INVESTIGATION OF SMALLHOLDER FOOD VALUE CHAINS: EVIDENCE FROM EASTERN CAPE AND KWAZULU-NATAL PROVINCES

Report to the
Water Research Commission

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EXECUTIVE SUMMARY

South African agriculture is characterised by a dual economy, with large-scale commercial farmers dominating the current food value chains and emerging farmers (otherwise termed smallholder farmers) being faced by a range of constraints, which prevent them from participating effectively in these same value chains. Water plays a key role in agriculture, not only for irrigated activities but also for rain-fed cropping and livestock production. The purpose of the current research project was to develop a better understanding of the environment in which emerging farmers operate, and their goals and aspirations for entering food value chains, as well as to ascertain the value chains in which they either currently participate, or could potentially participate. The research project aimed to analyse a number of key irrigated and rain-fed food value chains, with specific attention to water use, in order to identify mechanisms allowing subsistence and emerging farmers to participate in the mainstream economy, and to understand the current lack of participation. In addition, the study was expected to generate knowledge on the role of water in rural communities, and how it could be better (more efficiently) managed and shared.

The major objective of the study was "to analyse the economic benefits of water use in rain-fed and irrigated agricultural food value chains towards integrating subsistence and emerging farmers in the mainstream of the economy". The sub-objectives of the project were:

1. To assess water allocation reform, land reform and water for economic growth and development strategies and expand the existing literature study on the role of water in the food value chain.
2. To identify, motivate for and select study sites in rain-fed and irrigated farming areas with reference to, amongst others: (1) Established areas where rain-fed and irrigated agriculture is a feasible activity; (2) Relation to land reform initiatives and established settlement models; (3) Alternative staple food crops and animal types; (4) Access to appropriate technology for irrigation and/or water harvesting and conservation.
3. To empirically investigate the aspirations and needs of human capital with reference to, amongst others: (1) Description and quantification of rural livelihoods; (2) Classification of farmers as subsistence, emerging or commercial; (3) Definition and explanation of goals of farmers in each category; (4) Investigation of expressed interests to enter informal and/or formal markets.
4. To identify, map and empirically investigate appropriate food value chains in relation to water as a production input and with reference to, amongst others: (1) Different market outlets for food crops, animals and animal products; (2) Different attributes of the markets in these value chains; (3) Different standards within these food value chains; (4) Different opportunities and constraints of entering these food value chains.
5. To analyse and describe collective and individual use of water resources for crop and animal production in relation to collective and individual marketing with reference to, amongst others: (1) Land and water resource use; (2) Production input acquisition; (3) Marketing within selected food value chains; (4) Alternative co-operative governance structures for input/product marketing; (5) Public-private partnerships for resource use and input/product marketing
6. To analyse and describe the existing support structures of physical and social capital within food value chains with reference to, amongst others: (1) Institutional arrangements including property rights, norms and values; (2) Social embeddedness including trust, loyalty and power relationships; (3) Mentorship and skills transfer; (4) Transport and marketing infrastructure; (5) Information to access markets.

The first task was a review of policies and legislation related to water use and land, as well as a review of relevant literature. The literature review provided some understanding of water use in agriculture, South African agriculture and various attempts to develop farmer typologies. It then went on to explore various frameworks of analysis (Sustainable Livelihoods Framework and Williamson's approach to social analysis) and key concepts (value chain analysis, social capital, human capital and social embeddedness, and collective action). The review allowed for a better understanding of the research findings and the implications for policy makers.

The Sustainable Livelihoods Framework, in particular the identification of five different forms of capital that impact on livelihoods, informed the design of the research project and the analysis of the findings. Data was collected using a combination of structured questionnaires, focus group discussions and key informant interviews. Three sites were identified for the purposes of the study: (1) Willowvale, Eastern Cape – which comprised the Ciko and Mbozi villages and two of their community projects, namely Foundation Community project and Ciko Santrini Project; (2) Marina Village, Eastern Cape – which focused on banana farmers in this area, who operated largely as individuals and engaged in a range of agricultural activities including livestock and homestead vegetable production; and (3) Mooi River Irrigation Scheme, KwaZulu-Natal, which is a smallholder irrigation scheme.

At Willowvale, an initial survey (82 households) was followed by a second household survey (100 households). At Marina, the study focused on banana growers being supported by Lima Rural Development Foundation in five villages within the Bizana Local Municipality. The household survey interviewed 33 banana farmers, while the more detailed value chain analysis considered 11 households. Interviews also took place with representatives of the commercial banana sector from southern KwaZulu-Natal to allow for a comparison of the sectors, as well as the identification of opportunities for integrating smallholders into the formal value chain. The third site was the Mooi River irrigation Scheme. The preliminary study involved 71 farmers from across the scheme, and was followed by the main household survey, where 307 farmers (scheme members and non-scheme members) were interviewed. In addition, weekly data was collected from 60 potato producing farmers over the period June-December 2013 to enhance the quantification and valuation of water use in smallholder crop production. An understanding of cattle and goat value chains was obtained by collecting information from 90 households from the area adjacent to the irrigation scheme.

The study explored factors impacting on available human capital. The first element was the description and quantification of rural livelihoods, which included an assessment of rural livelihoods at the three sites in terms of economic status and resource availability. This informed the classification of farmers. It became clear from the study that one cannot use a single label for all small-scale farmers in a particular area as there is variation in the assets they own, the extent to which they market their produce or use it at home, their scale of production, and the access that they have to off-farm sources of income for investment in agriculture. It is clear that both subsistence and smallholder producers exist but there is some blurring of the boundary between these two groups with some subsistence farmers engaging in opportunistic but limited marketing.

The goals and aspirations of farmers were considered as criteria used to classify farmers. For example, it is generally accepted that subsistence farmers are less marketing-oriented than smallholder producers (previously termed emerging farmers). Many farmers have multiple goals and produce for own use as well as selling surplus produce when a market presents itself. Some farmers, who would be classified as profit makers or business farmers, engaged in certain commodities with the objective of marketing them and generating income, but these were generally informal markets rather than formal outlets such as fresh produce markets or retail outlets.

A number of food value chains were explored at each of the study sites. At the Ciko and Foundation irrigation projects, two value chains were investigated, namely cabbage and maize production. Erratic supplies and lack of transport affected farmers' participation in competitive markets. All their produce was thus destined for the smaller markets that included hawkers, neighbours (local sales), and – to a lesser extent – fruit and vegetable shops and retail stores. The study at Marina focused on smallholder banana production. The study revealed that they ranged in scale from <0.1 ha to 1 ha per farmer. Smaller farmers generally used their bananas for home use, while those at the other end of the scale mainly produced bananas for the purpose of generating income. Most of the bananas are consumed by the local community, while some also reach consumers further afield when purchased by traders / hawkers who sell their produce in Port Edward or Bizana. Irrigation was uncommon and limited to manual watering, but mulching was fairly widely practiced and was also seen to improve soil fertility. Commercial and smallholder banana value chains were compared. The most obvious difference was the access to irrigation that characterised most commercial farmers in southern KZN. The commercial farmers had a wider range of marketing options. They could either market via a structure called the KZNBC, which negotiated with retailers and/or municipal markets on their behalf, or they could supply directly to these markets since they generally had access to transport and had sufficient volumes to justify this cost. In addition, commercial farmers could also supply to traders and hawkers or sell a portion of their crop at the roadside to passers-by (farm gate sales). The farm-gate sales competed directly with the larger smallholder producers. The study concluded that while the smallholder value chain is able to absorb their bananas and little wastage is encountered, this is probably the best route. However, it appears that the smallholder system does not allow for much expansion of production.

Farmers at the MRIS were found to produce a variety of crops at the scheme to meet their household needs. The preliminary value chain analysis focused on three commodities, namely maize, cabbage and tomatoes, which were the dominant crops grown in MRIS. A detailed analysis of the potato value chain at MRIS was subsequently conducted. Potato production in MRIS started in 2011 through a government initiative to support smallholder farmers to grow high value crops. Profitability of production decreases from the head section of the scheme towards the tail-end section of the scheme, as water availability becomes less reliable. The smallholder potato value chain is short and mainly dominated by two informal markets, namely the local community and the informal bakkie traders. The data collection procedure also allowed for an evaluation of the effectiveness with which farmers at MRIS were using irrigation water. The influence of plot location along the main canal structure on water access is highlighted. The results show that the actual water applied to the crop gradually decreases from the head/upper section to the tail-end section. This calls for improvement in local water management systems and fair allocation of irrigation water resources.

Generally value chains were very short. There was almost no value adding or processing encountered. Overall, very little use was made of formal markets such as fresh produce markets. Generally they were not accessible and the farmers could not compete with large-scale producers. Sometimes farmers' products were not of a standard that allowed them to supply higher paying markets, but even hawkers raised the issue of poor grading of produce during interviews.

The extent to which small-scale farmers engage in collective or individual action to access or utilise land and water resources, acquire inputs (including access to machinery and labour) and market their produce was found to be highly variable. Arable land is traditionally individually accessed, being allocated to individual households, but there were indications that under some circumstances it was easier to access land if individuals formed a group as this was seen as potentially beneficial to more people within the community. Grazing land is a communal access resource available for the use of all livestock owners. There are some local rules controlling land use – though the extent to which these were enforced was variable and had generally declined. Collective use of tracts of land was largely restricted to projects. The situation of water access and use also showed variation in terms of collective and individual action. Generally water was a communal resource available to any community members – whether it was in rivers or taps supplied by municipalities. Equipment for accessing water was generally accessed and owned by groups rather than individuals. The study encountered some cases of labour sharing but this usually led to some form of remuneration by the person whose land was being weeded, harvested, etc. Truly collective action was only encountered within the projects where members collectively farmed the land and collectively engaged in various farming activities. A number of groups had formed because they recognised that it was a requirement for accessing funding through government. An investigation of funding conditions of various spheres of government reinforced that this was a requirement for most of their programmes. The extent to which the members of these groups engaged in collective and individual action was also variable. Some members collectively used a portion of a land. In this case most of their activities were undertaken collectively. In other cases members individually farmed on sub-plots within the project area but engaged in some level of collective action – either jointly acquiring inputs or hiring equipment or marketing their produce. Some of the organisational arrangements had changed over time as the members encountered challenges of unequal participation of members in collective activities. Some of the small-scale farmers interviewed stressed that the costs of collective action outweighed the benefits and therefore they preferred to operate individually. The best example of collective action was displayed by the commercial banana producers, but this highlighted the supportive environment and capacity that is needed to ensure that the collective action indeed yields the anticipated benefits.

Some of the challenges that limited effective collective action among communal smallholder farmers included weakened traditional institutions, loss of social capital and lack of organisational capacity. Together, they resulted in poor cooperation between producers. Lastly, strengthening small-scale production and integrating producers into the mainstream economy calls for collective action involving multiple stakeholders. Multi-stakeholder innovation platforms are one mechanism that has recently been recognised as an effective way of ensuring that different stakeholders engage effectively to solve the challenges of small-scale farmers. This also addresses the need for improved coordination of stakeholders and improved clarity of roles and responsibilities.

The social capital available to, or impacting on, smallholder value chains, was considered in terms of traditional leadership, organisations supporting smallholders (government and NGOs) and governance of local structures such as committees. It was found that traditional leadership structures played a key role – manly in land allocation procedures and conflict resolution. Relationships with other actors also ensured access to resources and support. Such actors included provincial and local government. In some cases there was apparent confusion over the division of roles and responsibilities of government departments. Skills transfer and capacity building was found to take place either through experiential learning, knowledge sharing between farmers or through training and mentorship initiatives by various stakeholders. Most organisations working with farmers required that they form some sort of structure to facilitate training and support. In some cases support was only provided where farmers actually produced collectively (e.g. the projects at WIllowvale), while other support organisations only required that farmers participate in some sort of organization or commodity groups (as with the banana commodity group supported by Lima). As many farmers operate in groups, the internal environment of these groups, in terms of trust and commitment of the members, was an important aspect of social capital. Where trust had eroded, groups were generally not functional. One key aspect that affected the functioning of groups was the level of governance and leadership of the decision-making body, often a committee. The effective management of an irrigation scheme of this nature requires compliance with rules imposed by the scheme and block committees – not only for operating the scheme but also for cleaning and maintaining it. This same issue was found to affect the functioning of many of the smaller groups encountered through the study. Embeddedness within the local social environment was found to be at two levels – either it was because farmers participated in other formal and informal structures such as savings clubs or church groups which created ties with the broader community or it involved personal relationships that farmers had with other members of the local community. A qualitative application of New Institutional Economics, which speaks specifically to social embeddedness, the institutional environment and governance structures, was applied to the findings of the study to allow for an assessment of the transactions through this lens. In particular this provided an understanding of the nature of the transactions that farmers engage in, which are largely spot markets characterised by short-term relationships and opportunism.

The investigation of physical capital considered infrastructure as well as equipment. The exploration of physical capital highlighted the linkages with both human and social capital: not just skills for operating and maintaining equipment, but solid institutional arrangements and networks to ensure access to, and effective sharing of, equipment. Transport and marketing infrastructure included the roads and infrastructure for necessary for marketing produce. Road infrastructure at all three sites was problematic. Poor road access meant that it was sometimes impossible for traders to access gardens / fields to collect produce, especially during wet weather. The wear and tear on vehicles meant that people hiring out bakkies charged more for their services and bakkie traders also built the wear and tear into the prices they were willing to pay. There was a general lack of storage, packing and marketing facilities, and this also impacted negatively on smallholder enterprises. All farmers faced challenges during the production of their crops, and those that managed to grow high quality produce then faced the bigger challenge of being able to market it effectively. Collective behaviour was sometimes a means of overcoming this, highlighting the linkages between social and physical capital.

The discussion about agricultural infrastructure focused mainly on fencing and irrigation. None of the farmers encountered at MRIS or WIllowvale exercised objective irrigation scheduling methods. They used a combination of plant observation (i.e. signs of wilting or distress), soil observation and a method of feeling the soil to assess how moist / dry it was in order to determine when there was a need to apply water to crops. At MRIS, irrigation took place when water was available – or when it was permitted – rather than being based on plant requirements. The importance of fencing to prevent livestock damage of crops was frequently cited at the different sites. Maintenance of agricultural infrastructure is a more widely experienced challenge. At MRIS, leaks in the canals were frequently cited as a challenge. Beyond the need for maintenance of the canals and dams at MRIS, the general lack of compliance with the irrigation scheduling roster and the weak regulatory framework resulted in inequitable water supply. The discussion about agricultural infrastructure highlighted the need to consider social and human capital. Maintenance of equipment requires some level of skills and availability of labour (human capital), but the effective operation of the infrastructure relies on strong social capital. Lack of access to market information was cited as a problem by the farmers at all three sites. To some extent this can be addressed by physical support structures (e.g. mobile phones), but it also requires relationships to be established with organisations or individuals (including fellow farmers) that are able to provide such information.

In conclusion, the consideration of the different forms of capital available to smallholders showed that their participation in the mainstream economy is limited by a range of different factors. These include a lack of physical capital (infrastructure as well as machinery), a lack of human capital (skills and ability to do work) and a lack of social capital (especially in the case of activities such as irrigation schemes that require coordination and compliance if they are to be successful). In many cases, there are strong linkages between different forms of capital. For example, linkages with markets constitute a form of social capital, but without good roads to allow for the transportation of produce (physical capital), these linkages soon break down. Furthermore, the ability to engage with markets and negotiate prices requires human capital. Underlying all of this is the need for access to natural capital – especially water and land. However, even with land and water, the success of farmers is undermined if the access to the water is affected by a lack of social capital.

Human capital deficits related to skills and knowledge as well as the ability to do work, should be addressed. Specific skills gaps, such as irrigation water management and business skills, should be addressed appropriately. In general, agricultural development programmes need to recognise the value of the existing human capital as well as its limitations. Interventions should be varied to suit people's objectives, available resources and aspirations, with the understanding that in communal areas, households adopt diverse livelihood strategies and have multiple objectives with regard to their farming activities. While farmers may strive to be more market oriented, the importance of meeting household food needs simultaneously should not be underestimated. Classifying farmers and their activities according to typologies allows organisations working with farmers to develop programmes that are suited to their objectives and resources.

Water was a key input in all the value chains encountered. In livestock, water use was largely restricted to drinking water, but was frequently highlighted as a limiting factor, especially in the Msinga area. Here the irrigation canal not only supported vegetable and crop production but also provided a water source for livestock. For the Willowvale and MRIS sites, irrigation water was a key input for the production of the various crops. The farmers were very aware of the role of water – and the challenges associated with the equitable provision of water. At Marina, where bananas were generally grown under dryland conditions, a number of small-scale producers highlighted the limitations of dryland production and some use of mulching was already being practised as a mechanism for retaining soil moisture. The commercial farmers in southern KZN stressed that dryland production of bananas was too risky and were largely in the process of converting to irrigated production.

The study clearly demonstrated a range of opportunities and constraints that small-scale farmers face when accessing various markets. As a result of a general shortage of resources for purchasing inputs coupled with a lack of technical skills and business acumen, many farmers are not able to participate in mainstream markets that have stringent standards (e.g. hygiene, traceability of produce, etc.). The lack of packing facilities, limited scale of production and the lack of access to transport are some factors that constrain the participation of small-scale farmers in mainstream value chains. Despite this, there are some value chains that small-scale farmers have effectively claimed, such as "green mealie" production. These are value chains where farmers have the skills necessary to produce a good quality product and where systems have developed that have allowed them to market their produce effectively. Perhaps it is important for small-scale farmers to find opportunities that do not require that they compete directly with large-scale commercial farmers.

The recommendations that have emerged from the study require consideration by policy makers as well as decision makers:

- Effective monitoring and evaluation (M&E) of government programmes is essential. This should include critical assessment of whether the intended benefits are being achieved.
- Provincial Department of Agriculture extension officials need to have a less technical, more socio-institutional approach to dealing with agricultural projects.
- Provincial DoA, and other organisations proving technical support to farmers, must consider the use of alternative extension methods, such as farmer-to-farmer sharing and farmer experimentation.
- Given that government supports the establishment of cooperatives, there is a need to support collective action outside of primary production.

- Programmes must consider the heterogeneity of smallholders in their design and implementation. Importantly, it must be recognized that most smallholder farmers rely on multiple income sources and often have multiple goals, as they produce both for own consumption and to generate revenue.
- In order to improve water use productivity, rainwater harvesting and conservation techniques should be promoted as alternatives to the conventional production practices that are currently supported.
- Since the data from smallholder communal irrigation schemes are particularly unreliable in terms of quantity of water used and the cost of capital, water metering should be introduced during the current revitalisation and rehabilitation programmes to address the concern of suboptimal use of water.
- Value-adding and marketing must be supported rather than retaining a focus on primary production.
- Poorly maintained road infrastructure has a strong negative impact on smallholder production, making it costly to acquire inputs as well as to market produce. Infrastructural development and maintenance should also include cell phone infrastructure, potable water for processing needs and the supply of electricity.
- Marketing ventures between farmers in the same area need to be coordinated to enable effective planning and cooperation in meeting their market's requirement for a consistent supply of produce.
- The provision of agro-processing infrastructure (such as equipment for grading produce and storage facilities) could make a significant impact on smallholder production (especially for vegetable production where none of the value-adding benefit accrues to the smallholders). Besides the supply of equipment and infrastructure, attention to regular maintenance and servicing, especially of irrigation equipment, is also essential.
- Systems that involve tractors owned and managed by government departments and municipalities, are notoriously ineffective and result in delays in land preparation. Therefore consideration should be given to alternative solutions, such as supporting private tractor owners so as to improve their service.
- Sometimes one factor (such as the poor access road at FCP in WIllowvale) results in the collapse of a project that had the potential to create employment and income generation opportunities. The Local Municipality needs to play a more active role in coordinating the services of the different government departments to ensure that such challenges are effectively addressed.
- In many cases there are a variety of different government departments supporting a particular project. Suitable forums should be established to facilitate interaction and communication between government departments and other key stakeholders.
- Smallholder farmers need to decide whether to continue within their current value chains and rely on selling to hawkers, traders and the local community, or whether to participate in the formal value chain. Critical decisions require the assistance of support agents who can compare the costs and benefits of making such changes. Similarly both government extension staff and NGO field staff need to work with farmers to determine the viability of different enterprises so that farmers have the necessary information to make meaningful decisions regarding crop mixes
- Effective linkages between smallholders and commercial farmers should be facilitated wherever possible by extension staff or other organisations supporting farmers.

Some challenges can be seen as composites, comprising both technical and socio-institutional aspects. The successful future of smallholder or emerging farmers lies in holistic and broad-based developmental approaches encompassing the whole cycle of production, storage and marketing of produce.

The outcomes of this research project have led to the identification of a number of research needs / gaps, which are presented below:

- Participatory action research to address some of the socio-institutional constraints faced by smallholder farmers would be useful. Pilot studies of possible solutions might be necessary.
- The physical capacity of the MRIS (and other such schemes) to meet farmers' needs should be investigated, so that the findings can be used to inform future planning for the scheme. It may be necessary to consider alternative crop mixes, or possibly the introduction of infield water harvesting and conservation measures to improve water use and crop production.
- The use of mobile phones to distribute information to farmers and facilitate collective action between farmers should be explored.
- The current policy environment appears to be supportive of smallholders. However, an assessment of government programmes aimed at supporting smallholders should be undertaken to determine the real impact of these interventions and the factors constraining them. This could feed back into policy development and planning. Opportunities to test the outcomes of policy implementation (such as DWA's support to small-scale irrigation farmers) should be identified through engagement with government officials.
- The process of registering smallholder irrigation projects / schemes as water users is a challenge, especially where it requires the integration of smallholders and commercial farmers. An investigation of successful cases should be undertaken so that lessons could be drawn from them to inform the process in other areas.
- Cooperatives are the structures chosen by government to develop smallholder farmers. A study of successful models from southern Africa should be undertaken to inform current programmes as most collective action is only undertaken to access funding and most cooperatives are not functioning optimally. Research should also consider alternative models for developmental activities in communal tenure areas.
- Water use in both rain-fed and irrigated farming systems should be explored in more detail to gain a better understanding of the volumes of water currently used and the possibilities of improving water use productivity. In addition, simple methods for measuring the efficiency of water use within irrigated farming systems should be developed.
- The use of principal component analysis to generate farmer typologies should be explored, as this methodology enables the aggregation of farmers with similar characteristics. A more detailed typology would allow for a clearer picture of the types of challenges faced by different categories of farmers. It might also be possible to identify the types of farmers most likely to engage in collective action.
- A better understanding of water use productivity is necessary in South Africa. One way of addressing this is to develop and test economic models for evaluating water use productivity in different production systems in South Africa, considering specifically food and nutrition security, labour requirements and broader landscape benefits (.e.g. water regulation, reducing pollution from agrochemicals and reduced erosion / sedimentation).
- The values of agricultural water vary significantly due to various factors. In order to achieve both social and economic efficiency, there is a need to generate better data and knowledge of demand behaviour by the season, region, climatic and technological conditions under which water is used. The data can then be used in economic models for evaluating water use productivity in different systems.
- It would be useful to obtain a better understanding of dietary diversity of rural communities and the costs of feeding households, as well as the direct contribution of current farming production to meeting household needs. This would allow for the quantification of potential household savings that could be achieved by substituting purchased foods with home-grown foods.
- Another aspect that requires additional research is the issue of security of tenure and the effect that lack of security is having on farmers' interest in participating in formal food value chains. This includes the situation where unfenced crop lands are allocated to a household and yet in winter become an open access resource that can be used by all livestock owners.

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The reference group responsible for this project consisted of the following people:

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AP: Anchor Project
ARDRI: Agriculture and Rural Development Research Institute
BDS: Business Development Services
BFA: Bizana Farmers' Association
CA: Collective action
CBO: Community based organisation
CDW: Community Development Workers
CGIAR: Consultative Group on International Agricultural Research
CIPC: Companies and Intellectual Property Commission
CIPRO: Companies and Intellectual Property Registration Office
CRDP: Comprehensive Rural Development Programme
CSF: Critical success factor
CSP: Ciko Santrini (Community) Project
CWP: Crop water productivity
DAFF: Department of Agriculture, Forestry and Fisheries
DLA: Department of Land Affairs
DoA: Department of Agriculture
DoSD: Department of Social Development
DRDLR: Department of Rural Development and Land Reform
DTI: Department of Trade and Industry
DWA: Department of Water Affairs (recent name change to Department of Water and Sanitation)
DWAF: Department of Water Affairs and Forestry
EC DoA: Eastern Cape Department of Agriculture
ECDC: Eastern Cape Development Corporation
FAO: Food and Agriculture Organisation
FCP: Foundation Community Project
FGD: focus group discussion
FPM: Fresh produce market
GLM: General Linear Model
HACOP: Hertzog Agricultural Cooperative
HDI: Historically Disadvantaged Individual
HEIP: High economic impact project
ICRA: International Centre for Development-oriented Research in Agriculture
IDP: Integrated Development Plan
IGP: Income generating project
INR: Institute of Natural Resources NPC
IRWH: In-field rainwater harvesting
IWMI: International Water Management Institute
KNBC: KwaZulu-Natal Banana Cooperative
KZN: KwaZulu-Natal
LAL: Learning about livelihoods
LRAD: Land Redistribution for Agricultural Development
LWP: Livestock water productivity
M&E: Monitoring and evaluation
MFPM: Municipal Fresh Produce Market
MRIS: Mooi River Irrigation Scheme
MWUA: Muden Water Users Association
NAMC: National Agricultural Marketing Council

NBA: Natal Banana Association
NGO: Non-governmental organisations
NIE: New institutional economics
NSM: Non-scheme member
NWA: National Water Act
NWRS: National Water Resource Strategy
OECD: Organisation for Economic Cooperation and Development
OPV: Open pollinated variety
PPP: Public-private partnership
PTO: Permission to occupy
RVM: Residual Value Method
SLF: Sustainable Livelihoods Framework
SMME: Small, medium and micro enterprises
TA: Traditional Authority
TFIS: Tugela Ferry Irrigation Scheme
UFH: University of Fort Hare
USAID: United States Agency for International Development
VCA: Value chain analysis
VIF: Variance Inflation Factors
VMP: Value marginal product
WAR: Water allocation reform
WGDF: Water for Growth and Development Framework
WMP: Water Management Plans
WRC: Water Research Commission
WUA: Water user association

1 INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

South African agriculture is characterised by a dual economy, with large-scale commercial farmers dominating the current food value chains and emerging farmers (otherwise termed smallholder farmers) being faced by a range of constraints, which prevent them from participating effectively in these same value chains. Secure access to land and other resources is a major primary determinant of rural incomes and welfare (Pratt and Knowles, 1993). It has been said that for poor smallholder farmers, secure access to water cannot be separated from secure access to land. Steps also need to be taken to understand and recognise land and water governance structures that already exist in some form at a local level (IFAD, 2006). The current study aimed to achieve a better understanding of the institutional environment within which subsistence and emerging farmers operate in South Africa.

Water plays a key role in agriculture, not only for irrigated activities but also for rain-fed cropping and livestock production. While attention has been given to the role of water in irrigated food value chains in the project "*An economic analysis of the contribution of water use to value chains in agriculture"* by Jordaan and Grové (2012), the role of water in rain-fed food value chains is not sufficiently well understood. This is an issue that is not limited to South Africa and the International Water Management Institute (IWMI), a non-profit scientific organisation funded by the Consultative Group on International Agricultural Research (CGIAR), also identified a need for a more integrated understanding of the water-food-livelihoods-environment relationship so as to reduce uncertainties about where to invest in order to address both human and environmental water needs (Comprehensive Assessment of Water Management in Agriculture, 2007).

The purpose of the current research project was to develop a better understanding of the environment in which emerging farmers operate, their goals and aspirations for entering food value chains, as well as the value chains in which they either currently participate, or could potentially participate. An analysis of food value chains was undertaken to understand, not only the challenges limiting entry of emerging farmers and the enablers that support their participation, but also the role of water as a production factor in the value chains. The research project aimed to analyse a number of key irrigated and rain-fed food value chains, with specific attention to water use, in order to identify mechanisms allowing subsistence and emerging farmers to participate in the mainstream economy, and to understand the lack of current participation. In addition, the study was expected to generate knowledge on the role of water in rural communities, and how it could be better (more efficiently) managed and shared.

At the onset of the project, it was anticipated that the results of the study would enabled subsistence and emerging farmers, as well as other stakeholders, to understand the food value chains in which they are participating in terms of both barriers to entry and opportunities that could be pursued. The study was also expected to provide decision makers with more accurate information on the institutional and physical environment in which farmers operate, the key value chains relevant to each study site, and the role that water plays in each value chain, particularly in relation to land and water reform policies.

1.2 PROBLEM STATEMENT

High poverty levels and increasing unemployment in rural areas have highlighted the need to promote rural economic development and it is a national priority to include subsistence and emerging farmers in the mainstream of the economy. The role of water in food value chains, with particular attention to irrigated agriculture, was investigated in Water Research Commission (WRC) research project K5/1779: *An economic analysis of the contribution of water use to value chains in agriculture* (Jordaan and Grové, 2012). This research identified a need to investigate the production of staple food crops in rain-fed agriculture.

Opportunities for rural development through agriculture exist. On the demand side there are consumers requiring food in different marketing outlets, while on the supply side there are a large number of rural inhabitants, who can potentially respond and enter any one, or a combination of several, value chains. Many factors, such as needs and aspirations, technical capabilities, risks of crop production, food price expectations, water use security and incentives to increase water productivity, will influence the selection of a value chain and the degree of success obtained. Therefore innovative ways must be explored through research to promote integration of subsistence, emerging and commercial farming in food value chains for crop and animal products in both rain-fed and irrigated agriculture. This project sought to understand the existing value chains used by subsistence and emerging smallholders and to identify opportunities to integrate them into the mainstream economy.

1.3 PROJECT OBJECTIVES

The main aim of the study was "to analyse economical beneficial water use in rain-fed and irrigated agricultural food value chains towards integrating subsistence and emerging farmers in the mainstream of the economy". This study focuses on deriving value from water utilisation and boosting the participation of emerging farmers in the mainstream economy, through efficient water usage and produce marketing.

The specific objectives of the project were:

1. To assess water allocation reform, land reform and water for economic growth and development strategies and to expand the existing literature study on the role of water in the food value chain.
2. To identify, motivate for and select study sites in rain-fed and irrigated farming areas with reference to amongst others: (1) Established areas where rain-fed and irrigated agriculture is a feasible activity; (2) Land reform initiatives and established settlement models; (3) Alternative staple food crops and animal types; (4) Access to appropriate technology for irrigation and/or water harvesting and conservation.
3. To investigate empirically the aspirations and needs of human capital with reference to, amongst others: (1) Description and quantification of rural livelihoods; (2) Classification of farmers as subsistence, emerging or commercial; (3) Definition and explanation of goals of farmers in each category; (4) Investigation of expressed interests to enter informal and/or formal markets.
4. To identify, map and empirically investigate appropriate food value chains in relation to water as a production input with reference to, amongst others: (1) Different market outlets of food crops, animals and animal products; (2) Different attributes of the markets in these value chains; (3) Different standards within these food value chains; (4) Different opportunities and constraints of entering these food value chains.
5. To analyse and describe collective and individual use of water resources for crop and animal production in relation to collective and individual marketing with reference to, amongst others: (1) Land and water resource use; (2) Production input acquisition; (3) Marketing within selected food value chains; (4) Alternative co-operative governance structures for input/product marketing; (5) Public-private partnerships for resource use and input/product marketing.

6. To analyse and describe the existing support structures of physical and social capital within food value chains with reference to, amongst others: (1) Institutional arrangements including property rights, norms and values; (2) Social embeddedness including trust, loyalty and power relationships; (3) Mentorship and skills transfer; (4) Transport and marketing infrastructure; (5) Information required to access markets.

1.4 STRUCTURE OF THE REPORT

This report is a compilation of the research findings from three sites over a five-year period from April 2009 to March 2014. The specific objectives of the project are each addressed by a chapter in the report. Following this introductory chapter, Chapter Two presents the outcomes of the review of relevant policies and literature. It explores the key concepts that are encountered in subsequent chapters. Chapter Three covers the research methodology and the process of selecting research sites.

Aspirations and needs of farmers, which relates closely to the availability of human capital, is addressed in Chapter Four, while Chapter Five explores various value chains encountered at the different research sites. Chapter Six looks at actions associated with resource access, input acquisition, and marketing in terms of collective or individual behaviour. This chapter also considers alternative cooperative governance and public-private partnerships. Chapter Seven covers support services and infrastructure, social and physical capital and impacts on smallholder production. The final chapter draws conclusions, makes policy recommendations and identifies areas for future research.

Within each chapter, findings from each of the sites are presented for each sub-objective and a synthesis of the findings across the three sites is then provided for each sub-objective. Each chapter closes with a summary and recommendations related to the specific objective.

2 REVIEW OF POLICIES AND THE LITERATURE

The first specific objective of the study was "to assess water allocation reform, land reform and water for economic growth and development strategies and to expand the existing literature study on the role of water in the food value chain". The first part of the chapter thus covers the policy and legislative environment that impacts on the capacity of emerging farmers to enter the mainstream economy. The focus of this section is water use and water use reform, but other key policies related to agricultural production have also been considered, especially land reform related policies and legislation. The second part of the chapter reviews the literature on water use in agriculture, as well as exploring various concepts and frameworks.

2.1 CRITICAL REVIEW OF EXISTING POLICIES, STRATEGIES AND LEGISLATION

2.1.1 South Africa's water policy and legislative environment

2.1.1.1 <u>White Paper on a National Water Policy for South Africa (1997)</u>

The White Paper (DWAF, 1997) outlines guidelines for the management of water, drafting of legislation and creation of programmes that will ultimately promote equity in access to, and benefit from, the country's water resources. Previous legislation excluded the majority of South Africans from access to water because access was linked to ownership of land. The second aspect that is given attention in the policy is the achievement of long-term, environmentally sustainable social and economic benefits for society, and thus the environmental reserve is also recognised, along with the supply of water to meet basic human needs. The White Paper also covers licensing procedures and water pricing policy. The intention is to charge for all water resource use except for water use to meet basic human needs. Furthermore the White Paper states that disadvantaged communities will receive support, which may relate to subsidising the water charges.

The White Paper states that "The need for the review of South African water law and for a fundamental change in our approach to water management is underpinned by the Constitution, both in relation to the creation of a more just and equitable society and, in relation to the broad need for more appropriate and sustainable use of our scarce natural resources, driven by the duty to achieve the right of access to sufficient water." Water allocation reform (WAR) involves the re-allocation of water between users and/or sectors to address equity needs and beneficial use, and to ensure socio-economic stability and growth. WAR in South Africa, while founded on sound water resources management approaches, is profoundly a social, political, economic and legal process. The major thrust of water allocation reform in South Africa includes taking proactive steps to meet water needs of historically disadvantaged individuals, sustainable use of water resources and promoting the beneficial use of water in the public interest. These actions are spear-headed by the Department of Water Affairs and Forestry (DWAF), with support from various government departments, water user associations, catchment forums, Non-Government Organisations (NGOs), Community Based Organisations (CBOs) and civil society.

The WAR framework in South Africa summarises broader objectives and strategies aimed at achieving equity, sustainability and efficiency in water use by recognising the gaps and inefficiencies in distribution and utilisation of water among the different stakeholders. It is important to note that South Africa's framework on WAR forms part of the government's strategies towards poverty eradication and economic development. The government of South Africa believes that inequalities still exist in the country where disproportionate use of water along race and gender lines is worsened by a lack of capacity of historically disadvantaged individuals (HDIs) and the poor to participate equitably in water resource management (DWAF, 2006). Active farmer participation in WAR is very critical to ensure sustainable use of water resources as well as beneficial and efficient use of water in the public interest. The guiding principles for effective WAR in South Africa were proposed by DWAF in 2006 and these include:

- Introduction of mechanisms to reduce the administrative burden associated with water authorisation without compromising its productive uses
- Fair, reasonable and consistent manner of water reform that does not curtail existing lawful uses of water
- Capacity building, especially of HDIs to ensure their participation and also to promote responsible water use
- Ensure that WAR contributes to the broad-based black economic empowerment as well as facilitating gender balances in water related enterprises
- Redress the past imbalances in water allocations to the historically disadvantaged individuals by giving the poor and the less privileged priority in water allocation (also considering the issue of gender imbalances)
- Ensure that the process responds to local, provincial and national planning initiatives
- Give consideration to the issue of water quality, especially where impacts may result from the re-allocation process
- Ensure compliance with South Africa's National Water Act (Act 36 of 1998) that seeks to achieve both developmental and environmental objectives, undertaken in a phased approach.

Whilst an array of broad WAR objectives are ideal for an economy such as South Africa, where diversity exists in terms of scale of water usage, efficiency and the contribution of each strategy towards rural livelihood, retaining a focus on the overall outcome of the reform process remains critical. Based on several approaches for WAR that include the use of marginal cost pricing of water, public allocation, water markets and user-based allocation mechanisms, it is the responsibility of policy-makers to apply instruments that do not cause social and economic damage to the people. South Africa follows a public inter-sectoral water allocation mechanism to ensure equity, efficiency and sustainability. This is based on the principle that "the government is the custodian of the nation's water resources, and has ultimate responsibility for, and authority over, water resource management, the equitable allocation and use of water, the transfer of water between catchments and international water matters" (DWAF, 2006).

The need to address gender imbalances in water allocation

There are examples from all over Africa of women being in a compromised position when accessing water. In Kenya, it is necessary for people to dig wells in river beds in the dry season in order to access water for livestock and for domestic purposes. This is a very labour intensive task and women-headed households rely on the goodwill of well owners as they are not able to construct their own wells. In addition, livestock can empty the well and women must then wait long periods for the well to recharge.

A women's group in the area used savings generated from the sale of crafts to hire labour to dig and line two wells. This innovative behaviour led to a change in local practices where women now owned wells and men were willing to dig on behalf of women's groups as a means of earning income. This is an example of how local innovation among women helped them to solve a challenge that they were experiencing.

Source: Lemunyete (2003)

The DWAF Water Allocation Reform Strategy (2006) sets national targets for ensuring that the existing imbalances are addressed. For example, by 2024, 60% of allocatable water should be allocated to black people, and 50% should be allocated to women. The strategy outlines some of the short-, medium- and long-term mechanisms to be used to achieve this (e.g. set-asides, general authorisations, compulsory licensing, etc.).

2.1.1.2 The National Water Act (1998)

South Africa's National Water Act (NWA) (Act 36 of 1998) is founded on the principle that the National Government has the overall responsibility for, and authority over, water resource management, including the equitable allocation and beneficial use of water in the public interest. On the basis of this, a person is only entitled to use water if the use is permissible under the Act.

The NWA covers the following matters:

- Water management strategies at a national and catchment level
- Protection of water resources (including reserve determination and pollution precautions)
- Use of water resources (including the issue of licenses and authorisations)
- The establishment of institutions / structures such as water user associations, catchment management agencies and advisory committees
- International water management
- Monitoring of water resources and availability of information related to water resources
- General powers and duties of the authorities, offences and remedies, appeals and dispute resolution and the Water Tribunal.
- Operation of government water works and the issue of safety of dams.

The National Water Act is broadly divided into five distinct schedules (Schedules 1-5). The schedules that most directly affect small holder communal farmers are schedules 1 and 5. Schedule 1 (Permissible use of water) covers the matter of people's rights to use water for domestic purposes, homestead gardens and livestock watering, as well as their right to harvest and store water, and use it for emergencies (e.g. fires). The schedule also addresses people's rights to discharge run-off water or water containing waste into certain structures.

Schedule 5 (Model constitution of water user associations) covers the constitution and functioning of a water user association (WUA). The principal function of a WUA is to perform various water-related duties in their area, which include the following:

- Preventing water from any water resource being wasted and exercising general supervision over water resources
- Protecting water resources, preventing any unlawful water use and preventing any unlawful act likely to reduce the quality of water in any water resource
- Arranging for the removal of any obstruction unlawfully placed in a watercourse and regulating the flow of any watercourse by clearing its channel, reducing the risk of damage to the land in the event of floods and changing a watercourse back to its previous course where it has been altered through natural causes
- Investigating and recording the quantity of water at different levels of flow in a watercourse, the times when, and the places where, water may be used by any person entitled to use water from a water resource

- Constructing, purchasing or otherwise acquiring, controlling, operating and maintaining waterworks considered to be necessary for draining land and supplying water to land for irrigation or other purposes
- Supervising and regulating the distribution and use of water from a water resource according to the relevant water use entitlements, by erecting and maintaining devices for measuring and dividing or controlling the diversion of the flow of water.

The major challenge to date is compliance with the NWA of South Africa by the respective stakeholders, especially the users. Whilst it is mandatory for all commercial water users to be registered and to be affiliated to a WUA, many users still operate independently making regulation of the whole water sector a challenge.

2.1.1.3 National Water Policy Review (2013)

The National Water Policy Review documents policy positions based on four policy documents namely the White Paper on Water Supply and Sanitation (1994), White Paper on a National Water Policy for South Africa (1997), White Paper on Basic Household Sanitation (2001) and the Strategic Framework for Water Services (2003) (DWA, 2013a). One key aspect that the document addresses is "water for equitable use". The aspect of most relevance to the current study is the position that "the allocation and use of water must support the reduction of poverty and inequality across the country and that the water needs of poor communities are met and protected to support the development of sustainable livelihoods." Another element that receives attention in the review is that of the Multiple Water Use approach in planning infrastructure. This approach incorporates the needs of all water users when bulk infrastructure is being planned.

2.1.1.4 National Water Resource Strategy (2004, and revised 2013)

The National Water Resource Strategy (NWRS) is a legislative requirement of the National Water Act (DWAF, 2004a). The central objective of managing water resources is to ensure that water is used to support equitable and sustainable social and economic transformation and development. Five yearly reviews will provide the opportunity to re-evaluate developments in the social and economic environments and to adapt approaches to water resources management to suit changing circumstances and needs. The first edition of the strategy, which was released in 2004, covered five main areas:

- Water policy and water law
- South Africa's water situation and strategies to balance supply and demand
- Strategies for water resources management (including protection and use of water resources, water demand management, water pricing mechanisms, water management institutions as well as monitoring and information management)
- Complementary strategies
    - Capacity building in the water sector
    - Public consultation, education and awareness creation
    - Water research (commissioned and coordinated by the WRC)
- National planning and co-ordination, and international co-operation in water management.

The second edition of the NWRS was published in 2013 and sets out mechanisms to achieve the core objectives. It is anticipated that water will support development, eliminate poverty and inequality, and contribute to job creation. It is also recognised that water must be protected, used, developed, conserved, managed and controlled sustainably and equitably. The vision in the strategy is "Sustainable, equitable and secure water for a better life and environment for all" (DWA, 2013).

The strategy refers specifically to mechanisms foreseen to improve efficiency of water use for irrigation, for example highlighting the need to improve scheduling of irrigation. Mention is also made of the development of Water Management Plans (WMPs) by Water User Associations (WUAs). The Department of Water Affairs (DWA) has initiated the development of WMPs by irrigation schemes as a means of reducing water losses – the state of disrepair of many of the schemes is clearly recognised (DWA, 2013).

Institutional arrangements for improved management of the country's water resources are given attention in the strategy. One of the strategic areas highlighted is the support of resource-poor farmers and transformation of the irrigated agriculture sector. Regulation of the sector is also covered, which includes Catchment Management Agencies and Forums and, at the lowest level, WUAs. The latter are said to have three core functional areas, (1) pooled resources and mutual benefits, (2) delegated powers and duties and implementing agent and (3) Integrated Water Resources Management / representivity and transformation (DWA 2013).

2.1.1.5 Water for Growth and Development Framework (2009)

Water scarcity and increasing demand for water has led to the government, through DWAF, looking for ways to ensure maximum beneficial utilisation of water in the country. The Department of Water Affairs and Forestry (DWAF) developed the Water for Growth and Development Framework (WGDF) to guide actions and decisions in order to ensure that water availability supports economic growth and social development, while not compromising the ecological sustainability of the resource. It should be noted that in term of the framework, the phrase "water for development" refers to the critical role of water in poverty alleviation and people's constitutional right to have reliable access to safe drinking water. The WGDF recognises the relationship between water availability and the many forms of economic activity that depend on available water supply of specific levels of quality. The Department also recognises that the country's economic growth targets cannot be achieved at the expense of the ecological sustainability of water resources or meeting people's human needs (DWAF, 2009).

The WGDF considers the current status of water demand across the different sectors (domestic, agriculture, mining, energy, forestry, environment and recreation), highlights various risks and challenges to the sector (including climate change) and a number of current interventions to address these. It also discusses a range of issues under a section called 'Choices and options, which includes balancing supply and demand, achieving water security, water conservation and demand management, water governance and various strategic plans.

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A number of recommendations have emerged from the framework, namely: (1) strengthen institutional capacity, (2) mainstream water, (3) diversify the water mix, (4) promote water conservation and water demand management, (5) promote and maintain water quality, (6) address service backlogs (water for development), (7) change water use behaviour for the future (water for growth) and (8) nurture attitudinal and behavioural changes towards the value of water.

The framework makes reference to the Department of Agriculture's Irrigation Development Strategy which foresees 600 000 ha of additional land being put under irrigation as a result of water-loss savings and improved water use efficiency. Another matter of direct relevance to the agricultural sector is that of economic instruments that have been introduced to regulate water use. For example, the raw water pricing strategy which will see levies being charged on raw water. Currently resource-poor farmers are excluded from some of the levies that have been put in place. It is also anticipated that water demand will be reduced through the introduction of improved irrigation technology.

“Water for growth” refers to water for economic growth. One of the sectors referred to in the WGDF is the agricultural sector. Recommendations are made for commercial agriculture, household & community level and groundwater. In terms of household or community level water use, water harvesting technologies as well as the inclusion of food plots in irrigation schemes in former homelands are recommended. Also of importance is the recommendation that areas previously under irrigation and producing high value crops be re-established.

2.1.1.6 Financial Assistance to Resource Poor Irrigation Farmers (2004)

DWAF developed a policy on Financial Assistance to Resource-poor Irrigation Farmers in 2004. The National Water Act makes provision for financial support to be made available by the Minister in support of social and economic development. The policy aims to promote such development as well as increasing the sustainability of the various water management institutions (DWAF, 2004). A number of mechanisms have been identified to promote rural development, including:

- Interventions to achieve empowerment, family food security and poverty
- Interventions to achieve institutional, social and economic sustainability (i.e. strengthening institutions such as WUAs)
- Establishment of civil society partnerships (with investors, commercial farmers, etc.).

Applications for financial support to be provided by DWAF can be submitted to the Coordinating Committees on Agricultural Water, which then pass them on to Head Office. The different forms of support catered for through the policy include:

- Capital costs for construction and upgrading of irrigation infrastructure
- Grants to cover operations and maintenance of waterworks
- Grants to cover the acquisition of water entitlements
- Grants to cover viability studies
- Grants for training of WUA management committees
- Grants for the purchase of rainwater tanks for individual households.

In 2007, the DWAF published the Regulations on Financial Assistance to Resource Poor Farmers (No. R 1036 Government Gazette No 30427), the purpose of which was “to provide for the granting of financial assistance to resource poor farmers in support of agricultural water use development.” The document indicates that individuals must submit applications for financial support via the DWAF regional offices.

2.1.1.7 DWA Strategic Plan for the fiscal years 2013/14 to 2017/18

This five-year plan for the DWA, prepared in 2013, outlines four strategic outcome-oriented goals, namely:

1. An efficient, effective and development oriented sector leader
2. Equitable and sustainable provisioning of raw water
3. Provision of equitable and sustainable water services of acceptable quantity and quality
4. Protection of freshwater ecosystems.

The strategic objectives of the second goal (Equitable and sustainable provisioning of raw water) include:

- Ensure the availability of / access to water supply for environmental and socioeconomic use

- Improve equity and efficiency in water allocation (*Improve equity in water allocation to ensure water availability for socio-economic development, to redress imbalances of the past, to facilitate efficient management of water resources and to protect resource quality*)
- Strengthen and implement strategies for water management in the country
- Improve water use efficiency.

This has direct relevance to the current study. While there is no direct reference to the policy for financial assistance to resource-poor irrigation farmers, there is reference made to financial assistance having been provided to 750 resource poor farmers in 2012/13, as well as 7000 rainwater harvesting tanks having been distributed (DWA, 2013b). The extent to which individual farmers or groups have been able to access irrigation infrastructure or other related support is not clear.

2.1.2 Other key policies and legislation relevant for food value chains

2.1.2.1 Land reform policy and legislation

South African agriculture is dualistic in nature, where a highly-developed and generally large-scale commercial sector on privately-owned land, co-exists with large numbers of small-scale and mainly subsistence-oriented black farmers on communally-held land (Lahiff, 2007). The process of economic empowerment in South African agriculture requires improved access to land and the vesting of secure tenure rights in people and to areas where these do not exist.

The White Paper on South African Land Policy (DLA, 1997), published by the Department of Land Affairs (DLA) in 1997, built on the Reconstruction and Development Programme and an extensive programme of public consultation and commissioned research. This sought to elaborate on the economic arguments for land reform and the link to poverty alleviation. However, most references to poverty in the White Paper are little more than unsupported assertions – such as that 'Land reform can make a significant contribution to the alleviation of poverty and injustice caused by past apartheid policies (Lahiff, 2007). From a poverty and economic perspective, the most important arguments for land reform deal with household food security, expansion of smallholder agriculture and job creation.

The Green Paper on Land Reform (2011), prepared by the Department of Rural Development and Land Reform, highlights the underlying need to restore land to rural communities and proposes mechanisms to ensure that the national targets will be reached.

South Africa's land reform process is divided into three categories namely: land redistribution, land restitution and land tenure reform, as is evident from the Land Redistribution policies (1997/1998) and the Restitution of Land Rights Act (Act 22 of 1994) and the Restitution of Land Rights Act Amendment (Act 48 of 2003). Land redistribution entails making land available to the landless and the poor for agricultural production, settlement and non-agricultural enterprises. This is supported by the programme called Land Redistribution for Agricultural Development (LRAD). The LRAD Programme has been designed to expand the range of support to strengthen the philosophy of a market-assisted land redistribution programme and speed up delivery of land to the landless in South Africa. International experience has shown that market-based programmes of state-directed land redistribution tend to perform better than programmes that are operated exclusively by the public sector (NDA, 2008). Land restitution is the land reform component that ensures that land is given back to its owners who were dispossessed during the apartheid era, as facilitated by the land claims court. The land tenure reform on the other hand has involved the introduction of various laws to give people security of tenure over houses that they live in and land that they utilise for agriculture-related purposes. One of the key pieces of legislation relating to land tenure reform is the Land Reform Act (Act 3 of 1996), which protects the rights of labour tenants who live and grow crops or graze livestock on farms. According to this legislation they cannot be evicted without an order from the court nor if they are over 65 years. Another key act is the Extension of Security of Tenure Act (Act 62 of 1997), which protects the tenure of farm workers and people living in rural areas, including their rights to live on the land and the guidelines for other rights such as receiving visitors, access to water, health, education, etc.

It is important to note that although land reform is the critical point of departure in ensuring broad-based participation in the agricultural mainstream, a number of support services need to be addressed simultaneously to ensure a successful and sustainable programme. The departmental post-settlement schemes for farmers must be strengthened, through the introduction and steady roll-out of a mentorship programme (ECDC, 2008). Post-settlement support requires better coordination primarily between the Departments of Agriculture, Social Development and Land Affairs, between national and provincial governments, and with local authorities and farmers' organisations and the agribusiness sector. A needs assessment to establish farmer requirements in terms of access to support services needs to be conducted, and the geographic areas and service categories where their needs are the greatest also need to be targeted for preferential support service provision.

The communal land tenure system poses a challenge of a different nature. Communal ownership of the grazing land interferes with proper planning processes which are seen by some parties to exacerbate environmental degradation and soil erosion (ECDC, 2008). In addition, large areas of arable lands are lying fallow in many communal areas, which is said to be mainly because of ineffective land administration policies. It has been suggested that the Department of Land Affairs (DLA) should engage the local authorities to pass by-laws that will allow for the mobilisation of underutilised land for food security purposes. In an attempt to improve security of tenure of people living in communal areas, the Communal Land Rights Act (Act 11 of 2004) was passed. However, this Act was struck down by the Constitutional Court in 2010 primarily on the basis of a faulty process, but most concerns raised by organisations such as the Association for Rural Advancement and the Institute for Poverty, Land and Agrarian Studies were that it put communal land under the control of unelected traditional councils and was therefore unconstitutional (Mnisi, 2010).

2.1.2.2 Strategic Plan for South African Agriculture (2001)

The objectives of the Strategic Plan for the Agricultural Sector, which was drawn up in 2001 through a consultative process led by the National Department of Agriculture, were to: (1) Create a common vision for key stakeholders; (2) Design and implement a strategic framework to guide policy and implementation in the future; (3) Address issues undermining investor confidence and the building of better understanding and good social relations; (4) Ensure increased access and participation in the sector through well-designed empowerment processes and programmes; (5) Combine, share and optimise the resources and benefits among the partners; (6) Foster global competitiveness, growth and profitability in the sector in order to attract new investment; (7) Ensure sustainable development and (8) Build lasting partnerships among public, private and community stakeholders and NGOs.

In the plan, the vision for the agricultural sector is stated as “A united and prosperous agricultural sector”, which implies sustained profitable participation of all stakeholders in the South African agricultural economy while addressing the historical legacies that have resulted in skewed access to land and representation in the sector. In support of the vision the following strategic goal was set: "To generate equitable access and participation in a globally competitive, profitable and sustainable agricultural sector contributing to a better life for all." The document identifies a number of key challenges facing the agricultural sector namely:

- Constrained global competitiveness and low profitability

- Skewed participation
- Low investor confidence in agriculture
- Inadequate, ineffective and inefficient support and delivery systems
- Poor and unsustainable management of natural resources.

The three core strategies highlighted in the Strategic Plan are: (1) Equitable access and participation, which includes land reform and provision of support services; (2) Global competitiveness and profitability and (3) Sustainable resource management. In addition, a number of essential supporting and enabling strategies have been identified, which include good governance, integrated and sustainable rural development, knowledge and innovation, international cooperation and safety and security. A number of priority programmes are also listed in the Strategic Plan:

- Implementation of the safety and security strategy to bring rural stability and confidence
- Improved governance and implementation of partnerships and a mentorship programme
- Fast track the programme of LRAD
- Transform the system of agricultural technology development and transfer towards being more market responsive
- Establish a broadly accessible market information system (information systems, economic analysis capacity in each province)
- Develop and operationalise an effective risk management system (plant and animal health system, natural disasters, credit guarantees)
- Ensuring fair competition – locally and internationally
- Implementation of the shared vision on labour and land reform
- Process of empowerment in all sectors of the agri-food sector. In this process mentorship programmes are critical and will be established immediately with full government support
- Targeted investment to enhance competitiveness (infrastructure: water, electricity, telecommunications, rail, air, road; financial services; training; mechanisation)
- Lowering the overall cost of production, including a further reduction in the taxes and duties on diesel and other inputs.

Many commercial farmers are resorting to measures such as diversification and intensification as ways to address declining profit margins (NDA, 2008). The changing nature of farming also means that there is an implicit entry barrier for many potential new entrants to farming. Lack of infrastructure in the former homeland areas is a major challenge affecting smallholder agriculture, which makes these areas uncompetitive where modern farming has changed as a result of economic pressures. Although several roles are earmarked for the Government in the access and participation strategy, it is important to note that the private sector (i.e. agribusinesses, farmers, cooperatives, farmer organisations, etc.) has a much more important role to play in fostering empowerment and participation.

The latest Strategic Plan for the period 2012/13-2016/17 developed by the Department of Agriculture, Forestry and Fisheries (DAFF, 2012), highlights priority areas and strategic goals that fall under 6 key programmes. According to the Strategic Plan, the 6 programmes are:

- Administration
- Agricultural Production, Health and Food Safety
- Food Security and Agrarian Reform
- Economic Development, Trade and Marketing
- Forestry and Natural Resources Management

- Fisheries Management.

The strategic goals of particular relevance to this study include:

- Strategic goal 1: Increased profitable production of food, fibre and timber products by all categories of producers
- Strategic Goal 4: A transformed and united sector (which refers specifically to smallholder and subsistence producers accessing financial services).

2.1.2.3 Review of the 2001 Strategic Plan for South African Agriculture (2008)

In 2007, the Minister of Agriculture and Land Affairs, together with other signatories, commissioned a review of the implementation of the 2001 Strategic Plan for Agriculture. Given that the initial review was not accepted due to the selection of stakeholders to interview, a task team was set up in 2008 by the Minister to produce a balanced report that represented the views of various stakeholders as well as some that were seen to be specifically required.

Some of the key findings from the review are included in this report. Firstly, national food security was identified as being a priority for the country. Progress in the sector was measured against a number of strategic pillars. In terms of “equitable access and participation”, which covers land reform, slow progress in terms of reaching targets was highlighted. Progress with implementing priority programmes such as LRAD, agricultural technology development and transfer and empowerment in all sectors of the agri-food sector (through the AgriBEE Charter) were also reviewed.

The report concluded that the slow pace of implementation was of concern, as was the limited capacity within government to implement many of its programmes (Sebakwane, 2008). A number of recommendations were made, some of which are relevant to the current study and are summarised below:

- The delivery of support services to farmers, in particular black farmers, should be restructured to make them more effective and co-ordinated. In this regard the findings of the international studies, which highlight the success of joint public-private initiatives, should be taken into account and skilled facilitators should be used to co-ordinate such voluntary joint initiatives.
- The recovery and co-ordination of extension services (in its broader sense) should be undertaken as a joint Public Private Partnership (PPP).
- The following areas of urgent strategic attention were identified:
    - To ensure national and household food security
    - Aggressive pursuance of sustainable productivity
    - Impact of Energy availability/ access and affordability on Agriculture
    - Impact of Climate Change on Agriculture and farmer resilience;
    - Economic sustainability of strategic initiatives;
    - Enhanced bio security (e.g. improved sanitary and phyto-sanitary systems);
    - Accelerated land reform
    - Comprehensive support services to agriculture.
    - Developing viable models for production of small-scale farmers
    - Participation of vulnerable groups in the sector.

2.1.2.4 National Development Plan (2011)

This plan was developed by the National Planning Commission and the first draft was released in 2011 (National Planning Commission, 2011). The aim of the plan is to define a path to address poverty and inequality by 2030. One element of the plan focuses on the rural economy and the aim is to achieve 643 000 direct jobs and 326 000 indirect jobs in the agriculture, agro-processing and related sectors by 2030. The plan specifically makes mention of an investment in irrigation infrastructure and also aims to create tenure security for communal farmers – especially women – and to strengthen the process of vesting private property rights to beneficiaries of land reform. The need to improve the efficiency of existing irrigation is highlighted, as well as the establishment of innovative market linkages. The need for improved road infrastructure as well as processing and value adding facilities to support this, is recognised. The plan also refers to extension support, suggesting that innovative means for extension and training by the state should be sought.

A focus on smallholder farmers is highlighted, though established agricultural industries are seen as enabling partners. Underused land in communal areas is seen to have potential to be brought into commercial production. Successful farmers operating within communal areas are also prioritised. The plan specifically mentions "develop strategies that give new entrants access to product value chains and support from better resourced players".

2.1.3 Critical assessment of policies and strategies

The current policy environment is, in principle, very supportive of smallholder agriculture. If one considers the policies related to water and land, there is a focus on addressing past inequalities. For example water allocation reform is a key component of the White Paper on a National Water Policy for South Africa (1997), and is raised again in the 2013 policy review as well as the latest DWA Strategic Plan (2013). The importance of socio-economic development is recognised, and water is seen as having a role to play in poverty eradication. There is a policy that aims specifically to provide financial and other support to resource-poor farmers. If one considers agricultural policies and strategies, then one sees evidence of an intention to empower smallholders. DAFF's latest Strategic Plan (2012) talks of a transformed and united sector and makes specific reference to the provision of financial support to smallholder and subsistence producers. Finally, if one considers the National Development Plan, then this too addresses the need for development of the rural economy and recognises the role that agriculture can play in achieving this. The plan highlights the need to improve infrastructure in order to improve the competitiveness of rural producers. It plans to "give new entrants access to product value chains".

While the policy environment appears to be very supportive currently of small-scale producers, it is the translation of policy into implementation which is more challenging. While the recent DWA Strategic Plan makes reference to provision of financial assistance to resource-poor farmers and the supply of tanks for water-harvesting, it appears a challenge for smallholders to actually access these opportunities. Another aspect to consider is the effort to regulate water use through the establishment of WUAs and the registration of water users. While policy documents talk of supporting previously disadvantaged communities to comply with, and benefit from, these structures, there is in fact very little compliance on the ground. It is clear that more resources and action are required to translate policies into action.

2.2 REVIEW AND SYNTHESIS OF THE RELEVANT LITERATURE

This literature review covers the following topics:

- Smallholder agriculture in South Africa (including farmer typologies)
- Water use in South African agriculture
- Concepts and frameworks used in the study.

The first two sections provide a context for the research in terms of providing a better understanding of the smallholder sector, as well as water use within agriculture. The section on concepts and frameworks provides a foundation for the application of these within the current project.

2.2.1 Smallholder agriculture in South Africa

2.2.1.1 Introduction

Farming is important for rural households in South Africa. However, rural people are searching for diverse opportunities to increase and stabilise their incomes (Chapman and Tripp, 2004). The extent of dependence on non-farm income sources varies across countries and regions. Evidence from a sample of rural villages in Tanzania (Ellis and Mdoe, 2003; Chapman and Tripp, 2004) shows that, on average, half of household income came from crops and livestock and the other half from non-farm wage employment, self-employment and remittances. The poorest households were more reliant on agriculture; a reliance which decreased as non-farm activities increased (Chapman and Tripp, 2004).

According to Vink and van Rooyen (2009), there were 8 million households in South Africa located in non-metropolitan areas in 2006. Of these, 17% (1.3 million households) had access to land for farming purposes and 97% of those households engaged in some form of farming activity. More recent figures indicate that 43% of South Africans can be termed 'rural survivalists' (Backeberg and Sanewe, 2013). Most households clustered in former homeland areas, the current in KwaZulu-Natal, Eastern Cape and Limpopo Provinces, were said to be located on relatively small plots of land (Vink and van Rooyen, 2009). They relied on multiple livelihood strategies with farming being an important but small contribution to livelihoods (i.e. the main source of income in only 3.7% of non-metro households with access to land). At that time 78% of households engaging in agricultural production did so as an extra source of food for the household, 6% as an extra source of income, 3% as the main source of income and 8% as the main source of food. These smallholders, characterised by small plots of arable land and low output (Matungul *et al*., 2001), are faced with a wide range of challenges including limited access to factors of production, credit, information and markets (Ortmann and King, 2010).

There is a growing realisation that the smallholder sector in South Africa is important in providing employment and food security (Sinyolo *et al*., 2014); however, the critical issue is how these farmers can improve their competitiveness by participating sustainably in agri-food supply chains (Ortmann and King, 2010). The South African government has launched several programmes to enhance smallholder food production in rural communities. Among these are irrigation schemes, varying in size and scope, for minimising the impact of dry spells on famers' output. The South African government also invested substantially in irrigation schemes in the less-developed areas to benefit smallholder farmers (van Averbeke and Mohamed, 2004): to date, more than 200 small-scale irrigation schemes in South Africa irrigate about 50 000 hectares and provide income to over 37 000 farmers (Machethe *et al*., 2004). However, research has revealed that production in most of the small-scale irrigation schemes in South Africa is not as intensive as is needed and often involves production of low-value food crops which do not even meet subsistence food requirements (Backeberg, 1997).

Besides the socio-economic challenges being faced by farmers in South Africa, the Eastern Cape Province's 2006-2009 Strategic Plan highlighted a serious backlog of infrastructure in the agricultural sector (EC DoA, 2006). The level of infrastructural services being provided is currently inadequate to match up with the demand for provincial infrastructure development. The Strategic Plan also stated its major objectives of infrastructural development as: (1) Viable commercialisation of irrigation schemes, (2) Support for agricultural production and agro processing, (3) Commercialisation of small units, (4) Commercial livestock production and (5) Sustainable management of agricultural resources. In both

KwaZulu-Natal and Eastern Cape, weak extension support is recognised as limiting the potential benefits from smallholder agriculture.

Extension support in South Africa

"In South Africa, the scope of work for extension officers has expanded significantly since 1994. Instead of servicing a relatively small number of large-scale commercial farmers, there has been a significant shift in client focus, which requires officers to play new roles, including institutional development for small farmers, assisting them to get access to finance and other production requirements, to market their produce, and to access second-economy government support projects, such as cooperatives, land reform, food security and land care. Extension officers are also expected to assist with the administration, implementation and monitoring and evaluation of such initiatives. Farmers are generally very critical of the extension capacity of provincial agriculture departments."

Source: Vink and van Rooyen, 2009

Besides addressing extension and infrastructure needs, some of the key success factors that have been identified as contributing to the participation of smallholder farmers in commercial value chains include effective collective action, secure tenure and coordinated efforts to address challenges, as well as more efficient use of inputs (Jordaan and Grové, 2012).

2.2.1.2 Typologies of farmers

There are two broad categories of farmers in South Africa – small-scale and large-scale farmers. While large-scale farmers are mostly regarded as commercially oriented, several definitions are used for the smallholder farmers. According to Fanadzo *et al.* (2010), 'smallholder' recognises a characteristic of small farm size and a partially developed link to the larger economic system. In South Africa, smallholder irrigators have been categorised into four groups, that is, farmers on irrigation schemes, independent irrigation farmers, community gardeners and home gardeners (Crosby *et al*., 2000; van Averbeke, 2008). Furthermore, some schools of thought categorise smallholders into subsistence, emerging and small-scale commercial (Fanadzo *et al.*, 2010), and no clear distinctions are drawn between the categories.

According to Gilimani (2005), the most common case in South Africa are farmers whose production may be characterised by varying degrees of subsistence production and commercial production. Clifton and Wharton (1969) [cited by Gilimani (2005)] suggested some criteria that could be used to define subsistence, emerging or commercial farming. These include:

- Economic criteria – where consumption and production decisions are interdependent, and the degree of interference makes consumption or survival considerations overrule or dominate the commercial ones, thereby affecting decision-making and economic behaviour.
- Purchased factor input ratio – where the ratio of purchased inputs to all inputs used is considered to be a useful index of the farmer's involvement in commercial activities, for example fertilizers versus manure.
- Level of technology – where the assumption is that subsistence farmers use simpler techniques and tools in production, for example hoes versus tractors and other intensive production implements.
- Income and levels of living – where subsistence farmers are cultivators who are poor. However, to employ such a criterion requires the determination of some absolute minimum income or minimum level of living which is difficult to specify in absolute terms.

The critical issue arising from the use of the several criteria as coined by Clifton and Wharton (1969) is that differentiating between subsistence and commercial farmers is vague without parameters to determine the cut-off points for these measures. According to Chapman and Tripp (2004), the extent to which households, especially rural ones, are able to feed themselves depends on non-farm income as well as on their own agricultural production. In most instances non-farm income is used by many households to purchase their staple grain. Subsistence agriculture should therefore be understood in this context of diversified income sources. Furthermore smallholder farming is generally done to achieve diverse objectives that include consumption, marketing and cultural purposes.

The subsistence-emerging-commercial classification does not, however, take into account the variation that exists within these categories, nor does it recognise the two-way movement of farmers that occurs between the first two categories. A number of authors have developed different typologies for describing subsistence or smallholder farmers in more detail (Vink and van Rooyen, 2009; van Averbeke 2008; Scoones *et al*., 2010).

Vink and van Rooyen (2009), beyond distinguishing between the 'fewer than 40,000 farmers' in commercial areas and the 'millions' of farmers in communal areas that make up less than 15% of available farmland in South Africa, went on to define a range of farmer typologies based on turnover; ownership and management of the farms, as shown in Table 2.1. They also identified binding constraints and support requirements for each of these categories of farmers.

Table 2.1 A classification of farmer typologies in South Africa that includes commercial farmers

Production unit	Turnover	Ownership and management
Large commercial farmers on private property	>2 Million	Family owned but incorporates multiple farms Rented land – professional management
Medium commercial farmers on private property	R300,000 to R2 Million	Family owned, could be incorporated. Some renting of land – family managed
Small commercial farmers on private property	<R300,000	Family owned, generally part-time Some lifestyle farming
Commercial farmers in communal areas	>R300,000	Communal ownership Development projects Private ownership
'Emerging' commercial farmers in communal areas	<R300,000	>20 hectares Communal ownership Small farmers in development projects Private ownership
Subsistence farmers in communal areas / allotments / market gardens		<20 hectares Communal ownership Private ownership Little formal market participation

Source: Adapted from Vink and van Rooyen, 2009

Considering small-scale agriculture on various irrigation schemes, van Averbeke (2008) recognised that they were not homogenous in terms of their objectives and classified the livelihoods of farmers in terms of their main source of income (cash and kind) as follows:

- Pensioner households
- Wage earner households (skilled and unskilled formal employment)
- Households active in the informal sector
- Market oriented farming households
- Subsistence farming households
- Diversified income households.

He also went on to describe what he refers to as 'farming styles'. Table 2.2 provides more description of the range of farmers operational in the irrigation schemes**.**

Table 2.2 One typology of farming styles of irrigation scheme members

Farming style	**Definition**	**Characteristics**
Profit makers	• They farmed mainly for marketing purposes (>50% of the total annual value of their production was sold) • Produced cabbages in summer and winter – and actively marketed their produce	• Least risk averse • Made use of high quality inputs and services • Mainly provided own labour from households, but used temporary labour during peak demand periods
Employers	• They hired one or more fulltime farm workers • Main objective was household food security	• This often resulted in negative gross margins! • Similar levels of risk taking as Type 2 food farmers but able to cultivate larger plots because of hired help
Food farmers (Type 1)	• Subsistence farmers • Farmed mainly for home consumption (>50% of total annual value of production consumed) • Produced maize for grain in summer that was stored at home or delivered to a commercial mill for credit notes • Limited winter production – mainly traditional vegetables on home plots	• Limited scale and output • Household food security the primary objective • Limited use of purchased inputs • Cash sales of produce a minor source of household income • Aimed to limit expenditure and avoid risk (e.g. using cheap tractor service even though it delayed planting)
Food farmers (Type 2)	• Similar to type 1 food farmers BUT were prepared to take risks and grow cabbages and white maize on a small-scale • Less conservative than Type 1 food farmers • More inclined to sell surplus grain	• They achieved high returns from expenditure on variable costs of production

Source: Adapted from van Averbeke and Mohammed, 2006; van Averbeke, 2008

Van Averbeke (2008) highlighted that recommendations (e.g. when disseminating technical information) need to be tailored to suit the objective of farming households, which are very diverse. Farmers falling into each of the four farming styles tended to have similar farming objectives. Denison and Manona (2007) also recommended that the needs of farmers in the different categories were sufficiently distinct to require different forms of support.

Van Averbeke and Mohammed (2006) saw the three main farming styles shown in Table 2.2 as being at different points along a development trajectory (aligned with subsistence, emerging and 'small-scale commercial' but also noted that farmers did not always aspire to move upwards along the trajectory. They suggested that the change would be likely to occur as a result of structural changes in the livelihoods of individual households, rather than as a result of empowerment-focused activities. Denison and Manona (2007) classified smallholder irrigation farmers into four styles (Table 2.3). They also noted that a mix of styles could co-exist on a scheme and the mix was not static, but could be influenced by various economic and social factors.

Table 2.3 An alternative classification of smallholder irrigation farmers (typology)

Farming style	Characteristics	Requirements
Smallholder	• Low risk approach • Diversified crops • Smaller plots • Typically on flood and smaller schemes	• Need lower water costs
Business farmer	• Larger plots • More externally oriented with cash focus • Farming is main income	• Needs land leasing efforts
Food producer	• Off-scheme activity • Intensive food gardens with rainwater and grey-water harvesting	• Hits poverty • Stimulates land-leasing
Equity labourer	• Commercial partnership arrangements, joint ventures and share-cropping • Main benefit is basic employment • Especially on schemes with high costs	

Source: Adapted from Denison and Manona (2007)

More recently, Scoones *et al.* (2010) used the following typology to describe livelihoods that have emerged post land reform: (1) dropping out, (2) hanging in, (3) stepping out and (4) stepping up. Individual households within these four broad categories were further divided. For example under those said to be stepping up (which constituted 35% of resettled households), households were categorised as follows:

- Hurudza[1] – the "real farmers" that accumulated assets through their farming activities (Scoones, 2011)
- Part-time farmers – while a core livelihood activity, farming was supported by off-farm activities (including remittances)
- New (semi-) commercial farmers – Large plot farmers that were using off-farm income (including foreign exchange) to invest in their farming activities
- Farming from patronage – Those who had received state support through patronage and were able to invest in farming.

Again, Scoones (2011) highlighted that people move between categories but that the categorisation does help to understand variation in conditions of farmers within an area and the forms of support that are required.

When developing or exploring typologies, it is also important to consider the current terminology being used in policy documents. The Strategic Plan (2012/13-2016/17) for DAFF no longer makes reference to the term 'emerging farmers' – beyond the reference in the Deputy Minister's address to "emerging farmers and commercial farmers" and recognition of the importance of both. The terminology currently in use is subsistence producers and smallholder producers, both of which are given attention. For example, the Department's focus includes food security (consider the Zero Hunger Programme) and the key priorities are food security, job creation and rural and economic development. A policy mandate is the strategic plan for smallholder producers. Programme deliverables include for example: 'increase access to development financial services by smallholder and subsistence farmers through comprehensive funding facility'. Another DAFF programme is 'Food security and agrarian reform targets subsistence and smallholder producers'. Thus it would suggest that producers are currently being defined as subsistence or smallholder or commercial.

[1]According to Scoones (1988), *hurudza,* which is a Shona word, are rural agricultural entrepreneurs.

2.2.2 Water availability and utilisation in South Africa

South Africa is characterised by water stress and scarcity due to low, erratic rainfall and low and erratic run-off, Furthermore, 9% of the country generates 50% of the run-off (Green *et al*. 2011). Rainfall patterns range from levels as low as 100 mm/year on the West Coast of the county, to as much as 2000 mm/year on the East Coast, with a mean national average of 497 mm, which is substantially lower than the global average of 860 mm. In terms of distribution, 65% of South Africa receives less than 500 mm of rain per year, with about 20% receiving less than 200 mm, making it a semi-arid country (DWAF, 2006). Another factor that contributes to water scarcity is high evaporative demand. These factors all limit dryland crop production in much of South Africa (van Averbeke *et al*., 2011).

Approximately 15% of annual rainfall contributes to surface and ground water (Bennie *et al*., 1998). As shown in Table 2.4, irrigation is the sector that uses the majority of surface and ground water, accounting for more than 60% of total water use in South Africa (DWA, 2013). When considering the forward and backward linkages – since agriculture provides inputs into the manufacturing / processing sector and also creates a demand for agricultural inputs – the agricultural sector is said to contribute 20-30% of the GDP (Fenyes and Meyer, 2003) although the contribution of primary agriculture to the GDP is only 3%, The other sector that is a substantial water user is the domestic sector (specifically urban requirements).

Table 2.4 Water requirement for the year 2000 (million m^3/a)

Sector	Percentage of total water requirement (%)
Irrigation	62
Urban	23
Mining and bulk industrial	6
Rural	4
Afforestation	3
Power generation	2
Total	**100**

Source: Adapted from DWAF, 2004

2.2.2.1 Water use productivity in agriculture

Farming systems are broadly grouped into crop and livestock systems. These systems can be further categorised into irrigated and rain-fed systems. Smallholder farmers in South Africa generally engage in one or a combination of these, with a wide range of crop, livestock, vegetable and fruit tree enterprises constituting the main farming systems. Performance of these enterprises differs depending on a specific area's soil and climatic conditions but, to an even greater extent, farmers' objectives and resource availability also affect the relative input – output relationships of specific agricultural value chains.

With the persistent growing pressure on finite freshwater and soil resources, it is becoming increasingly clear that the challenge of feeding tomorrow's population is, to a large extent, about improved water productivity within present land use, of which rain-fed agriculture plays a critical role. The fear of rapidly growing water scarcity problems, especially in arid and semi-arid tropical regions of the world, is based on analyses comparing blue-water (rivers, dams) availability with actual blue-water withdrawals, and projections of future withdrawals based on general per capita water requirements (Kijne *et al*., 2003).

Various techniques have been used world-wide to determine productivity and usage of water by different consumers in different sectors. Quantitative modelling techniques have also been used to show linkages between primary productive sectors (agriculture) and secondary sectors (manufacturing and processing) with respect to water usage in these sectors.

The water footprint of a country is defined as the volume of water needed for the production of the goods and services consumed by the inhabitants of the country. The internal water footprint is the volume of water used from domestic water resources while the external water footprint is the volume of water used in other countries to produce goods and services imported and consumed by the inhabitants of the country. The four major direct factors determining the water footprint of a country are: (1) volume of consumption (related to the gross national income); (2) consumption pattern (e.g. high versus low meat consumption); (3) climate (growth conditions); and (4) agricultural practice and water use efficiency (Hoekstra and Chapagain, 2007).

South African Breweries (SAB), as a specific example, undertook an investigation to calculate its water footprint. According to Smit (2009), the report defines a water footprint as an indicator of water use that looks at both the direct and indirect water use of a consumer or producer. SAB assumed that their water footprint started with the cultivation of the crops that are used in beer brewing (barley, wheat, hops) and followed all the processes through to bottling of the final beer product and recycling. This represents a very long value chain for industrial crops as well as showing high water value per each stage of value addition.

The water footprint concept is closely linked to the virtual water concept, which was introduced in the early 1990s. Virtual water is defined as the volume of water required to produce a commodity or service, and has widely been used as a partial solution to problems of water scarcity in the Middle East and Africa. The total volume of water use in the agricultural sector is based on the total volume of crop produced and its corresponding virtual water content. Calculation of the virtual water content (m^3/ton) of primary crops is based on crop water requirements and yields. Calculation of the virtual water content of crop products is based on product fractions (ton of crop product obtained per ton of primary crop) and value fractions (the market value of one crop product divided by the aggregated market value of all crop products derived from one primary crop) (Hoekstra and Chapagain, 2007).

The virtual water content (m^3/ton) of live animals is calculated on the basis of the virtual water content of their feed and the volumes of drinking and service water consumed during their lifetime. Though water estimates are easier for intensive livestock enterprises that rely on artificial feeds, they are less accurate where extensive grazing in communal areas is the main production system. However, calculation of the virtual water content of livestock products is again based on product fractions and value fractions. It is suggested that livestock products have a higher virtual water content than crop products, mainly because a live animal consumes a lot of feed crops, drinking water and service water in its lifetime before it produces some output. An example of beef produced in an industrial farming system was analysed and it was realised that it takes an average 3 years before it is slaughtered to produce about 200 kg of boneless beef. During this period it consumes nearly 1300 kg of grains (wheat, oats, barley, corn, dry peas, soybean meal and other small grains), 7200 kg of roughages (pasture, dry hay, silage and other roughages), 24 m^3 water for drinking and 7 m^3 water for servicing. The higher in the product chain, the higher will be the virtual water content of the product. For example, the global average virtual water content of maize, wheat and rice (husked) is 900, 1300 and 3000 m^3/ton respectively, whereas the virtual water content of chicken meat, pork and beef is 3900, 4900 and 15 500 m^3/ton respectively (Hoekstra and Chapagain, 2007).

The following sections of the literature review consider water use with the three key types of enterprises, namely irrigated crop production, rain-fed crop production and livestock production.

2.2.2.2 Water use in irrigated crop production

2.2.2.2.1 Introduction to irrigated crop production

Irrigation is the major user of surface and ground water in South Africa. Irrigated agriculture generally depends on engineered structures and field layouts to make the best possible economic and technical use of water that has been pumped or stored, usually at considerable cost. The full range of irrigation systems is found on various schemes across South Africa, namely flood, sprinkler, centre pivot, and micro and drip irrigation, with sprinkler irrigation being the most common (DWAF, 2006).

Small-scale vegetable irrigation farming plays a significant role in rural and urban areas in South Africa, where an estimated 150 000 growers participate in community gardening projects and an unknown number grow food in home gardens (NDA, 2006). Irrigation schemes are said to be agricultural projects that involve multiple holders that make use of a shared water storage, diversion and/or distribution system (van Averbeke *et al*., 2011). In South Africa, in 2010, there were 302 smallholder irrigation schemes covering an area of 47 667 ha of which 206 were operational at that time (van Averbeke *et al*., 2011). In terms of plot sizes, van Averbeke *et al*. (2011) found that 43% of schemes had plot sizes of 1-2 ha, and some plots were being used mainly for the purpose of selling (i.e. commercial purposes), while others were being used mainly for food production for own consumption.

Van Averbeke *et al*. (2011) highlight that within irrigation schemes farmers are dependent on each other because of their joint reliance on the same water source, which requires willingness to work collectively in order to achieve individual objectives. Sharing of a common resource is perceived to limit members' flexibility in terms of irrigation. The choice of suitable technology is one mechanism to ensure as much flexibility for each individual farmer as possible (DWAF, 2006). The irrigation technology on some centrally managed schemes in South Africa has been adapted and/or expanded to increase flexibility and manageability by farmers. According to DWAF (2006), it has been established that the successful sharing of water resources requires that the group of farmers be well organised and equipped (trained) to control, operate and maintain their infrastructure and manage their finances. Other studies, such as that of van Averbeke *et al.* (2011) revealed that other reasons why schemes are not operational relate to infrastructural problems, water shortages, conflict and theft – but the main problem cited by extension staff was said to be poor management.

Independent irrigation farmers are those not participating in an irrigation scheme or in a gardening group but who have a "private" water supply, such as pumping directly from a river or from their own borehole (NDA, 2006). The majority of the subsistence farmers and smallholder farmers consider farming as an additional income source as part of their multiple livelihood strategy. Some are shopkeepers or other entrepreneurs who develop irrigation as an additional income-generating opportunity, Independent farmers typically start their irrigation enterprises using their own or family capital and build it up over a period. These enterprises range from the very small vegetable or fruit tree plots, to fairly large commercial units such as 100 ha of intensive tomato cultivation under sophisticated drip irrigation. Although the “independent farmer" sector is believed to form a significant component of small irrigation farming in South Africa, there are virtually no statistics on independent farmers, as they are not being financed or managed by formal institutions (NDA, 2006). There must therefore be a way of identifying and accounting for this crucial group of farmers whose involvement in land reform programmes might help achieve the productive use of land.

One of the modern techniques developed to estimate water usage in agriculture involves the use of computer programmes such as SAPWAT (sapwat.org.za). This can determine crop as well as farm requirements, which is useful for planning purposes. It is a further development of the Food and Agricultural Organisation (FAO) model known as CROPWAT (Marica, 2014), and takes into account different planting dates as well as different irrigation methods (Woyessa *et al.*, 2004).

2.2.2.2.2 Water use productivity in irrigated crop production

Water productivity (WP) refers to the ratio of the net benefits from rainfed cropping (or other agricultural production systems), to the amount of water required to produce those benefits (Molden *et al*., 2010). Unlike water use efficiency, which calculates crop yield per unit water used, water use productivity considers broader objectives of producing more food, income, livelihoods and ecological benefits at less social and environmental cost per unit of water used (Green *et al.*, 2011; Molden *et al*., 2007; Molden *et al.*, 2010; Igbadun *et al*., 2005). This can refer to water delivered (in the case of irrigation) or water depleted (in the case of rainfed production). Thus rainfed crop water productivity means providing optimal benefits considering multiple factors, which implies that maximising yield may not necessarily maximise water productivity. However, most efforts to enhance water productivity focus on maximising water efficiency and price received for product through either value addition or increases in quality and quantity.

It is recognised that the potential to improve WP does not exist under all circumstances, and those areas with highest potential are those with low yields, such as much of Africa (Molden *et al*., 2010), Crop water productivity is a vital parameter to assess the performance of irrigated agriculture. It will vary greatly according to the specific conditions under which the crop is grown[2]. According to Green *et al.* (2011) water use efficiency (and thus physical productivity) can be improved by selecting the correct irrigation system, improving scheduling of irrigation water and optimising root zone water management to maximise beneficial evaporation. The efficiency of water used in agriculture increased by at least 100% between 1961 and 2001, thanks mainly to increases in crop yields. Improving water productivity requires, firstly, an increase in crop yields or values (i.e. the marketable yield of the crop for each unit of water transpired); Secondly, a reduction of all outflows or "losses" (e.g. drainage, seepage and percolation) except crop transpiration, finally, more effective use of rainfall, stored water, and water of marginal quality.

Achieving higher water productivity requires changes in crop, soil and water management. Strategies include selection of appropriate crops and cultivars, use of improved planting and cultivation practices (e.g. minimum tillage), synchronisation of water applications with the most sensitive growing periods, and improved drainage for water table control. Techniques and practices that reduce water evaporation (e.g. mulching) will also improve water productivity, while better nutrient management will increase yields at a greater rate than the increase in evapotranspiration (FAO, 2003). To summarise, Sharma (2006) suggests that the strategies to increase crop water productivity (CWP) include the following:

- Increasing production per unit of water consumed
- Reducing non-beneficial depletion (e.g. evaporation losses from fallow land, reduced deep percolation)
- Tapping uncommitted outflows (i.e. using outflows or increasing the size of storage facilities)

[2]http://www.fao.org/nr/water/topics_irrig_cropwat.html

- Re-allocating water between user (i.e. crop-livestock combinations are much more productive than systems only involving crops).

Most existing smallholder schemes in South Africa were developed for the purpose of crop production, yet integrating animal and crop production offers potential advantages. Current policies do not support the integration of animal and plant production, and little attention has been paid to this in smallholder irrigation development. Growing crops to feed animals represents a value-adding process that reduces bulk costs, which in turn can reduce the contribution of transportation to the cost of marketing products. The manure produced by animals is a valuable resource which, when returned to the irrigated land, can help to replenish soil fertility and improve the physical properties of the soil. Incorporating animal production enterprises on irrigation schemes can also provide a productive use for organic wastes, such as crop residues and crops for which no market could be secured. Where slopes require terracing of the irrigation land, which is often necessary when surface irrigation is practiced, the bunds and terrace walls can be planted to tree legumes or tall fodder grasses, which also serve as wind breaks, thereby increasing the intensity of production (van Averbeke and Mohamed, 2004).

2.2.2.3 Water use in rain-fed crop production

Rain-fed agriculture is the type of farming that is most typically practiced by the world's rural poor and is dependent on natural rainfall patterns. Use of water for maintenance and production of natural vegetation amounts to some 62% of rainfall received in South Africa, while water used for dryland crop production (evapotranspiration specifically) amounts to only 12% of rainfall (Bennie *et al*., 1998).

Small-scale, rain-fed crop production is frequently characterised by low output and farmers therefore rarely participate actively in full value chains, as they often remain at a subsistence level and even supplement their yields through non-agricultural income. Studies conducted by the International Centre for Development-oriented Research in Agriculture (ICRA) in the Herschel District of Eastern Cape in 2001, as reflected in the textbox below, clearly support the notion of low output among small-scale rain-fed crop farmers (Dhar *et al*., 2001*).*

The scenario shown in the textbox illustrates one of the major sources of distress and causes of food insecurity among rural inhabitants in Eastern Cape and it can be assumed that this is the general trend among smallholder farmers in South Africa. Further exacerbating the problem of low output per hectare is the poor state of markets, which also emerged from personal interviews conducted by ICRA in the Tapoleng village in Eastern Cape.

Rain-fed crop yields of small-scale farmers in the Eastern Cape

According to extension workers, the expected yield of different cultivars of wheat under water stress conditions and poor management conditions should be between 1500 and 2500 kg/ha. However, based on the information obtained from farmers, indications are that they get an average of eight bags (80 kg each) from one morgen (0.856 ha), which equates to about 700 kg/ha.

Similarly, the potential yield of maize cultivars under such conditions ranges from 1400 to 2600 kg/ha and yet farmers from the Storom village informed researchers that they obtained about 25 bags (60-65 kg each) from one morgen, which is almost equal to 1700 kg/ha".

Following the same trend, the potential yield of sorghum cultivars under the conditions in the district ranges from 1200 to 2000 kg/ha and yet Storom village farmers said that they get about 8 bags (60-80 kg) from one morgen, which equates to approximately 600 kg/ha.

Source: Dhar *et al,.* (2001).

Rain-fed agriculture has of late received attention from researchers with the intention of improving output from this generally risky system. Baiphethi (2004) performed an economic evaluation of water conservation systems for dryland crop production by small-scale resource poor famers in Free State Province of South Africa. The driving force behind Baiphethi's study was the evidence of low farm returns and high risk of crop failure mainly due to inadequate and erratic rainfall experienced by farmers who depend purely on conventional farming methods. As a result of low farm returns and the high risk nature of their enterprises, most farmers in the Thaba 'Nchu study area in the Free State Province gave up crop farming and the few who still grow crops have to deal with high levels of risk and uncertainty, inadequate moisture, and generally low returns, often at a great cost to their limited resources.

2.2.2.3.1 Water productivity in rain-fed crop production

There are many opportunities for increasing water productivity in rainfed systems, such as fertility management, conservation agriculture, mulching, rain water harvesting and agro-ecological approaches. The growing of locally adapted indigenous crops that can tolerate drought stress can also enhance water productivity. Molden *et al* (2007) point out that adoption of management practices to increase water productivity requires an enabling environment that aligns the incentives of producers, resource managers (e.g. DWA and Water Users Associations) and society.

2.2.2.3.2 Improving water use in rainfed agriculture

Given that 93% of farmed land in Sub-Saharan Africa is rain-fed, there is a need to place more emphasis on small-scale water management in rain-fed agriculture through the redirection of water policy and investment in infrastructure. The scope of water management policy needs to be widened beyond irrigated agriculture to include rain-fed activities, which also include grazing and forests. The fact that there is limited new land available to be put under agriculture makes it particularly important to find ways to increase productivity of water use in these systems (Igbadun *et al*., 2005).

There is evidence to suggest that the low productivity in rain-fed agriculture is the result of suboptimal performance related to management aspects rather than low physical potential. This means that, in the developing countries with the most rapid population growth, there is high dependence on rain-fed agriculture operating at a suboptimal level. The solution is to improve water availability and the water uptake capacity of plants in order to increase yields. Considering the importance of rain-fed agriculture in developing national economies, there is need for system innovations that aim at improving water productivity (increasing water use efficiencies) while conserving resources (Rockström *et al*., 2004).

According to Rockström *et al.,* (2010), the most promising way to upgrade rain-fed agriculture in regions with water constraints is to break the conceptual divide between rain-fed and irrigated crop production and invest in blue water management options for rain-fed agriculture (e.g. supplemental irrigation). It is suggested that this would be an important strategic step toward raising the institutional priority regarding investments in rain-fed agriculture and would also provide a larger set of management alternatives, ranging from fully rain-fed to fully irrigated systems.

In rain-fed agriculture, the key limitation is not the shortage of water, but rather the extreme variability and the incidence of high intensity storms and droughts. Emphasis must therefore be on securing water to bridge dry spells, dry spell mitigation and drought proofing, and increasing agricultural and water productivity through new technological water management options, facilitated through institutional and policy interventions. This must be done without decreasing resilience in agricultural landscapes (Rockström *et al.,* 2007).The reduction of water-related risks due to rainfall variability is an effective mechanism to unlock agricultural potential. This can be achieved by a number of different mechanisms. Rainfall in farmers' fields can be managed by the implementation of *in situ* soil and water conservation practices. Interventions and practices that maximise infiltration rates and soil water holding capacity and reduce evaporative losses have positive impacts on crop yields (Everson *et al*., 2011; Monde *et al*., 2012).

Baiphethi (2004) made a comparison of the performance of conventional rain-fed and supported rain-fed production that makes use of infield water harvesting techniques. He found that about 80% of the time, the conventional technique will yield gross margins that are negative (i.e. losses) or equal to zero, while the least productive in-field water harvesting technique had only a 36% chance of yielding a gross margin of zero or less. He concluded that the high risk nature of conventional production techniques was responsible for the high number of crop farmers who have stopped crop farming (Baiphethi, 2004). The stoppage of ex-field runoff is a very important characteristic, which directly explains yield advantages obtained from in-field rainwater harvesting (IRWH) systems in comparison to conventional rain fed approaches. The basin area of the IRWH system, where the water is temporarily stored until infiltration is complete, acts as a surface storage medium where the "loss" can be converted into a "gain". Ex-field runoff is one of the major processes responsible for unproductive water losses in agriculture. Various short- and long-term studies on mono-cropped maize estimate that these losses can vary between 8 and 24 % of the total annual rainfall, depending on rainfall intensity, soil characteristics and topography (Haylett, 1960).

More recently, Everson *et al*. (2011) and Monde *et al*. (2012) also considered the application of rainwater harvesting and conservation techniques to improve the production of crops by resource-poor smallholder farmers. Mulching as well as IRWH techniques such as ridging were found to improve soil moisture as well as crop yields. It is recognised by Everson *et al.* (2011), that these are practices that may play a role in addressing the challenges of increasing populations and high levels of unemployment. The research by Monde *et al*. (2012) produced similar results, highlighting the benefits of rainwater harvesting and conservation in minimising water losses and increasing crop yields. The wealth of knowledge that has been generated in this regard through work supported by the WRC has been consolidated in a paper by Hensley *et al*. (2011).

In addition to *in situ* water capture interventions, it is also necessary to invest in structures that add new freshwater to the system through local management of run-off and rainfall. Investments in supplemental irrigation and conservation agriculture practices lead to an increase in the consumption of green water. Supplemental irrigation is seen as an effective mechanism to increase yields and water productivity substantially in small-scale agriculture. It should, however, be noted that a programme cannot focus only on water management, but should also consider agricultural practices and land tenure. In terms of human capacity, the ability to adapt and innovate should also be strengthened as should local institutions (Rockström *et al.*, 2007). The relative contribution to system productivity of supplemental irrigation is assessed by calculating the incremental increase in water productivity for supplemental irrigated treatments (i.e. kg additional grain produced per mm of supplemental irrigation) (Kijne *et al*., 2003).

Another aspect to consider is the need to improve environmental sustainability since poor management is known to increase run-off resulting in soil erosion, loss of nutrients and reduced crop yields. Much water stress affecting crops is actually human-induced. Only 70-80% of rainfall received is actually available to plants as soil moisture and this percentage declines if soil is poorly managed. Poor management practices can result in 'droughts' in the root zone and as little as 5% of rainfall is actually used by plants on severely degraded land (Rockström *et al*., 2007). The partitioning of rainwater in the semi-arid tropics is shown in Figure 2.1 to illustrate how rainwater is lost to the system. Other authors have suggested that between 70 and 85% of rainfall can be considered 'lost' to the cropping system as non-productive green-water flow (soil evaporation) and as blue-water flow (deep percolation and surface runoff) (Sivakumar and Wallace, 1991).

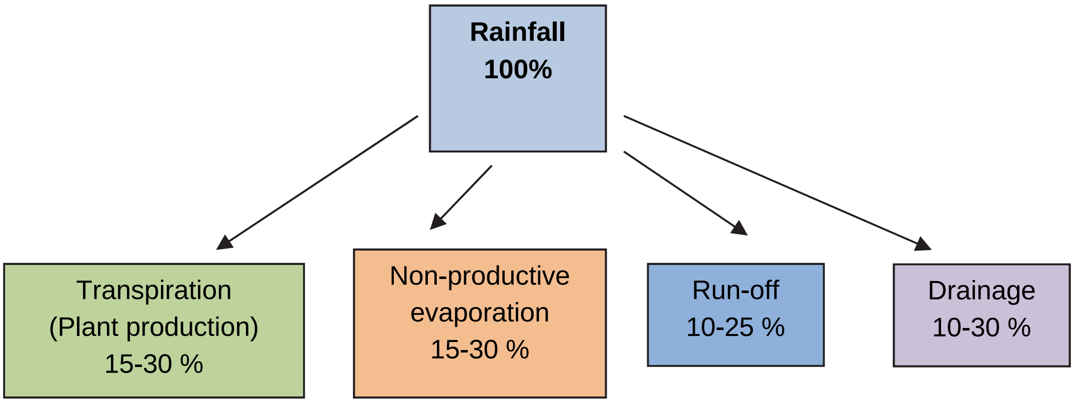

Figure 2.1 Partitioning of rainfall in the semi-arid tropics.

Source: Adapted from Rockström *et al*., (2007)

The focus in terms of upgrading rain-fed agriculture should be on managing the green-water resource and by capturing more soil moisture for plant uptake. Increasing the amount of water in the root zone is achieved by decreasing run-off, redirecting upstream run-off to the farm, maximising plant uptake capacity and reducing deep drainage / percolation. Practices to increase water productivity include mulching, drip irrigation and increased canopy cover so as to reduce evaporation (Rockström *et al.*, 2007).

Capturing run-off to supplement irrigation in smallholder farming systems can be achieved with water-harvesting systems that collect local surface runoff in small storage structures. For resource-poor smallholder farmers in water-scarce areas, even small volumes of stored water for supplemental irrigation can significantly improve the household economy. In the Gansu Province in China, small 10-60 m^3 (on average 30 m^3) subsurface storage tanks are promoted on a large scale. These tanks collect surface runoff from small, often treated, catchments (e.g. with asphalt or concrete), and are used later to supplement irrigation during dry periods (Kijne *et al*., 2003).

2.2.2.4 Water use in livestock production systems

Livestock production is diverse and covers small livestock (poultry, goats, sheep and rabbits) and large livestock (cattle, horses, donkeys) being kept under either intensive or extensive production systems. The focus of this literature review is on smallholder livestock production, which is generally part of a mixed crop-livestock system in South Africa. Livestock value chains among rural smallholder farmers are very short, with meagre returns from trading but additional returns from direct use benefits such as ploughing, consumption of milk and so on (See Textbox below).

Quantifying the benefits of livestock in communal areas

A study undertaken in Thorndale, a communal area of Limpopo Province, attempted to quantify benefits of livestock ownership that accrued to the households owning livestock as well as to the broader community. The study found that the direct-use value of livestock amounted to US$1335/household, while the traded value amounted to US$1385/household. The net annual direct-use value of livestock per household across all households was calculated to be US$656. The contribution of livestock to non-livestock owning households was through gifts and cheap services from households that did have livestock. Use of animals for ploughing was perceived to be the greatest benefit from livestock owned by other households.

Source: Dovie *et al.*, (2006)

The Pro-Poor Livestock Policy Initiative of the FAO identifies various factors and trends will affect rural livestock production and small-scale livestock producers in Sub-Saharan Africa. These include:

- Increasing pressure on common grazing and water resources
- A shift in livestock production from a local, multi-purpose activity to an increasingly market-oriented and vertically-integrated business
- Strong growth of industrial production units reliant on the use of cereal-based feeds close to urban centres.

The benefits of livestock production systems in terms of water productivity, are reflected by the fact that if surplus feed is available, the provision of one litre of drinking water effectively results in an additional 100 litres of otherwise unusable agricultural water evapo-transpired from rangeland vegetation. Livestock can be efficient and effective users of water when they depend largely on crop residues and by-products and on well managed rangelands unsuitable for crop production (Peden *et al.*, 2007).

2.2.2.4.1 Livestock water usage

Water usage in livestock enterprises is minimal compared to crop production. While irrigated pastures represent increased water usage in animal enterprises, this system is not common among rural smallholder farmers. Rain-fed livestock farming is therefore the core system in communal agriculture and water usage plays mainly a maintenance function as drinking water. In areas where water is scarce, access to sufficient water to meet even the drinking requirements of livestock can be problematic, requiring that animals travel long distances to reach a water source (See Textbox below)

Water resource stress can lead to conflict

Competition for access to water resources for livestock can result in conflict between livestock owners, as illustrated by the following case from Kenya. In the drought-prone Isiolo District, where annual rainfall varies between 252 and 623 mm, conflicts have developed between groups of livestock owners over access to water. The deficits in the dry season are large due to upstream irrigation abstraction. Access to water resources is largely a function of distance that livestock can travel. The maximum distance for cattle to travel is 10 km, however under stress conditions, pastoralists set the maximum distance at 30 km (a 60 km round trip). Poor water distribution also results in poor utilisation of forage because livestock owners cannot keep their livestock in such areas for long. Traditionally in this part of Kenya, people are not permitted to deny access to water and they allow access to water for cattle from other clans, but the cattle are not allowed to graze around the water source.

Source: Mati *et al*., (2005)

Water use for livestock production equates to some 8% of global human water use, with the main user being the irrigation of feed crops (FAO, 2006). Livestock generates 25% of agricultural GDP in Sub-Saharan Africa but water scarcity is one factor responsible for livestock productivity not achieving sustainable returns for poor livestock keepers. Efforts to address infrastructural limitations need to be accompanied by interventions to address governance and institutional matters such as the allocation of water between diverse groups of users (Opio, 2009). Investments in water and livestock have often failed to achieve maximum and sustainable returns because of a lack of integration of the two (Peden *et al*., 2007).

Water use in livestock involves watering of livestock, production of feed (produced by transpiration), crop production, waste disposal, maintaining animal health and hygiene, and processing of agricultural products (dairy products, slaughter facilities, meat packaging, etc.). Water used for meat processing and rendering (slaughtering animals and fowl, curing, canning meat products, transforming inedible and discarded remains into useful by-products such as lards and oils) is variable, but is said to be less than 2% of that needed for feed production (World Bank, 1998, cited by Peden *et al.,* 2007).

Drinking water intake accounts for less than 2% of all water used for livestock production (Peden *et al*., 2007), with water used for the production of feed being much more substantial (Schwartz, 2010). It is stated that water transpired for feed production will be about 50 times or more the amount of drinking water intake and evapo-transpiration associated with the production of maintenance feed totals about 450 cubic meters per tropical livestock unit per year, an amount that can underestimate the actual value by as much as 50% depending on animals' growth, reproduction, work, environment and lactating state (Peden *et al*., 2007). Some authors such as Peden *et al.,* (2007) suggest that crop residues and by-products represent a feed source that requires no additional evapo-transpiration.

2.2.2.4.2 Water use productivity in livestock production systems

Livestock water productivity (LWP) is equal to the value of beneficial outputs (products and services) / amount of water depleted in producing them. Livestock outputs can include the value of ploughing, value of milk, manure, meat as well as hides and skins (Owoyesigire *et al*., 2009). Some authors suggest that livestock water use efficiency should involve expressing the value of products and services relative to the value of water depleted, degraded or devalued (Schwartz, 2014). This is important because inappropriate grazing and watering practices contribute to widespread degradation of water and land resources, particularly around watering sites. Peden *et al.* (2007) suggest that LWP differs from water or rain-use efficiency because it looks at water depleted rather than at applied or inflowing water.

Introducing animal management practices that promote useful transpiration or infiltration of available water will likely increase LWP. In order to improve LWP, it is also necessary to select feeds (crops) that meet the feed requirements of the animals (based on their age and reproductive state) and which have high water productivity relative to other uses for agricultural water. Increasing LWP will also depend strongly on increasing the amount of feed animals use for production relative to the amounts used for maintenance (Peden *et al.*, 2007). LWP is also affected by access and ownership of the key resources, namely land, water and livestock. Peden *et al.* (2007) suggest four basic livestock development strategies that can lead to more productive and sustainable use of water resources, namely:

- Improving the sourcing of animal feeds
- Enhancing animal productivity (products, services, and cultural values) through better veterinary care, genetics, marketing of animal products, and value-added enterprise
- Improving watering and grazing practices to avoid degradation of land and water resources
- Providing quality drinking water.

Some additional measures to improve LWP have been suggested by Descheemaeker *et al.,* (2010). Given that livestock make use of various feeds, some of which are grown specifically for them, another aspect to consider is improving the feed water productivity. Management practices that reduce unproductive water losses can also improve LWP. These measures all recognise that livestock is only one component of a system that also includes crops. Lastly, there is a need to consider factors that impact on the uptake of interventions – including policies and institutions. Another author suggests that engaging in multiple-livestock use strategies can make animal production more water productive at a watershed scale (Haileslassie *et al*., 2009).

2.2.3 Concepts and frameworks

2.2.3.1 The concept of a food value chain

Kaplinsky and Morris (2000) defined a value chain as the full range of activities required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), and delivery to final consumers, to final disposal after use. As such, value chain analysis overcomes the important weakness of traditional sectoral analysis which tends to be static (Kaplinsky and Morris, 2000). Typical chain maps are illustrated either vertically or horizontally in such a way that they depict all "upstream" activities and functions (input supply, farming activities) and "downstream" activities such as processing, wholesaling and retailing of products. Chain segments are normally represented by boxes that are linked by arrows in order to symbolise product, information or monetary flows (da Silva and de Souza Filho, 2007).

While most competitive value chains involve a lot of value addition and high product differentiation, this is not always the case with smallholder farmers, who in most instances just supply raw and fresh products to the market. It is believed that processors, brokers and some agricultural commodity traders have managed to make substantial gains from agricultural commodities at the expense of the farmer. Several factors could be at play, including lack of knowledge and poor resource endowments on the part of the farmers. The impact of poor support services on farmers' participation in value chains cannot be underestimated.

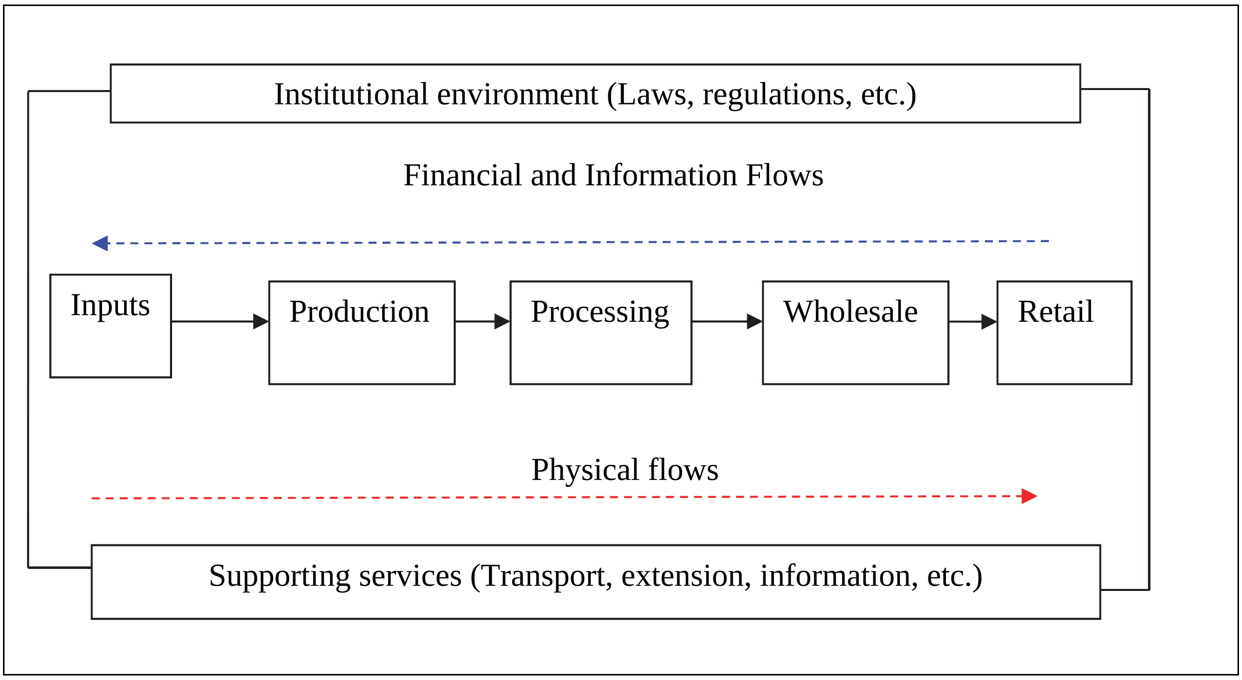

Figure 2.2 A generic, horizontally drawn value chain map.

Source: Adapted from Sebrae (2000), as cited by da Silva and de Souza Filho (2007)

Some authors make use of similar notions such as supply chains, production chains, or commodity chains. There are direct similarities and overlap between these different concepts although their focus may be different. Value chains integrate supply chain activities, from determination of customer needs through product or service development, production / operations and distribution (Altenburg, 2007).

The activities that comprise a value chain may be contained within a single producer (firm) or may embrace many firms and can be limited to a single country or stretch across national boundaries. If firms specialise in a certain stage of the value chain and establish linkages with input providers (upstream) and processors or distributors (downstream), these are usually referred to as vertical linkages. At the same time, firms tend to be embedded in horizontal linkages, whereby cooperative relationships exist with other firms at the same stage of the value chain. In addition, firms are connected with non-firm organisations such as employers' associations, trade unions, non-governmental organisations (NGOs), universities and government agencies. Many of these relationships do not directly influence the process of value addition and should therefore be distinguished from vertical value chain links (Kaplinsky, 2000).

Perroux (1955), as cited by Kaplinsky (2000), proposed the notion of growth poles that allow large industries with strong interactions and externalities to induce local growth. According to Perroux's approach, investment in a firm produces demand effects that induce subsequent investments (backward linkages) by input suppliers while the output of the firm can be used as an input into another industrial activity. Thus, subsequent investments are also stimulated on the output side (forward linkages).

Porter's value chain concept considers the broader context in which a business operates and proposes that sustainable competitive advantages build on a range of location-specific conditions. These include linkages with related and supporting industries with a role to allow firms to build on external economies. In addition, Porter's analysis emphasises the importance of local competition and specific demand conditions. Rivalry with strong competitors as well as extraordinarily challenging home markets (either due to especially demanding consumers or government regulations forcing firms to raise standards) both drive innovation and create competitive advantages relative to other countries (Porter 1985, cited by Kaplinsky, 2000).

2.2.3.1.1 Forces impacting on the alignment of value chains

In a paper prepared by Ag Education and Consulting (AEC), critical forces that affect the alignment of agricultural value chains are identified (AEC, 1999). These forces are subdivided into drivers, barriers, enablers and regulators of the value chain, as shown in Figure 2.3. All the four forces are broad and encompass various sub-factors. Value chain drivers and enablers (such as consumer demand and information technology) positively affect the value chain by creating pressure on the sector to move towards higher alignment, while barriers and regulators (such as lack of trust and willingness) slow down or reverse the movement.

Over the past years, substantial restructuring downstream (retail) has not always matched upstream (farm) restructuring, and, as such, uneven restructuring and alignment along the chain needs to be better understood. This comes in the light of an emerging retail sector in developing countries and transition economies that is increasingly controlling upstream segments of the supply chain through supply contracts, private standards and sourcing networks (Vermeulen *et al*., 2008).

The need for increasing the efficiency of value chains entails an understanding by emerging agricultural sectors of the various forces that are at play. Ideally, an efficient value chain must evolve from or improve from "Low Value Chain Alignment" to "High Value Chain Alignment" as shown in Figure 2.3. The positive factors that promote this transition are grouped into "drivers" and "enablers". As production commences both drivers and enablers act as the favourable environment that boosts the value chain. Without strong drivers and value chain enablers, a value chain remains at a lower level, hence unprofitable for the farmer. It is important to note that the value chain drivers and enablers are working against antagonistic forces imposed by barriers and regulators. Both barriers and regulators are unfavourable for the development of the value chain. Minimising or complete removal of barriers and regulators along value chains makes them more efficient and profitable. This calls for continuous monitoring of individual value chains as well as implementing intervention strategies. While the monitoring and evaluation component involves complex simulation modelling and data visualisation, it is at this point that technical support is required for emerging farmers to be able to appreciate the complexities of different product chains.

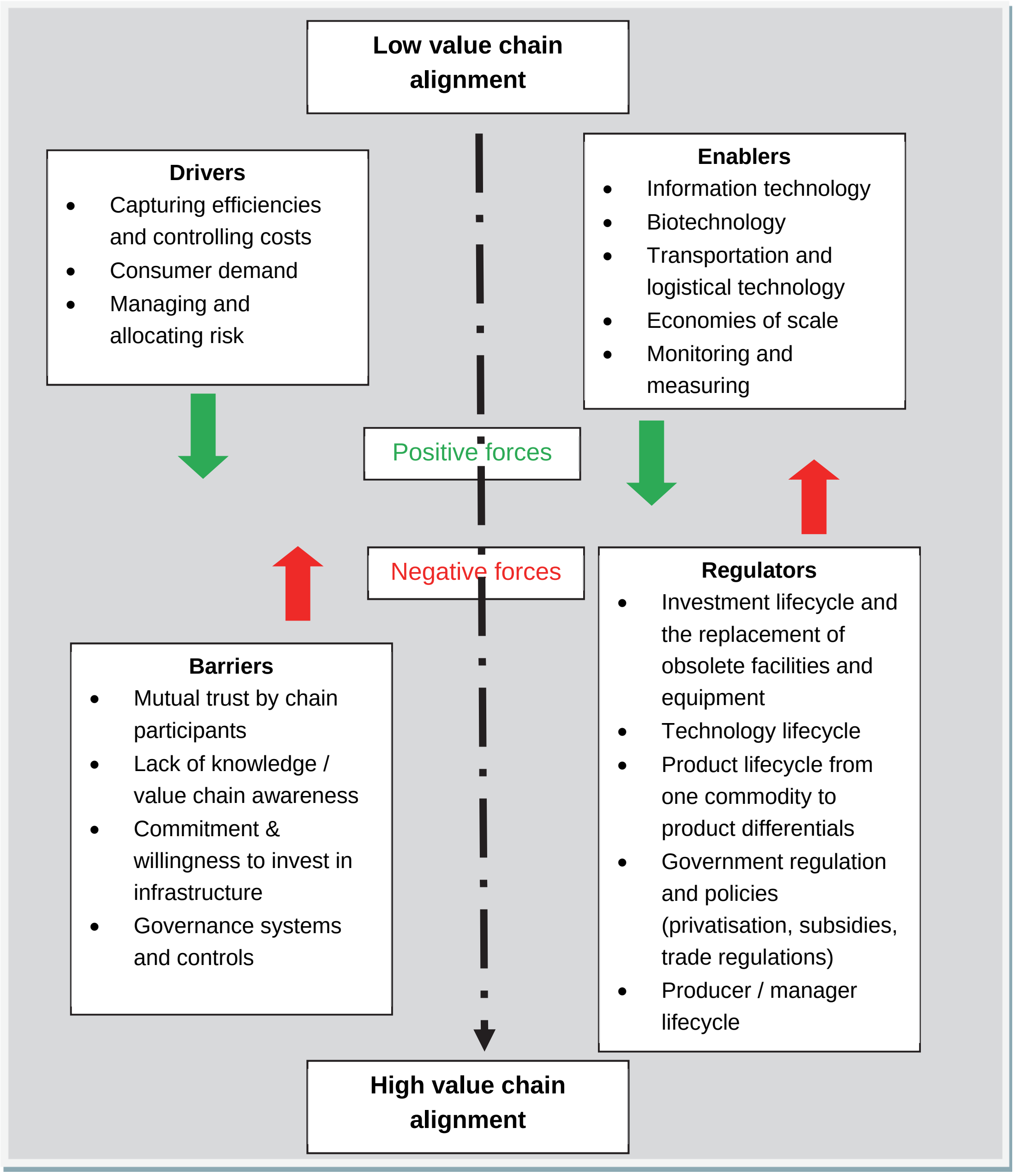

Figure 2.3 Forces that affect the alignment of agricultural value chains.

Source: Adapted from AEC (1999)

2.2.3.1.2 Value chain analysis

A value chain analysis (VCA) provides a description of the value chain by plotting the flow of goods and services up and down the chain and between the different value chains. The process can identify barriers to entry at each point along the chain as well as 'economic rent' along the chain, this being the ability to insulate activities through owning or monopolising scarce resources of human capacities or skills. Players along the chain find ways to innovate in order to increase their ‘rent’ and their profits (Kaplinsky and Morris, 2000).

VCA involves investigating the direct functions of primary production, collection, processing, wholesaling and retailing, as well as the support functions, such as input supply, financial services, transport, packaging and advertising. Traditional value chain analysis has focused on the transaction level, incorporating a mapping of market actors along the functions and market channels of a particular industry. This is often complemented by a breakdown of production costs from raw material to finished product to identify inefficiencies from a cost perspective, which are often benchmarked against similar industries in other countries (Knopp, 2008).

It has been realised that in the past there may have been too much focus on increasing production without sufficient attention to markets and the role of effective supply chains (Vermeulen *et al*., 2008). In a bid to explain what happens to agricultural products from production to final utilisation along specific value chains, comprehensive tools and guidelines have been designed world-wide. However, the complexity of each value chain requires the identification of a suitable approach to analyse it. According to Kaplinsky and Morris (2000), a VCA can involve the following activities:

- Identifying the point of entry – for example, if one’s interest is in agricultural producers then the point of entry is the farm and one would then map forward to processors and their customers and backwards to input suppliers
- Mapping the value chain – this involves gathering data from key respondents at each link in the chain and preparing a ‘tree’ of input-output relationships and identifying gross output values, net output values (excluding input costs), flow of services and skills, employment, destination of sales (number of buyers and concentration among major buyers), imports and exports (including the locational aspects)
- Identifying the product / market segments and critical success factors (CSFs) for each segment,
- Identifying how producers access final markets – identifying key buyers and charting the critical success factors that they exercise
- Mapping governance – involves looking at power / level of influence of actors in terms of their share of chain sales, value added, buying power as well as the identification of those players that ‘make the rules’ and those that have to keep to them
- Investigating ‘upgrading’ along the chain – this is the process whereby firms or actors innovate at a rate greater than their competitors in order to be competitive and successful. This can involve improving either the product or the process of developing the product, or the mix of products / activities that the firm produces / engages in
- Investigating distributional issues – this analysis involves both power (balance of leverage of different parties) and income (returns that accrue to different parties) components
- Investigating the distributional issues involves obtaining data on value added at each stage in the production of a good or services (whether this is within a firm, a link in the value chain or a specific location). In order to assess the value added at each stage, it is necessary to take the gross output costs (including material costs, depreciation costs, labour costs, utilities costs and profitability) and then subtract the total input costs
- Profitability, which can be used as an indicator of the distributional outcomes, can be determined by either considering the return on net assets, the margins on sales or the apportionment of total profit throughout the chain. One can also look at the functional distribution of returns relative to different categories of people, considering age, gender, ethnicity, income bracket, etc. The distribution of skills along the value chain can also be analysed
- Mapping the distribution of rewards along the value chain is also a key part of the analysis. This is related to the mapping of ‘rent’ and there is also an association with barriers to entry since reward / profitability is generally greatest where barriers to entry are greatest. The VCA can allow for the identification of links in the chain that are characterised by high or growing rent. This could, for

example, involve a situation where certain parties have access to knowledge that allows them to be stronger than their competitors (Kaplinsky & Morris, 2000).

Vermeulen *et al*., (2008) identified six key components that should be considered when undertaking a VCA. While some of them overlap with the set of activities suggested by Kaplinsky and Morris (2008), they do give a concise summary of the aspects to be considered, namely:

- Mapping out the value chain by identifying the main actors and the flows of products, money and information
- Establishing the key drivers, trends and issues affecting the value chain and its actors (where drivers' influences change in the chain and trends indicate the directions of change such as prices and marketing channels)
- Exploring future scenarios in relation to uncertainties about drivers and trends and their implication for both small-scale and large-scale producers
- Identifying the options for better inclusion of small-scale producers
- Developing strategies for supporting change of policies and institutions within the public, private and civil society sectors.

The value chain analysis undertaken in this study has drawn on the methods described above. Both qualitative and quantitative methods have been used in the value chain analysis in order to understand the nature of the specific value chains, as well as to identify opportunities and constraints along the chains. The first stage of the analysis was to identify the actors and product flows within specific value chains, including input supply, production, processing, and marketing activities. The results will be presented in a value chain map or flow chart.

The study also identified marketing channels and compared prices at the different stages (reflecting the value-addition) of the marketing channels to determine marketing margins for the various market intermediaries. The marketing margin of an intermediary will be the difference between his selling price and his buying price. This margin represents his contribution in the whole process of delivering the product from its source to its final destination in terms of the marketing services he provides.

2.2.3.1.3 The benefits of undertaking value chain analyses

Value chain analysis has emerged as a strong agent of change. Regardless of the location of a business along a supply chain, business success depends on an understanding of, and ability to respond, to the needs of the entire chain (Vermeulen *et al*., 2008). Value chain analysis and perspective has become a central development strategy to enhance different sectors of economies. VCA is important because it allows for systematic competitiveness by identifying core competencies that are required, or which already exist, and because it involves mapping the flow of inputs (goods and services) so that one can see which parties' behaviour is important (Kaplinsky and Morris, 2000).

Multiple linkages of sectors within an economy can be effectively analysed and evaluated using the value chain concept. It can therefore be argued that the use of the value chain approach to inform production and processing sectors is helpful in identifying those industries exhibiting exploitable characteristics relevant to the objectives of the farmers and the funding organisations / financial institutions. This is based on economic assumptions that farmers channel their produce towards the most profitable markets so as to maximise their profits, while funding organisations advocate efficient production and marketing cycles that enable them to recover their invested incomes with interest.

A necessary condition for profit-maximisation is that each downstream firm chooses its output so that marginal revenue equals marginal cost (where marginal revenue is its perceived marginal revenue curve). As such, a holistic value chain approach looks at both the backward and the forward linkages along the chain. Backward linkages rely more on the type and sources of inputs, of which water is the major input in agricultural enterprises and their respective value chains.

VCA is valuable in detecting a very important relationship involving changes in downstream output and labour demand / employment. This is crucial in developing countries that are battling to find solutions to high levels of unemployment and very low agricultural productivity. Downstream value chain beneficiation allows for greater employment, particularly of unskilled workers, because downstream production is labour intensive and frequently makes use of unskilled labour. The Department of Trade and Industry also aims to diversify the South African economy into more labour-absorbing and value-adding tradable goods and services (DTI, 2006).

VCA has also been widely used as a tool to explain the link between changes in upstream prices and downstream output, which is based on the relationship between the prices of the primary good and the final good. Price differences have always been at the centre stage when discussing smallholder markets in developing countries, including South Africa. Imperfect markets are very common in developing countries, hence farmers are confronted with pricing dilemmas based on the little information that they have about their market. The responsiveness of downstream agricultural demand to changes in the prices of the primary commodity is dependent on a range of factors that include the elasticities of demand for the intermediate and final products as well as the market structure at each level of the value chain.

It is important to note that value chains do not resemble linear processes. Regardless of the enterprise, an initial set of facilitation activities may achieve their intended effect of stimulating a market response, yet those activities are often accompanied by unintended behaviours or consequences that require follow-on assistance. It is critical that a value chain programme possesses the necessary structures and processes to read, observe, and react in a dynamic manner. Informed value chain interventions can stimulate various market responses. Given such a phenomenon, it is recommended from previous experiences, that value-chain facilitators be able to read market behaviour, observe divergences from intended results, and respond as necessary. It is this dynamic management which is often overlooked (Knopp, 2008).

2.2.3.1.4 The regional integration of value chains

Another concept that should be noted is that of the regional integration of value chains. According to the Economic Report on Africa (2009), prepared by the African Union and the Economic Commission for Africa, one suggestion for strengthening Africa's agricultural sector is to integrate value chains not only within regions but across country borders. This can be achieved through the use of (1) a Comprehensive Planning Approach or (2) through an incentive-based approach to supporting the private sector actors that promote value chain development. Direct interventions identified in the report to support the integration of value chains include:

- Awareness raising and coordination of actors, facilitating access to information
- Encouraging lead (successful) firms to support farmers and Small Medium and Micro Enterprises (SMMEs)
- Facilitating access to credit
- Promoting inclusive standards and abilities of actors to meet the standards, along each step of the value chain
- Encouraging regional integration and horizontal linkages, which requires harmonization of policies and legal frameworks.

2.2.3.1.5 *Examples of the application of value chain analyses*

The following two cases reflect different situations when VCAs have been undertaken, where the purpose and outputs have been quite diverse.

Case 1: Use of value chain analysis to improve marketing

Knopp (2008) documented a process where a VCA was conducted by Kenya Business Development Services (BDS) to identify challenges related to the marketing of avocados. The analysis was funded by the United States Agency for International Development (USAID) and it revealed that severe misalignments in the marketing of avocados challenged smallholder farmers and inhibited competitiveness of the overall industry.

The smallholder farmers in Kenya faced numerous challenges in production and marketing their produce. For instance, the marketing of avocados was dominated by informal brokers that benefited from misinformation among market actors. Whilst prices were fluctuating daily, farmers and lead firms could not rely on when brokers would come to buy their fruit.

It is important to note that Kenya BDS facilitated the development of rural professional brokerage services to get round the existing market constraints on the avocado market. These brokerage service providers offered bulking, linkage, traceability, forecasting and food safety services for smallholders and firms exporting avocados to the European Union market. This was achieved through an initial capacity-building of each firm and their related out-grower networks that led to the signing of supply contracts with designated lead exporters. An improvement on market performance was noted since the lead exporters offered guaranteed prices and markets for farmers. The involvement of Kenya BDS to improve avocado value chain performance in Kenya exposed a lot of potential for the fruit sector.

Kenya BDS also provided cost-sharing assistance to the brokerage firms during the initial season as they demonstrated their value to both farmer and buyer. During the first year of implementation, the exporter provided agrochemical spraying services, pesticide inputs, fertilizer, field agronomists, graders, pickers and transporters to 405 farmers under a pilot scheme, with the cost of each service being embedded in the final price offered to farmers for first grade fruit.

Some unforeseen challenges were, however, confronted during the initial phases of market intervention. Firstly, the brokerage firms' field workers had little skills to undertake their duties, and most were on a monthly salary, leaving little incentive to maximise yields and sales. The second challenge was based on the nature of the product. Unlike vegetables, avocados are limited to one primary harvest each year. This meant that, while the brokerage firms covered their costs during peak harvest, they were left with no cash-flow during the off season. Furthermore, in order to maximise their income and avoid deductions from the embedded services, some farmers began "side-selling" their fruit to spot-market brokers rather than honouring their lead firm commitments.

Based on these developments, Kenya BDS field staff responded with a series of follow-on facilitation activities to realign market signals, promote ownership and self-selection, and encourage competition among brokerage firms. Technical assistance in business strategy was provided to each of the brokerage firms to assist them to better articulate their value proposition, as well as explore additional areas for revenue. As such, this intervention resulted in a positive contribution in the whole avocado production and marketing chain. For instance, review of progress by Kenya BDS showed that each brokerage firm expanded the services offered into new yet complementary areas (e.g. provision of spraying services; brokerage services for vegetable sales). Such a realisation by the implementing agent (BDS) and the key brokerage firms was thus not only important to avocado production, but to other value chains like vegetables, thereby increasing the income base of participating farmers. This also acted as a way to spread risk and improved cash flow for farmers.

As many brokerage firms entered the seemingly lucrative business, the market moved towards a pure competitive market. This gave rise to the need for brokerage firms to aggressively market their services since selection of brokerage firms was done entirely by farmers and formalised through a service agreement. The simple coordination of these events underscored to brokerage firms the importance of value in service delivery.

This synopsis of the Kenyan avocado industry demonstrates some complex phenomenon associated with typical food value chains. No clear cut solution is available to match the ever changing environment under which farmers operate and therefore continuous improvement processes have been adopted by different organizations and donor agents to improve efficiency among farmers.

Case 2: Value chain analysis to improve agricultural productivity

USAID funded a programme in Zambia called Production, Finance and Improved Technology (PROFIT), which used a value chain approach to create and strengthen links between micro and small enterprises and other actors at different levels of the value chain (PROFIT, 2010).

The programme targeted competitive, high potential industries that included lots of small and micro enterprises and had three components, namely (1) identifying the competitive advantage, (2) designing strategies to upgrade the industry and (3) ensuring competitive sustainability.

The scrutiny of the Zambian beef industry identified poor animal health among smallholders as a primary constraint affecting the competitiveness of the industry. Lack of private veterinary services available to smallholder farmers, as well as logistical challenges emanating from their dispersed location in hard-to-reach areas, were the major causes of poor animal health. This negatively affected the whole cattle to beef value chain in Zambia and highlighted the need for an intervention strategy. USAID thus facilitated the development of a veterinary services model.

The background document on the PROFIT veterinary services initiative (PROFIT, 2010), prepared for an electronic conference, suggests that the intervention around animal health provided a sound basis from which to focus on increasing smallholder cattle sales because the investment in herd health encouraged other key actors (such as insurance companies and abattoirs) to engage with the livestock owners. This allowed for more substantial business dialogue with these actors. While the initial focus of the programme was on addressing the herd health issue, resources were then allocated to other activities that would build other beef industry relationships.

These two cases give an indication of how the concept of VCA can be used to obtain an overall understanding of the value chain in order to identify the point of intervention that is likely to have the greatest positive impact on the industry. According to Kaplinsky and Morris (2000), when seeking to integrate SMMEs into global value chains, one needs to benchmark their skills and weaknesses against other firms, map their connectedness with other SMMEs (horizontal linkages) and with other firms (vertical linkages) and analyse both their connection to markets and their ability to keep to the ‘rules’ set by the stronger players.

2.2.3.2 The Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework (SLF) approach was employed to facilitate a detailed understanding of the various existing and non-existing capital in the study area. In developing the SLF framework, Scoones (1988) identified five assets or types of capital that can be used to describe the livelihood condition of smallholder farmers. The SLF assessment is used as the basis of analysis because it is all encompassing. It can be used in a variety of ways from project through to programme and policy level. At a grass roots level, it is important that livelihoods analysis is carried out in a simplified manner which captures the basic capital currently existing in the locality as well as the capital needed by the community to facilitate effective change. Livelihoods analysis must also provide a basis for measuring the impact of government or private projects on the livelihood of the people. The SLF provides information to help understand the main factors that affect poor people's livelihoods, as well as the relationships between these factors. This could help in facilitating policy, planning and implementation, and lead to effective development interventions. The SLF places people at the centre of development programmes. Figure 2.4 below shows the five assets or capital types. The framework was found to be suitable for analysing the livelihood of the smallholder farmers in the study areas as it identifies existing assets and strategic opportunities for rural poor people. More recently, other authors have developed variations of the SLF framework, such as the Learning about Livelihoods (LAL) Framework developed by de Satge *et al.,* (2002), which is discussed below.

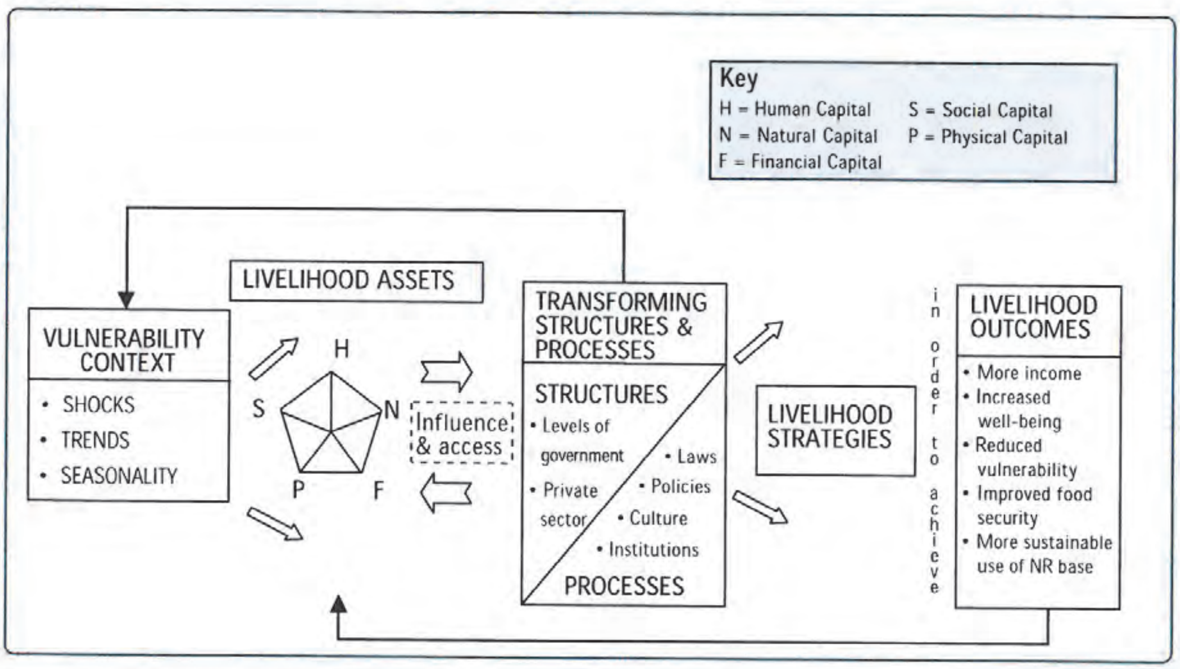

Figure 2.4 The Sustainable Livelihoods Framework.

Source: DFID (1999)

The SLF is generally used to conduct a livelihood analysis through a participatory process involving the target community. It is an approach to poverty reduction and is said to focus people's attention on strengths and assets. While recognising the multiple influences that people experience (and the multiple actors that are at play), it seeks to create an understanding of the relationships that exist between influences and their impacts on livelihoods.

The framework acknowledges that people use dynamic, multiple livelihood strategies in an effort to secure their livelihoods. The application of the approach is expected to lead to the identification of key challenges as well as opportunities for poverty reduction. In line with the multiple livelihood approach of people, there is also recognition that they may be seeking multiple outcomes (DFID, 1999). In line with the discussion above, Ellis (2000) observed that the livelihood approach comprises three main dimensions: (1) assets, (2) the processes that influence access to those assets, and (3) the strategies adopted for survival.

The main components of SLF are clearly represented in Figure 2.4 and can be summarised as:

- Livelihood assets
- Transforming structures & processes
- Livelihood strategies
- Livelihood outcomes
- Vulnerability context.

These five components are discussed further below.

Livelihood assets serve as the basis for people's livelihood. There are five types of assets / capital that enable people to pursue sustainable livelihoods, namely:

- *Human capital* (H): Comprises knowledge, skills and the ability to perform labour (including good health)
- *Financial capital* (F): Comprises various financial resources available to people
- *Natural capital* (N): Comprises natural resources available to people (e.g. land, water, minerals, etc.)
- *Physical capital* (P): Comprises the basic tangible infrastructure and producer goods available to the people (e.g. farm equipment, transport, road access, etc.)
- *Social capital* (S): Comprises the societal resources that people can draw upon individually or collectively within a community (e.g. social networks, clubs etc.).

Transforming processes and structures are those processes and structures with the capacity to inform or transform people's livelihoods. The term refers to institutions (including the policy and regulatory environment) and organisations (government and private institutions including local traditional structures) that impact on people's livelihoods, both positively and negatively (DFID, 1999).

Livelihood strategies are comprised of the range of choices and decisions that people make or undertake in order to achieve their livelihood goals and aspirations. In terms of the current study, these activities could be in the form of agricultural activities, investment activities, etc.

Livelihood outcomes are the achievements of livelihood strategies that individuals and households are always striving to attain (e.g. more income, improved food security, more sustainable use of natural resources, improved wellbeing, etc.). Livelihood outcomes can translate into increased physical or financial capital of a particular household, which are in turn available as assets.

People's livelihoods and available capital are usually affected by certain trends, shocks and seasonality over which they have limited or no control. This is defined as the vulnerability context. Shocks could be crop failures because of pest infestation, or livestock loss from disease outbreaks. The extent to which households are affected by such shocks is an indication of their vulnerability context. Transforming structures and processes often influence the vulnerability context, which in turn can impact on households' livelihood assets. The role of developmental programme interventions is shown in Figure 2.5 (Vulnerability Context Framework), where interventions aim to build assets and reduce vulnerability (Murray and Ferguson, 2001).

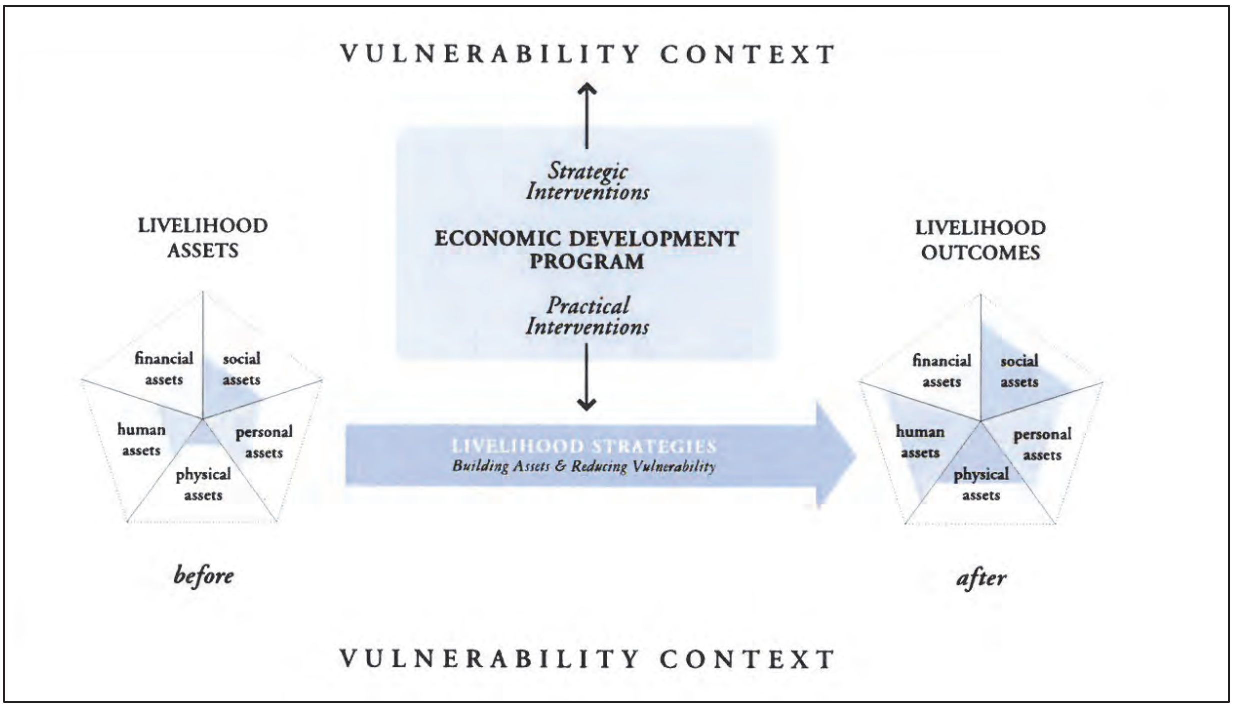

Figure 2.5 Vulnerability Context Framework.

Source: Murray and Ferguson (2001)

Power dynamics, which exist within communities as well as between different groups of stakeholders, also play a significant role within the components of the SLF. Poor communities and the poorer people within communities are those who generally have least access to assets. They are also likely to have limited influence over structures and processes and are highly vulnerable to shocks.

The SLF has been criticised for not giving sufficient attention to aspects of people's livelihood that are equally important for sustainable living and utilisation of assets. These include the aspect of culture, the notions of power and power relations and historical factors (Adato and Meinzen-Dick, 2002). The current study explores some of the implications of important issues such as culture and tradition of the people as well as power and power relationships. These are important factors, even though it might not be possible to attach any economic value to them. They are central to the way that smallholder farmers operate, providing the context of norms and beliefs that affect the sustainability of agricultural ventures.

The LAL Framework, mentioned above, provides an alternative approach for understanding the factors that impact on the livelihoods of households (de Satge *et al.,* 2002). This framework distinguishes between the social, physical, financial and natural assets that households have and their capabilities (otherwise termed human capital). The extent of people's capabilities determines the extent to which they can make use of available assets (de Satge *et al.,* 2002). The LAL framework is presented in Figure 2.6.

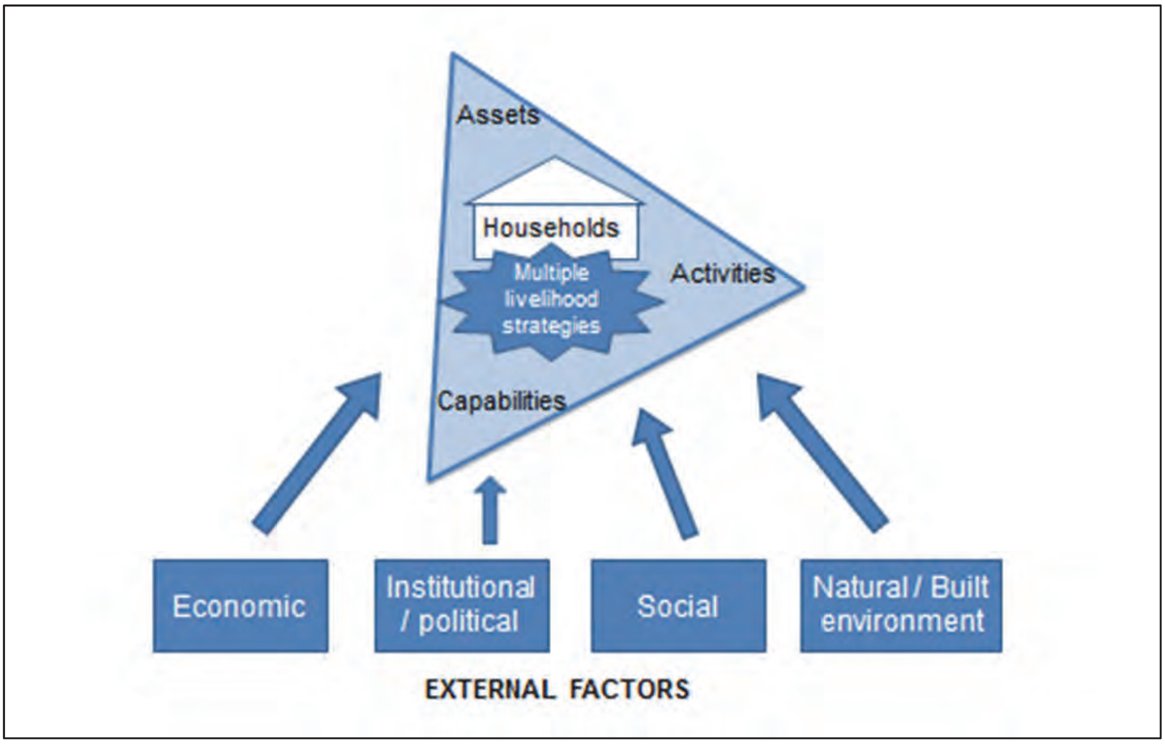

Figure 2.6 The Learning about Livelihoods Framework.

Source: Adapted from de Satge *et al.*, 2002.

2.2.3.3 Williamson's approach to institutional analysis

The concept of social capital, which is one of the forms of capital that the SLF defines, is a key component of institutional economics. Thus it was evident that a more relevant analytical approach that succinctly describes the various institutional frameworks in the study area could be appropriate. Williamson (2000) developed an approach to social analysis based on four levels of analysis. This approach has already been applied to smallholder farmers in South Africa (Jordaan and Grové, 2012). The approach also covers the historical aspect, because it takes into consideration the length of time over which changes occur.

Williamson, working in the field of new institutional economics (NIE), developed an approach to social analysis based on four levels of analysis that draws on different branches of economic thought. At the highest level (Level 1) is social embeddedness (customs, norms, traditions, etc.), which change very slowly over centuries or millennia. Level 2 is the institutional environment, which refers to informal social rules ('rules of the game'), which change at a rate of 10 years to a century. Level 3 is the governance structure level that refers to the 'play (or organization) of the game', and which changes more frequently, at the rate of one year to a decade. At the lowest level (Level 4), is resource allocation, which refers to prices and production quantities. At this level, change is continuous. Each level impacts on the level below it (so, for example, social embeddedness places constraints on the 'rules of the game') (Milagrosa, 2007). To some extent, there is also feedback from lower levels to higher levels, as is shown in Figure 2.7.

This analytical approach is appropriate for investigations of the current nature since it addresses a number of core areas referred to in the sub-objective of the overall study, namely social embeddedness and institutional arrangements / governance, including property rights, norms and values. Williamson's approach provides a direct method for analysing the social capital aspect of this study; as a way of complementing the SLF presented above.

Embeddedness (Level 1) includes informal institutions, customs, traditions, norms, religion, etc. Social embeddedness according to Williamson (2000) refers to the manner in which a social structure creates norms and values, customs, morals, traditions and codes of conduct. It is the level in which informal rules of economic behaviour originate i.e. the *informal rules of the game*. The level deals primarily with how economic transactions are embedded in social relations. The institutions on this level change very slowly. This is mainly because this aspect is ingrained in the lifestyle of the people and forms a major aspect of how a society controls itself.

The second level, institutional environment, is referred to as the *formal rules of the game*. This level emphasises the role of government, laws, constitutions and property rights among other things. The institutional environment is dynamic and it changes over time. For instance in the past, chiefs and kings had absolute control over the affairs of the people, especially in productive activities such as farming. However, modern societal systems no longer give them absolute power in most parts of the world. Political leadership has replaced and displaced their absolute authority and their activities are now closely monitored by legally constituted authority. The significance of this level of social analysis to the study site is clear, as the role of the local traditional leaders (chiefs) and their subjects are closely monitored by authority at the level of the local and district municipality. The government protects and enforces property rights, monitors the institutional environment (rules of the game) and ensures strict compliance to the existing legal structures in society. While it might take longer for informal rules of the game (such as norms, values, etc.) to change, the formal rules of the game under this level of analysis can be changed and implemented faster. Some aspects of the institutional environment will change more quickly than others depending on the prevailing circumstances. For example, ordinary laws can be implemented faster than constitutional amendments. In order to facilitate ease of analysis for the purpose of this study, it is good to stress that the informal rules of social embeddedness and the formal rules of institutional environment are the rules of the game within the society in which the institutional arrangements (governance structures) function.

Governance structures constitute level 3. This concept is often referred to as '*the play of the game';* which involves implementation of '*the rules of the game'*. A governance structure can be described as an institutional arrangement consisting of the rules of the game by which an exchange is carried out and administered (Hendrikse, 2003). It can also be considered as a contractual format chosen to manage a transaction, ranging from a simple spot market transaction, through a long-term relational contract, to a transaction entirely within an organisation or firm (Fitzroy et al., 1998). However, within the context of this study, the governance structures represent the existing rules or contractual arrangements within the study area which are instrumental to managing a transaction. They are influenced by the level of social embeddedness and the institutional environment in the study area.

The fourth level is resource allocation and employment. This level focuses mainly on neoclassical economic theory and it happens continuously within any given society. It is often referred to as theory of incentive and involves continuous changes to price and output. While this may not be directly relevant to this study it is worth mentioning, in order to complete the four level of analysis as illustrated by Williamson.

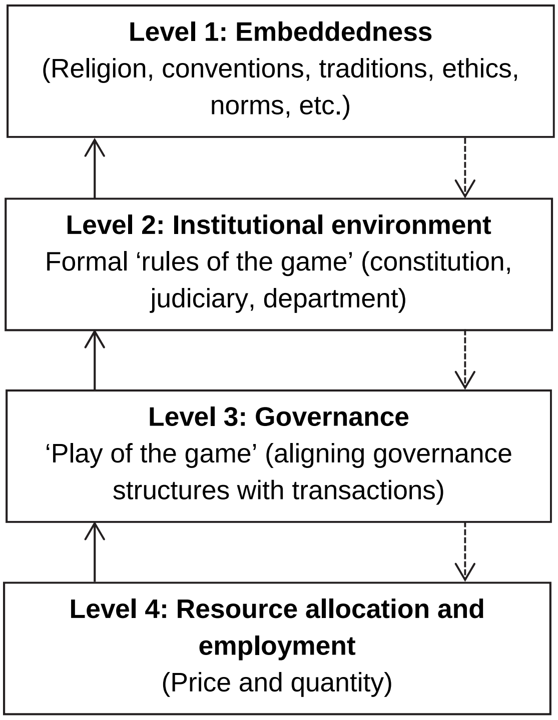

Figure 2.7 The four levels of social analysis.

Source: Adapted from Williamson (2000)

2.2.3.4 The concept of social capital

Social capital is a term that recognises social bonds and social norms as assets that can contribute to sustainable livelihoods. It can be discussed in terms of four elements: relationships of trust; reciprocity and exchanges; common rules, norms and sanctions and, lastly, connectedness, networks and groups (Pretty and Buck, 2002). These institutions, relationships, and norms shape the quality and quantity of a society's social interactions (World Bank, 2014a). These assets can impact on agricultural production in a number of ways, including facilitating the spread of new technologies (Liverpool-Tasie *et al*., 2011).

The conceptualisation of social capital is relatively recent (Seguya, 2009). The creation and operations of institutions and norms were once treated exclusively as a field of study meant only for sociologists. However, present day economic sociology had narrowed down the gaps between economics and sociology (Smelser and Swedberg, 1994) and it is now widely understood that social norms and institutions inform or supplement rational decision-making by individuals. Despite this shift within neoclassical economics, economic sociology still considers that economics underestimates the depth of the social character of norms and institutions. Given that forms of social capital are society-specific and change over time, research on social capital is necessary given its relationship to important development outcomes such as food security and access to resources like land and water.

Social capital is about the value of social networks, bonding similar people and creating bridges / linkages between diverse people, with some level of reciprocity (Dekker and Uslaner, 2001). Whereas physical capital refers to physical objects and human capital refers to the properties of individuals, social capital refers to connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them. Social capital is closely related to a term that some use, namely ‘civic virtue’ (Putnam, 2000).

Unlike human capital, social capital is not embodied in one person; rather it involves the relations a person has with other individuals as well as the socioeconomic institutions within which that individual operates (Coleman, 1988). It can also be termed social-structural resources that are common to society and operate as capital for the individual by facilitating rational action by the individual (Coleman, 1990). Thus it is the opinion of Coleman (1990) that social capital is a public good that can shape the actions of individual agents as well as influencing the formation of collective agents and their actions. The ‘social-structural’ resources that constitute social capital generally result in trust and mutual confidence between different individuals (and even parties), forming a strong basis for collective action (Fine and Lapavitsas, 2004).

Bourdieu (1985) defined the concept of social capital as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition”. Bourdieu’s definition highlights two key elements: the social relationship which gives people the right to claim access to the resources of their network, and the quantity and quality of those resources. Another aspect that Bourdieu highlights regarding social capital is the fact that, while the outcomes of social capital are economic, the process that brings about this economic outcome is not economic, but social. Social capital has also been termed the ‘stock of socio-psychological attributes of relationships including trust and commitment’ (Nkhata *et al.*, 2009).

The social capital available to smallholder farmers includes networks and connections, within and between neighbourhoods, families / tribes, etc. Relations of trust and mutual support are another related asset. Trust can be viewed as a socio-psychological state in which a party to a relationship adopts a belief that the other party will not act against its interests, and is based on past experiences, current interactions and future expectations. Commitment refers to the investment of time and resources in building long-term relationships and is an indicator of the extent to which a party values a relationship (Luo, 2002). The existence of both formal and informal groups provides social capital that can support agricultural production, as can collective representation. Strong leadership, common rules and sanctions as well as mechanisms that support participation in decision-making processes are all assets that can be described as social capital (IFAD, 2003).

It is generally believed that high social capital in a community will contribute significantly to a better organisation for collective action, improved bargaining power and confidence (Narayan *et al.,* 2000). Two forms of social capital, namely (1) Cognitive which includes norms, values and beliefs and (2) Structural which includes roles, rules and procedures, as well as networks, have been identified (Uphoff, 1999). The current study highlights these two forms of social capital as they relate to this study area. The study pays attention to networks and relationships, which, according to Coleman (1988), are fundamental to the concept of social capital. It also considers trust, social norms and information-sharing, all of which play very significant roles in how social capital is created, sustained and expanded.

2.2.3.5 The concept of social embeddedness

Social embeddedness is the degree to which individuals or groups / companies / firms are enmeshed in a social network. The term embeddedness involves the overlap between social and economic ties within and between groups, organizations and communities etc. (Granovetter, 1985). Embeddedness within the local community refers to relationships in the local context. This includes local relationships / networks as well as relationships with the traditional council, which is important for securing access to land and resolving problems, for example, censure for not controlling livestock or the commission of minor crimes.

It has been suggested by Granovetter (1985) that economic behaviour should be analysed as 'embedded' in networks of 'social relations'. This is how the term is used in this study. This means that personal relations between individuals are considered to inform s economic decision-making. Granovetter (1985) suggested that decision-making is shaped by the requirements, impositions and possibilities opened by 'social relations', such as friendship. According to Uzzi (1999), the approach of 'networks' or 'embeddedness' typically assumes that trust is a very important norm among economic agents in facilitating efficient decision-making. Trust emerges when agents have regular contacts and meetings with each other in any social and cultural context. This is particularly important in matters relating to finance, due primarily to the fact that trust plays a major role in credit management.

According to Woolcock (1998), the high degree of network density and closed relationships necessary for creating informal exchanges at the micro-scale level of inter-community relations has been found to constrain network members from making the transition to formal exchanges at the macro-scale level of state-society relations. In other words, a very strong social cohesion that should serve as the basis for building trust and close relationships also serves as a constraint to entering the formal mainstream market. This is often the case in small communities where everybody seems to know each other, and informal transactions take place without giving consideration to exploring the formal market. This is sometimes because it is thought that the people with close ties should come first. This could be a reason why a portion of yields is sometimes donated to other members of the community (Muchara, 2011). This concept is very applicable to the current study which seeks to find mechanisms for smallholder farmers to become more involved in the mainstream economy.

2.2.3.6 The concept of collective action

Currently, the policies of many African countries support collective action (CA) through cooperatives and farmer-based organisations (Salifu *et al*., 2010). Olson (1965) was one of the key authors who initiated discussion about CA. He saw groups as comprising a number of individuals with common interests, and suggested that generally organisations are expected to address these common interests of their members (e.g. farmers' organisations lobbying to change legislation). He recognised that where individuals have common interests, individual unorganised action is not able to advance the common interest effectively. He cited various authors who suggested that people are instinctively drawn to forming groups and that CA was evident in primitive times in CA based family / kinship relationships. He also highlighted that members of groups have their own interests so that organisations will fail if they are not able to meet the members' interests, and will also not form if members' needs can be met by individual action. CA is dependent on agreement or consensus amongst members. It involves both joint action and joint decision-making.

Another, slightly different view of CA is that adopted by Organisation for Economic Cooperation and Development (OECD) (2013). Their definition, for the purpose of their study, is a set of actions taken by a group of farmers, often in conjunction with other people and organisations, acting together in order to tackle local agri-environmental issues. They highlighted that government can contribute as participants on non-participants, either actively participating in the CA and providing specific advice or indirectly supporting CA through policy measures, providing technical assistance, funding programmes, regulations and promotion of CA. CA often relies on financial support from governments and NGOs, especially in the early stages where moving away from individual action has relatively higher transaction costs (OECD, 2013).

Olson (1965) went on to say that setting up a group and engaging in collective activities has costs for the members so there must be incentives for them to join and remain involved. He also suggests that members would always prefer that others pay the costs of acquiring the common goods. Building on this is the realization that in big groups, the share of the total benefit to individuals is relatively small and furthermore free-riding frequently occurs because group members think they will get their share of benefits whether or not they contribute.. One option is to have incentives that only benefit those members who actually participate, or, conversely, where there is a negative impact on members who do not participate. In a study undertaken in Ghana, groups were found to comprise members from the same community or neighbouring communities. Kinship (religious, gender, or family-based relationships) was often an underlying factor and membership was fairly homogeneous. Many practitioners believe that CA is only sustainable when groups develop spontaneously, driven by their recognition of the need for CA (Salifu *et al*., 2010).

Another concept which Olson (1965) explored is that of exclusive or inclusive goods. The former are those where a fixed benefit can be derived from the goods, so more members means less benefit per member. In contrast, inclusive collective goods increase with the size of the membership, so benefit per member is not reduced. Small groups are generally thought to engage in CA more easily than large groups, except where large groups are functional as they are then able to reduce costs as they have bigger economies of scale (OECD, 2013). Related to this, Olson (1965) identified three different groups. The first group – said to be privileged groups – included some members who have an incentive to see the collective good provided even if they have to bear the full burden of providing it. Intermediate groups are said to be those groups where no member's share of the benefit is sufficient incentive to provide the good himself and the group is small enough for members to be aware if others are not contributing to the provision of the common good. The third type of group is said to be the latent group where individual input is fairly small and others will not be affected much if a member does not help to provide the collective good. Since others are unlikely to notice, there is little incentive for the individual to participate – this is often the case with large groups.

2.2.3.6.1 The advantages of collective action

OECD (2013), lists the following advantages of CA: In comparison with uncoordinated individual actions, it can provide public goods effectively, and it also provides for economy of scale; It encourages knowledge exchange between members and increases their technical capacities; Finally, it has the potential to facilitate access to markets for smallholders through improving efficiency of input acquisition, training, economies of scale and increased bargaining power (Oxfam, 2013).

It can also be used as a mechanism to improve credit recovery and it empowers farmers to advocate for external support, manage open access resources, strengthen their position relative to downstream traders, and reduce transaction costs of exchanging goods and information with smallholders (Salifu *et al.,* 2010). Groups have been found to result in substantially improved income generation through improved productivity and quality (Oxfam, 2013).

World Bank (2014) recognises that CA counteracts various situations that compromise development, including market failures, deterioration of customary institutions and the lack of empowerment of vulnerable groups. Poteete and Ostrom (2004) also suggested that CA could be used for the development of institutions (rules) for managing a resource. World Bank (2014) highlights that, given the complexity of societies, different forms of CA can take place at different scales involving different sub-groups of people.

Collective action has been recognised as having a role to play in addressing agri-environmental issues (Ayer, 1997; OECD, 2013). Ayer (1997) promoted grassroots CA (initiated by farmers rather than government) as a mechanism for dealing with agro-environmental problems. He also described different types of goods: pure private goods can be withheld until payment is received (so excludes those who do not pay); pure public goods (such as clean air) cannot be excluded even if someone does not contribute to the cost of maintaining it. Kruijssen *et al.,* (2007) explored CA as a mechanism for smallscale producers of agricultural biodiversity products to market their goods more effectively. It was recognised that besides the members acting collectively, linkages with other actors along the value chain (especially traders) allowed the members greater bargaining power and improved access to markets.

Ostrom (2004), when considering collective action related to land and natural resource use, mentioned indigenous institutions for CA that have evolved and survived over time. Relevant examples of CA included planting or harvesting jointly, using a common marketing facility, maintaining an irrigation scheme or meeting to decide on rules and processes.

2.2.3.6.2 The challenges of collective action

Challenges or barriers to CA include 'free-riding' where some group members do not contribute to group activities because they can benefit from others' activities without themselves incurring any costs (Olson, 1965; OECD, 2013). Ostrom (2004), considering CA related to land and natural resource use, suggested that it is often difficult to exclude non-participants from benefiting from the collective action of others. Transaction costs associated with CA can also be a barrier and the benefits accruing to individuals must be greater than the costs they incur from the action (OECD, 2013).

Poteete and Ostrom (2004) went on to describe other challenges related to CA around natural resource management. In particular, they highlighted one that has relevance to the management and maintenance of the Mooi River irrigation scheme, namely that use and maintenance activities require coordination and if there is more than one solution to address a challenge and these options have different distributional consequences, then group members may not be willing to cooperate.

The functionality of groups is also a challenge for CA. In a Ghana study by Salifu *et al*. (2010), of the 18 groups explored, 13 had been dormant or inactive for at least one year. Leadership shortcomings emerged as a characteristic of the co-ops and Faith Based Organisations interviewed and while they had constitutions, these did not record the property and decision rights of the members clearly. Furthermore, the study found that the co-ops had an average age of 4.5 years, despite co-ops not being a new phenomenon. This suggested that they were generally short-lived and relied on external support for the duration of their existence. Focus group discussion (FGDs) found that most were only formed to access external support from government and NGOs.

2.2.3.6.3 Strengthening collective action

Some factors that can improve the effectiveness of CA are presented below. According to OECD (2013), successful CA requires leadership by farmers or other parties such as NGOs. In addition, members need to have similar identities and interests to facilitate group activities.

A study by Oxfam (2013) found that where CA is focused on economic outcomes, the changes in empowerment are far less substantial than when the action is focused on addressing social norms, or complemented by interventions that address societal norms such as property rights. Furthermore, when considering CA by women's groups, it was found that smaller groups where members were less dispersed tended to be more suitable for ensuring the participation of women. Also, women involved in groups focused on marketing required the support of their husbands – not just in allowing their participation but in taking on some of the household tasks and providing access to resources. Some interesting suggestions made by Oxfam for supporting CA included building on existing informal CA, and communicating the potential benefits of group membership relative to the costs of participating. Another recommendation was the establishment of a framework defining the relationships between district authorities and other actors.

2.2.3.7 Cooperatives and governance

2.2.3.7.1 Background

South Africa has a long history of cooperatives, but the nature of the cooperatives has changed over time. Cooperatives that characterized the commercial sector in South Africa not only provided services to their members, but were agents of the agricultural marketing boards and served as a conduit for subsidized loans from the Land Bank (Ortmann and King, 2007). Cooperatives are organisations that capture opportunities while addressing the needs and aspirations of their members. Most agricultural cooperatives involve either supply of inputs (such as distribution of planting material and agro-chemicals), joint production (where members operate on jointly held agricultural plots) and / or agricultural marketing (where farmers pool resources for processing and marketing their commodity). Sometimes input supply and marketing aspects are combined (Chambo, 2009). According to Ortmann and King (2007), three broad categories of farming cooperatives exist in South Africa. These are marketing cooperatives (negotiating prices, selling products, etc.); farm supply cooperatives (providing inputs and supplies to their members) and service cooperatives (providing services such as storage, processing, credit and so on). Cooperative structures can integrate certain functions into their operations (i.e. vertical). For example maize farmers could buy their own mill rather than supplying their maize collectively to another business (Ortmann and King, 2007).

Good governance is important for the sustainability of an organization. With cooperatives, which can involve a relatively large number of people, decision-making can be a challenge and requires rigorous internal processes. Governance is a term that refers to the internal processes of an organisation, with more emphasis on strategic focus than daily operations. The constitution of a cooperative is the document that provides a record of its governance arrangements. Committees are established to make the decision-making process more efficient as the size of the group increases and such processes become more difficult (Cooperatives UK, 2011). Some of the principles of good governance include transparency, accountability and risk management, which should lead to efficient use of resources and reduced levels of conflict (Mauritius Ministry, 2011).

Poor governance can lead to breakdowns in relations between members and the governing body (i.e. the committee) and can also lead to a lack of clarity regarding role and responsibilities (Cooperatives UK, 2011). Ortmann and King (2007) cited work done by van der Walt (2005) who found that 65% of Limpopo cooperatives included in a study were found to be non-operational for various reasons, one of which was that operations never started subsequent to registration. Poor management was however cited as the major reason for their failure, as well as conflict among members.

One of the challenges experienced by cooperatives is related to management and governance, and there is a need for entrepreneurial leaders and managers. An alternative approach is to have cooperatives where membership requires some level of investment which is likely to prevent free riding. The latter is a deviation from the traditional model where the mode of ownership is based on a low level of investment by members so as to allow for participation by the poor (Chambo, 2009).

2.2.3.7.2 Legislative aspects of cooperatives

Cooperatives are the preferred legal entity for development initiatives in South Africa, being supported by a number of different government departments and development agencies such as Department of Agriculture, Forestry and Fisheries; KwaZulu-Natal Department of Economic Development and Tourism; the Department of Trade and Industry; Small Enterprise Development Agency. Cooperatives are registered through the Companies and Intellectual Property Commission (CIPC). The CIPC was established through the amalgamation of the Office of Companies and Intellectual Property Enforcement and the Companies and Intellectual Property Registration Office (CIPRO). The

Commission is a juristic person, and as mandated by the Companies Act, 2008 (Act 71 of 2008), has jurisdiction throughout South Africa. It falls under the Minister of Trade and Industry.

Two key pieces of national legislation relate to cooperatives. The Cooperatives Act (14 of 2005) provides for the formation and registration of cooperatives; the establishment of a Cooperatives Advisory Board and the winding up of cooperatives. The Act specifically mentions the co-operative values of self-help, self-reliance, self-responsibility, democracy, equality and social responsibility and highlights that the government is committed to providing a supportive legal framework for cooperatives to develop and flourish.

According to the Act, a 'primary cooperative' means a co-operative formed by a minimum of five natural persons whose object is to provide employment or services to its members and to facilitate community development. 'A secondary cooperative' means a cooperative formed by two or more primary cooperatives to provide sectoral services to its members, and may include juristic persons. 'tertiary co-operative' means a co-operative whose members are secondary cooperatives and whose object is to advocate and engage organs of state, the private sector and stakeholders on behalf of its members, and may also be referred to as a cooperative apex.

Act No 6 of 2013, the Cooperatives Amendment Act, 2013, provides for additional aspects of cooperatives to be addressed, such as allowing for categories of primary cooperatives as well as amending the processes for annual audits of cooperatives. According to the new Act, primary cooperatives are now classified as small, small-medium and medium-large primary cooperatives and they are excluded from certain legislation that pertains to other primary cooperatives. There are also regulations relating to the Cooperatives Act of 2005 (General Notice, 2007, Department of Trade and Industry), which specify the process of registration, forms to be filled in when registering, costs and so on.

According to CIPC, a cooperative is a business where a group of people get together voluntarily to obtain a product or service. Thus a cooperative is an enterprise that provides services and / or products to its members. In addition, profits (known as surpluses in a co-operative) are divided among members in relation to the amount of the business each member does with the co-operative. The principles of a cooperative are: (1) Democratic member control; (2) Voluntary and open membership; (3) Autonomy and independence; (4) Educational training and information; (5) Co-operation among co-operatives; (6) Concern for community and (7) Member economic participation.

One of the initiatives aimed at supporting cooperatives is that of the DTI, namely their Cooperative Incentive Scheme (CIS). This is a 90:10 cost-sharing grant for registered primary co-operatives. The objective of the CIS is to improve the viability and competitiveness of co-operative enterprises by lowering their cost of doing business through an incentive that supports Broad-Based Black Economic Empowerment. The grant can be used for a range of activities including the provision of infrastructure, machinery, tools and working capital.

2.2.3.8 The concept of human capital

Human capital is another of the assets available to smallholder farmers and is based on the quality and quantity of labour available (Munthali & Muruyama, 2013). It is the capacity of individuals to be productive and relates to both farmers and those with whom they work, namely hired help or family labour. Family size is thus another factor impacting on availability of human capital (Boateng, 2013).

Human capital is a combination of people’s skills and knowledge base as well as their health (Pretty and Buck, 2002; Boateng, 2013). Human capital inputs, such as education, affect technical efficiency, which is a measure of a farm's productive performance, i.e. their ability to maximise output for a given set of inputs.

As mentioned above, de Satge *et al.,* (2002) refer to human capital as capabilities. Capabilities are required if households are to optimise existing assets, while similarly the lack of material and social assets prevents households making use of their capabilities. De Satge *et al,.* (2002) go on to propose that human capabilities include a range of skills and knowledge (from local knowledge about the environment to specific production and / or entrepreneurial skills) as well as their ability to labour, and are thus based on health status as well as level of education. Nutrition is another factor that impacts on people's health and their ability to be productive (Wouterse, 2011).

Human capital has been found to be strongly related to wealth levels as this impacts on people's access to education (Matshe, 2009). External agents can work with individuals to improve their skills and knowledge, as well as their leadership capabilities, thereby increasing the available capital (Pretty and Buck, 2002).

2.2.3.9 Summary of the literature

The literature review covered a diverse range of topics and was developed as the project unfolded and new concepts emerged. The review highlighted the important role that smallholder agriculture plays in South Africa as well as the heterogeneity that exists with the sector. This diversity needs to be addressed by development interventions aimed at growing the sector.

The fact that the agricultural sector uses some 60% of the country's surface- and groundwater resources highlights the need to improve water use productivity. Much work has been done on improving water use productivity, not only of irrigated crop production, but also dryland farming and livestock production.

Much work has been done to better understand the functioning of smallholder irrigation schemes and the factors that constrain them. It is clear that many of these factors are socio-institutional in nature. The literature review gave attention to the non-technical factors affecting smallholder participation in the formal economy, including the concept of social embeddedness and social capital and the role that collective action can play in overcoming many of the challenges that smallholders face.

Lastly, the literature review covered the various frameworks that guided the design of the research and analysis of the results. This included value chain analysis, the Sustainable Livelihoods Framework (SLF) and the New Institutional Economics (NIE) Framework. The literature review allowed the authors to draw on the experiences of other studies that were relevant to the current project and to gain a better understanding of key concepts. Both the SLF and NIE Framework have been applied within the context of the current project to understand how access to different forms of capital impacts on the ability of smallholder farmers to participate in formal food value chains.

3 RESEARCH METHODOLOGY AND SITE SELECTION

3.1 RESEARCH APPROACHES AND METHODS

This study made use of various tools to gather empirical data related to the identified farming communities and their agricultural value chains. The project was not specifically designed to address the challenges and opportunities encountered, but rather to improve current understanding of the factors that need to be addressed if smallholder farmers are to be integrated into the mainstream economy.

The Sustainable Livelihoods Framework, and its concept of different forms of capital, formed the basis for the study (DFID, 1999). The intensive data collection process at each of the sites allowed for the collection of both qualitative and quantitative data. This was gathered through the use of questionnaires, FGDs and key informant interviews.

At the end of each study, the findings were shared with farmers at the sites. Furthermore, efforts were made where possible to address knowledge gaps encountered during the study so as to provide direct benefits for farmers involved in the research. At one of the sites, joint experimentation was undertaken with a group of farmers to evaluate interventions to improve production collectively. This was an effort to build the decision-making capacity of the farmers.

3.2 SITE SELECTION

3.2.1 Motivation for selection of sites

In order to address Specific Objective 2, a process to identify, motivate for and select study sites in rain-fed and irrigated farming areas was undertaken. The choice of sites had to include areas where rainfed and irrigated farming were feasible, where impacts of land reform and established settlement models could be explored, where alternative staple food crops and animal types could be covered and where there was access to irrigation and/or water harvesting and conservation technology. Three sites that met the project requirements as shown in Table 3.1 were finally selected:

- Willowvale, Eastern Cape
- Marina, Eastern Cape
- Mooi River Irrigation Scheme (MRIS), KwaZulu-Natal.

The three study sites selected allowed for an analysis of both rainfed and irrigated food value chains, as demonstrated in Table 3.1. The Willowvale irrigation projects had both access to irrigation infrastructure and a reliable source of water, and provided the opportunity to investigate the factors impacting on small-scale vegetable farmers. These projects were located in an area where there was limited competition from commercial farmers. The farming systems at Marina were a combination of rainfed and irrigated commodities and involved both community projects active individual farmers. The inclusion of the MRIS as a site allowed for a comparison of two different models of irrigation initiatives supported by the South African government.

The MRIS and Marina study sites were both located in fairly close proximity to commercial farming areas that provided competition, but both sites were well located in terms of access to markets. In all sites, there were established agricultural activities taking place that ranged from household or subsistence-level production to small-scale commercial production. The value chains encountered across the three sites included a range of staple food crops and animal types, some of which were common across all sites, while others were encountered at only one site.

Table 3.1 Compliance of sites with criteria for site selection

Criteria	**Willowvale, Eastern Cape**	**Marina, Eastern Cape**	**Mooi River Irrigation Scheme, Msinga, KwaZulu-Natal**
Rainfed agriculture	Dryland cropping	Banana production	Dryland cropping (limited)
Irrigated agriculture	Two small irrigation schemes	Not applicable for individual farmers	Large irrigation scheme
Established activity	Irrigation projects in production	Household level banana production	Scheme in use though not fully utilised
Land reform initiatives and different settlement models	Communal tenure / Betterment scheme	Communal tenure / Scattered settlement, but more concentrated along roads	Communal tenure / Scattered settlement, but concentrated along the scheme
Alternative staple food crops	Cabbages, maize	Bananas	Maize, potatoes, tomatoes, cabbage
Animal types	Cattle, goats	Cattle, goats	Cattle, goats
Access to irrigation technology	Pumps and sprinklers at the projects	Not accessible (except at some vegetable projects)	Canal scheme
Water harvesting and conservation	Not occurring	Some mulching occurring	Not occurring

3.2.2 Processes of site selection

3.2.2.1 Willowvale, Eastern Cape

The site selection process undertaken was based on the following criteria:

- Existence of a functional irrigation system
- Good crop and animal diversity under production
- Participation in any of the available product markets (formal or informal) by the farmers
- Willingness of the farmers to participate in the project
- Growth potential of the irrigation project so that the research will empower more farmers
- No visible signs of farmer fatigue due to over participation in research activities
- Existence of a relationship between the community and the participating organisations (WRC, Agricultural and Rural Development Research Institute (ARDRI), University of Fort Hare) or opportunity to establish a positive relationship
- Project to encompass both men and women.

With the input from staff from ARDRI at University of Fort Hare (UFH), a pre-selection list of potential irrigation schemes in Eastern Cape was compiled. In addition, a number of other organisations were consulted, including the Eastern Cape Department of Agriculture, Local Municipalities and local leaders. Furthermore, documented strategies and plans (such as the Provincial Growth and Development Plans for Eastern Cape) were consulted. This process was used to exclude all non-operational schemes and those regarded as over-researched. A total of nine irrigation schemes in the

Eastern Cape were selected as potential study sites, namely: Melani irrigation scheme, Zalaze Irrigation Scheme, Qamdobowa Irrigation Scheme, Bettlestin Irrigation Scheme, Sheshegu Irrigation Scheme, Gcinisa North Irrigation Scheme, Kat River Irrigation Scheme, Hertzog Agricultural Cooperative (HACOP) and Foundation Community Project (FCP).

Physical assessment of these irrigation schemes was undertaken and the above stated parameters were employed, upon which a final selection of FCP and Ciko Santrini Community Project in Mbashe Municipality as the project's study sites was made. Various reasons underlined the disqualification of the other irrigation schemes, ranging from low number of participants (less than four) on most schemes such as HACOP and Qamdobowa irrigation schemes and limited areas under production, such as at Zalaze, Sheshegu and Gcinisa north irrigation schemes, where less than two hectares were under production. Some schemes also produced only one crop / vegetable and as such were discarded on the basis of inadequate enterprise diversity.

Based on the project objectives and the stated site selection process FCP met the basic conditions with regard to geographic location, product diversity, growth potential and the willingness of farmers to participate in the research process. Due to the limited scale of the project and number of beneficiaries at the FCP, as well as the need to broaden the range of farmer categories involved in the study, an additional irrigation project along the Shixini River, namely Ciko Santrini Community Project (CSP), was identified. Each of the projects had approximately 20 members operating on an area of approximately 6 ha in extent. These farmers were expected to contribute data on their production and marketing patterns, goals, needs and aspirations as members of the corporative and individually for their other agricultural activities.

3.2.2.2 Marina, Eastern Cape

The village of Marina, together with the neighbouring villages, was selected as a site for the value chain analysis study because it is one of the areas in the Eastern Cape where Lima Rural Development Foundation, one of the key partners, is active and has established relationships with farmers as well as the local extension officer from the Eastern Cape Department of Agriculture. The site allows for engagement of small-scale farmers that are operating semi-commercially on an individual basis on communally owned land under traditional leadership.

In addition, the farmers are involved in a range of value chains, some of which align closely with commercial activities happening in nearby parts of KwaZulu-Natal (banana production in particular), which could provide opportunities for the integration of small-scale farmers into the mainstream economy. The farmers could supply their fresh produce to nearby towns in both Eastern Cape and KwaZulu-Natal as well as to fresh produce markets in both provinces, namely the Kei Fresh Produce Market and the new Ugu Fresh Produce Market at Port Shepstone.

The site was selected after analysing Lima's farmer database for Bizana Local Municipality. Marina was chosen as the study site as this area had the highest concentration of farmers that are working with Lima and it is an active farming area with both crop (irrigated and dry-land) and livestock farming activities.

3.2.2.3 Mooi River Irrigation Scheme, KwaZulu-Natal

Through engagement with agriculture officials from selected districts in KwaZulu-Natal Province, ten potential agricultural cooperatives were shortlisted as potential study sites. Based on the selection criteria articulated above, the Mooi River Irrigation Scheme was selected as the final study site in KwaZulu-Natal Province. Most projects were discarded due to limited numbers of participants and non-existence of irrigation infrastructure especially with rainfed cooperatives (Amakhuze, Sukumani, Reichenau). Below is the list of ten sites that were identified as potential sites:

- Amakhuze Project – a massification initiative
- Sukumani Project – a massification initiative
- Thembalethu Youth Project – not very active
- Sibukeleni Project – a High Economic Impact Project (HEIP)
- Sibomvini Project – a HEIP
- Siyathuthuka Project – a land tenure reform initiative
- Reichenau Project – a land tenure reform initiative
- Khlahlamba Project – a land tenure reform initiative
- Mooi River Irrigation Scheme – a government irrigation scheme
- Deepdale Community project – a land reform initiative

Since none of the above sites proved suitable after further investigation, a decision was taken to use the Mooi River Irrigation Scheme as the final site. The scheme has a large number of participants (824), is fairly unresearched and yet operational. Production was being undertaken both to meet household needs and for marketing, hence it offered the potential to explore value chains at smallholder level.

3.2.3 Description of the respective sites

A description of each of the selected sites is provided below.

3.2.3.1 Willowvale site, Eastern Cape

Foundation and Ciko Santrini Community Projects are situated in Mbashe Local Municipality, which is one of the eight local municipalities under the Amatole District Municipality in the Eastern Cape Province of South Africa. The sites are located in the south eastern part of the Eastern Cape Province, between East London and Mthatha (Figure 3.1). The distance from East London to Willowvale is approximately 165 km (130 km from East London to Idutywa town along the N2-Highway and a further 35 km in the south easterly direction, along the R408 to Willowvale town).

Foundation Community Project (FCP) is located in Mbozi village (S 32^{o} 16' 44.1''), which is 17 km east of Willowvale town, while Ciko Santrini Community Project is located in Ciko village (S 32^{o} 14' 49'', E 28^{o} 34' 09”), which is 7 km east of Willowvale town and north of FCP. Other nearby small towns includes Elliotdale and Butterworth.

The terrain of the study area is generally hilly and undulating. In terms of climatic conditions, there is no meteorological station in either Mbozi or Ciko villages and the details of climatic conditions are extrapolated from surrounding areas. Rainfall in the Mbashe Local Municipality ranges from 800 to over 1500 mm per annum. Summer temperatures range from 17^{o}C in higher altitude areas to 27^{o}C in lower altitude areas, while winter temperatures range between 3 and 10^{o}C (Gubu *et al.,* 2005). Modelled climate data for the area indicates that the mean annual temperature is 18^{o}C for both sites, while the mean annual rainfall is 939 and 980 mm for the two sites, respectively. According to Acocks (1988), veld types in the area consist of Valley Bushveld in the river valleys, Eastern Province Thornveld on the ridges and Coastal Forest and Thornveld in the lower lying areas towards the coast.

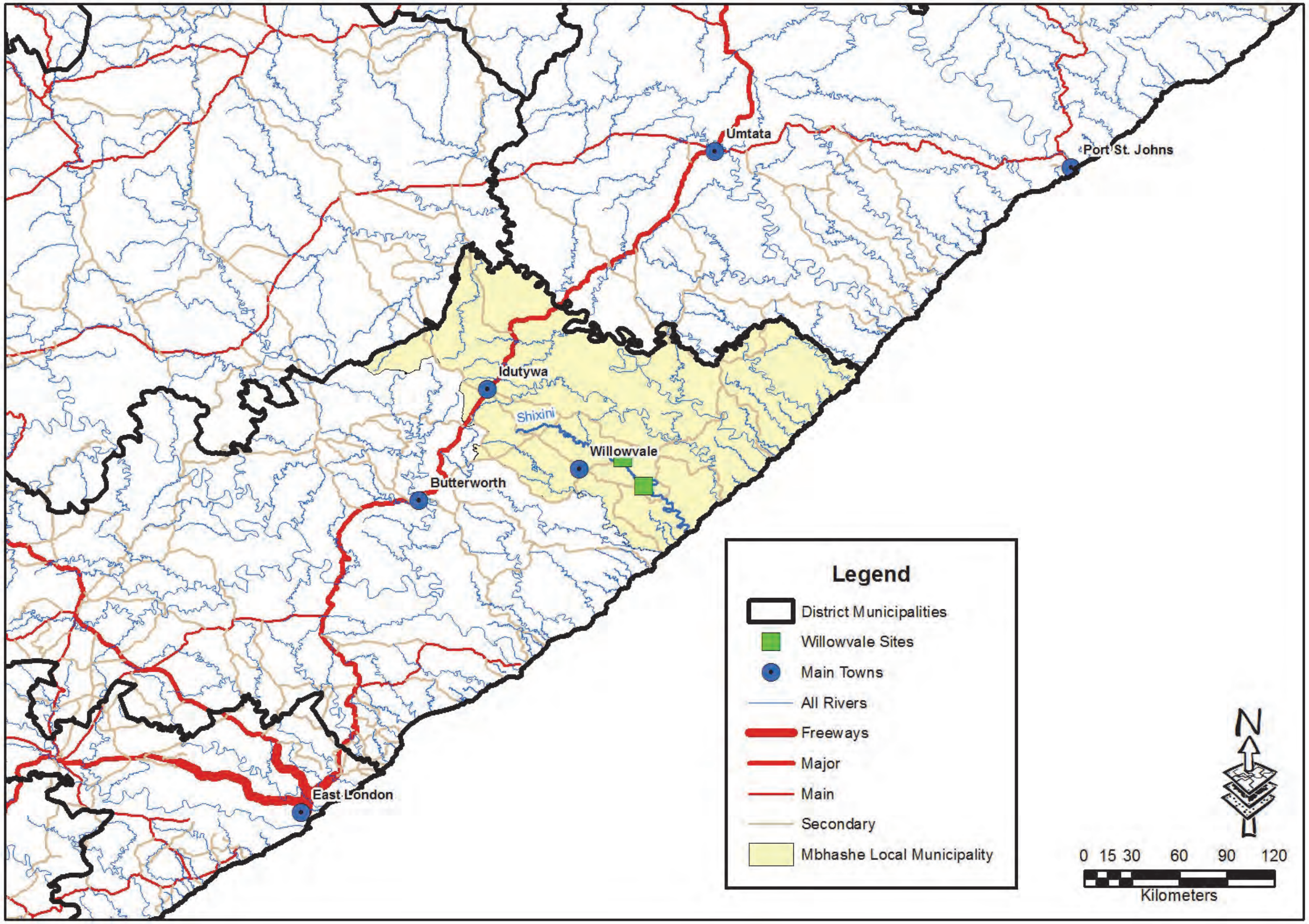

Figure 3.1 Map showing the location of Willowvale and the two irrigation projects.

Source: Prepared from data supplied by Chief Directorate Survey and Mapping (2014)

Amatole District Municipality has the highest population in Eastern Cape, with 1,657,373 people (EC DoA, 2006). Using census data for three sub-places listed in the Mbhashe Local Municipality and selected to represent the study area, an indication of demographic status of the local population at the study site was ascertained (Table 3.2). It is clear from the table that poverty levels are high. In addition, the large percentage of children and teenagers indicates a high level of dependency on those people that are employed or self-employed.

Table 3.2 Summary of demographic information for Ciko and Mbozi areas

Key criteria	Measure
Percentage of households with no income	16.1%
Gender balance % (male: female)	45.5 : 54.5
Percentage of population less than 20 years of age	42.3%
Density	1.69 people/ha

Source: Statistics SA (2011)

Land tenure in the study area is communal and residential stands are allocated by the headman, while grazing land is communally managed and used. The villages are generally located on the tops of the ridges and are serviced by gravel roads. Rural residents of the Mbashe Local Municipality have mixed farming systems. Livestock production is dominated by cattle, goats, and chickens with few sheep because of the steep terrain. The steep terrain also impacts negatively on crop farming, which is generally practiced at subsistence level and is restricted to homestead gardens and medium-sized plots where terrain permits. Rainfed production occurs mainly on the low lying areas that have deep, rich soils, and maize is the dominant crop. Mbashe Local Municipality is one of the local municipalities where the government launched its Green Revolution Programme. This programme aimed at supporting smallholder farmers so that food production could be increased by maximizing the area of land under cultivation. Mbozi village is also participating in the Siyazondla Food Production Programme of the EC DoA which is restricted to individuals owning less than one hectare of land. The objective of the programme is to enhance food security through boosting homestead food production (EC DoA, 2006).The nearest commercial farms with large-scale production of livestock and crops are found near East London. However, there are several medium to small-scale irrigated plots that produce cabbages, potatoes, spinach and butternuts for the market. Discussions with members from Foundation Community Project indicated that they have not yet seen these small-scale producers as a threat to their market and the project's viability. An analysis of the influence of these competitors on viability and pricing structures of the FCP is included in this project

3.2.3.2 Marina, Eastern Cape

Marina is a village in Ward 23 in Bizana Local Municipality, which falls within the O.R. Tambo District Municipality. In terms of the Lima initiative, Marina is seen as the centre for the area and thus represents a number of villages within Ward 23, including Biniza, Plangeni, Seaview, Vulindlela and Izikhuba. The villages of Biniza, Plangeni and Seaview fall under Nkosi Baleni, while the villages of Vulindlela and Izikhuba fall under Nkosi Mditshwa.

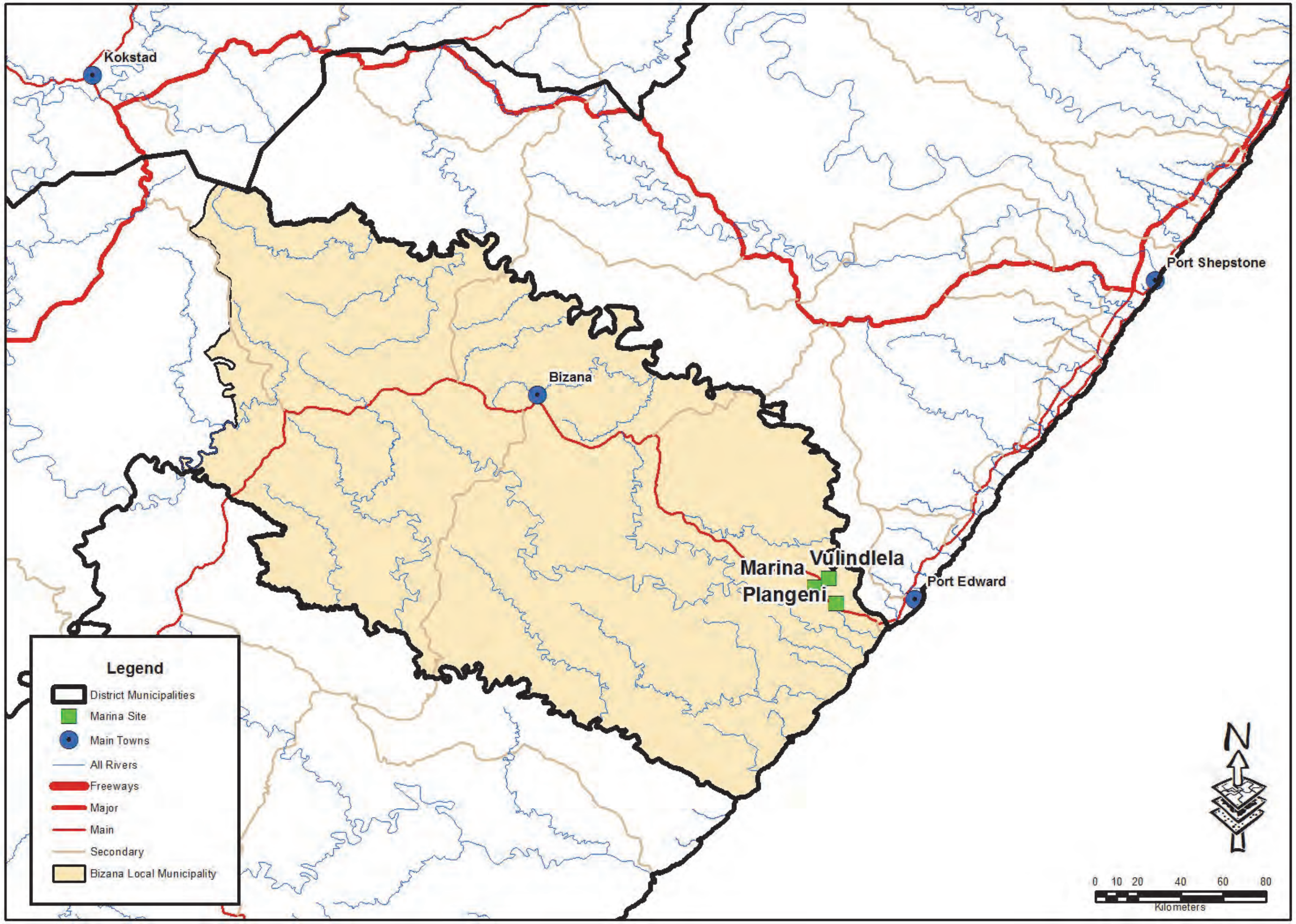

Figure 3.2 Map of the general area where Marina is located.

Source: Generated from data supplied by Chief Directorate Survey and Mapping (2014)

The villages are located along the main road between Port Edward and Bizana, some 20 km from Port Edward as shown in Figure 3.2. Harding and Port Edward are the closest areas where commercial farming activities occur (mainly timber, sugarcane, banana and dairy), both areas being located within KwaZulu-Natal. Terrain is generally undulating with incised river valleys. Mean annual temperatures are between 18 and 19^{o}C and mean annual rainfall is in excess of 1000 mm per annum, which falls mainly in summer. The area does not experience any frost. In terms of Acocks' vegetation types (Acocks, 1988), the study site consists of Pondoland Coastal Plateau Sourveld inland and Coastal Forest and Thornveld towards the coast.

Using census data for two sub-places listed in the Mbizana Local Municipality and covering the study area, an indication of the demographic status of the local population was ascertained (Table 3.3). From this it is clear that a substantial portion of households (44%) have no source of income, while more than half of the population is under the age of 20 years. Population densities for the area are high (3.53 people/ha), which has direct implications for agricultural production. Figure 3.3 shows the location of households, which provides a visual representation of the high population density and the concentration of households along the main tar road.

Table 3.3 Summary of demographic information for the Marina area

Key criteria	Measure
Percentage of households with no income	19.9%
Gender balance % (male: female)	45.6 :54.4
Percentage of population less than 20 years of age	52.5%'
Density	2.48 people/ha

Source: Statistics SA (2011)

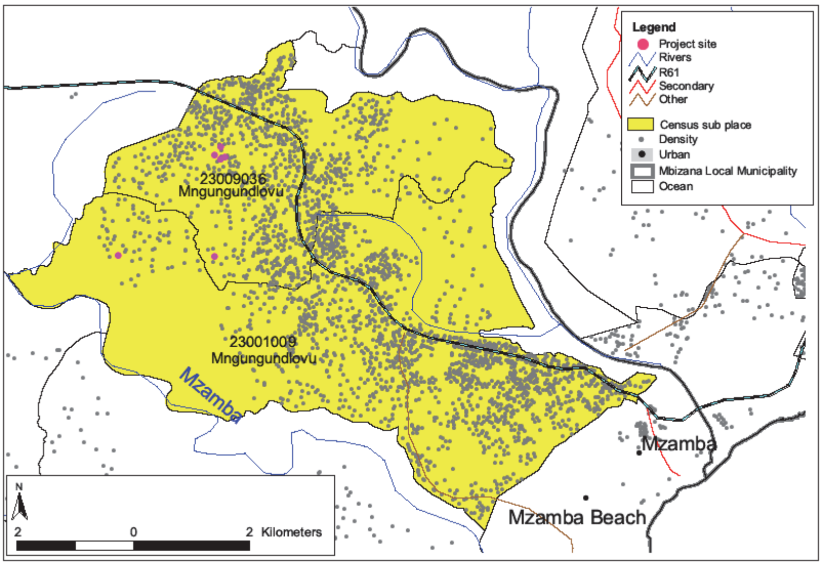

Figure 3.3 Map of the general area showing the concentration of dwellings.

Source: Eskom (2010)

The area is characterised by communal land ownership whereby land was allocated to families by the *inkosi*. Families are not permitted to sell this land and it is therefore passed from generation to generation. Some farmers lease land from other members of the community. They either pay cash or pay with a portion of the crop after harvest. For example, a farmer might keep 15 bags of maize after harvest and give 2 bags to the person with rights to the land (Njeya, 2009). The settlement pattern is characterised by homesteads that are dispersed across the landscape rather than being clustered in villages as with areas of the Eastern Cape where a Betterment Scheme was put in place. There are, however, more homesteads along the tar road where ease of access to transport is an obvious advantage. Besides the main road between Port Edward and Bizana, the roads are predominantly gravel and access to farmers' lands can be problematic during the wet season.

Agriculture in the region is largely subsistence in nature with the majority of the arable land remaining underdeveloped. Most households have access to an arable plot (usually 1 to 2 ha in size), on which they usually plant maize, dry beans or potatoes. In addition, many households have a homestead vegetable garden where they will plant a variety of seasonal vegetables. A number of these household gardens also have fruit trees including citrus, peaches and bananas. A number of small-scale banana plantations for commercial purposes also exist within the study area. Livestock, including sheep, cattle and goats, are kept by many households and these are grazed on the communal land. In addition there are some small-scale broiler projects within the area. Most of the fresh produce is used for household consumption (e.g. maize is used for feeding chickens) however, the excess is usually sold to local community members and to hawkers in Bizana. During the site visit, farmers said that they also sell some maize locally but that people do not always have cash to purchase it, which is a challenge. A maize milling machine located near Bizana provides a milling service to farmers but not a market. Farmers pay R14 for milling of a 20 litre container of maize. The three community projects supported by Lima in Marina were the Mahlathini Vegetable Project, Masiqhubekeni Poultry Project and the Marina J.S.S. Vegetable Project. Mahlathini Vegetable Project started in 2003 and at the time of the study had 10 members, 4 of whom were active. They farm vegetables (sweet potato, spinach and tomatoes) on 2 ha of land which is fenced and equipped with an irrigation system. Masiqhubekeni Poultry Project started in 2007 and at the time of study consisted of seven members who farm poultry collectively. They made use of an existing building and were initially funded by the EC DoA with 500 chickens and feed. The Marina J.S.S. Vegetable Project operated on about 0.5 ha and had six members who were parents of children who attend Marina Junior Secondary School. This garden was well fenced but did not have irrigation.

3.2.3.3 Mooi River Irrigation Scheme, KwaZulu-Natal

Mooi River Irrigation Scheme (MRIS) is located in Msinga Local Municipality, as illustrated in Figure 3.4. Msinga is a local municipality established in December 2000 (Msinga Municipality, 2009) as one of the four local municipalities constituting the Mzinyathi District Municipality in the northern part of the province of KwaZulu-Natal. According to the 2009/2010 Integrated Development Plan, Msinga Municipality is largely rural, with 69% under Traditional Authority, (where land is held in trust by the Ingonyama Trust) while the remaining 31% of land is commercial farm land located to the north of Pomeroy. It is estimated that 99% of the population in Msinga lives in traditional areas. Some of the demographic information drawn from Census 2011 data is presented in Table 3.4. Small towns of Tugela Ferry, Keates Drift and Pomeroy are the main service centres in the area (Msinga Municipality, 2009). The Msinga Municipality is in the south western part of the Mzinyathi District Municipal area, sharing boundaries with the Nquthu and Nkandla Local Municipalities to the east, Umvoti Local Municipality to the south, uThukela District Municipality to the west and the Endumeni Local Municipality to the north. The MRIS is accessible via the R33 road, linking it with Dundee, Ladysmith, Pietermaritzburg, Kranskop and Weenen. It is situated between Tugela Ferry and Greytown and is approximately 124 km from Pietermaritzburg along the R33 road.

The MRIS falls within a vegetation type known as Thukela Valley Bushveld (Acocks, 1988). Rainfall is between 600 and 700 mm per annum and mean annual temperatures are high (17.1-22.2^{o}C). Vegetable production is only possible under irrigation.

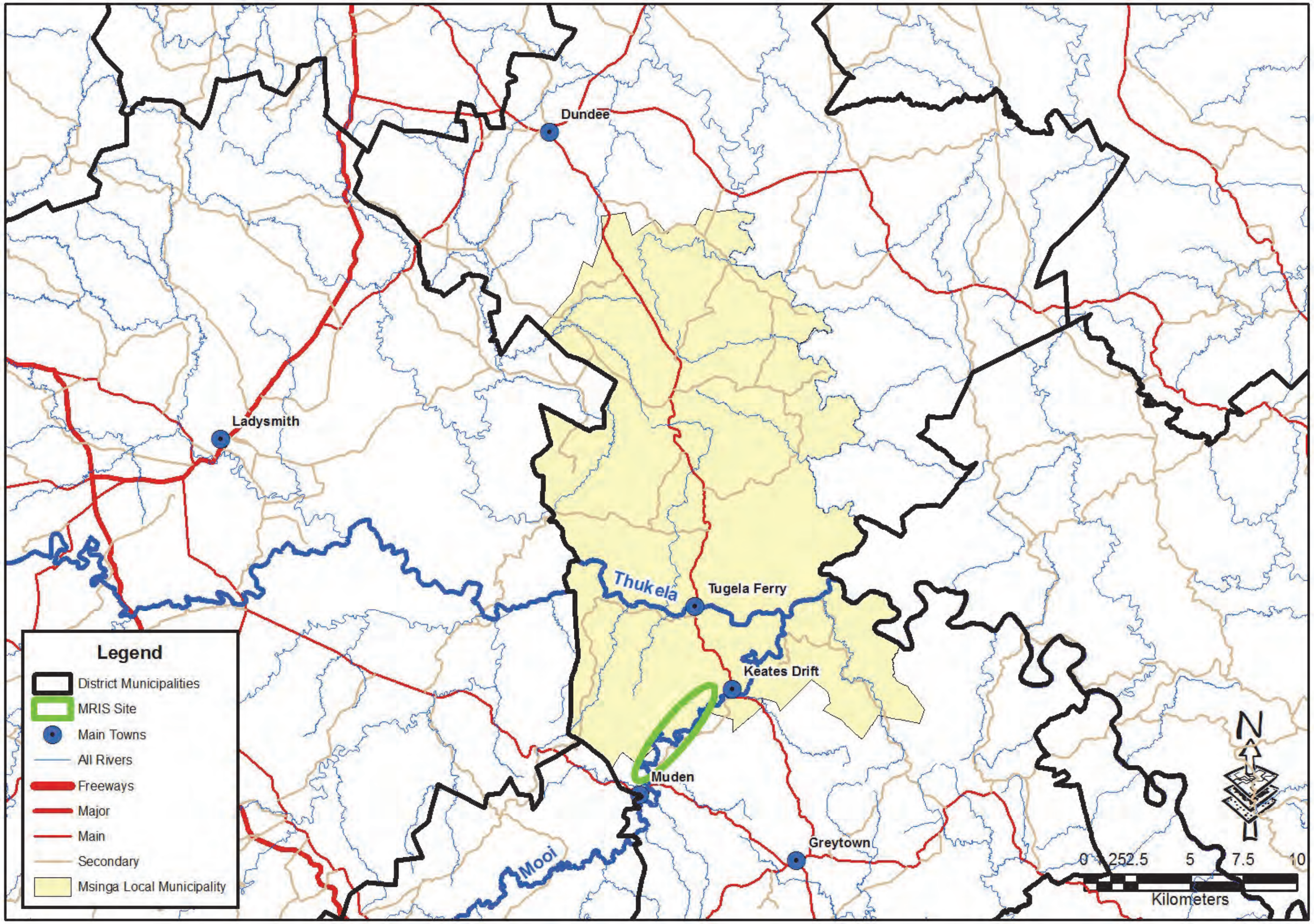

Figure 3.4 Map showing the location of the MRIS in KwaZulu-Natal.

Source: Generated from data supplied by Chief Directorate Survey and Mapping (2014)

Table 3.4 Summary of demographic information for the MRIS area, KwaZulu-Natal (KZN)

Key criteria	Measure
Percentage of households with no income	10.2%
Gender balance % (male: female)	41.8 : 58.2
Percentage of population less than 20 years of age	57.2%
Density	1.10 people/ha

Source: SA Statistics (2011)

The MRIS is communally owned. It consists of fifteen blocks that run alongside the Mooi River. Across the Mooi River are commercial farms, and they share the water resource.. A total of 824 farmers participate in the MRIS on 601 hectares. Crop production is undertaken individually and marketing of produce is done individually as well. Infrastructural development is wholly funded by the government.

Farmers at the MRIS produce a variety of crops under furrow irrigation. The main crops are cabbages and maize, but potatoes, onions, carrots and tomatoes are also produced. Preliminary discussion with extension officers indicates that members of the scheme are market oriented, especially those producing vegetables.

3.3 DATA COLLECTION AND ANALYTICAL FRAMEWORKS

3.3.1 Data collection methods

The research relied mainly on primary data and a limited amount of secondary data. Primary data was collected through a combination of methods including structured questionnaires for household surveys, key informant interviews and FGDs (See Appendix 5 for a selection of tools used for data collection). Conventional survey techniques were followed, where enumerators were trained to gather data in household surveys. For FGDs, unstructured questionnaires / checklists were used to guide discussions and ensure that the necessary information was collected. Key informant interviews were both quantitative and qualitative in nature and were carried out with guiding tools that listed topics and issues to be discussed. Where possible, information was gathered from different stakeholders using different tools to allow for triangulation.

3.3.1.1 Willowvale, Eastern cape

Three villages benefited from the Ciko Santrini Community Project and the Foundation Community Project. These were Ciko, Mbozi 7 and Mbozi AA villages, with 67, 43 and 70 households respectively. By stratified random sampling according to village and project membership, 82 *de facto* heads of households were selected as a sample. The sampled households comprised 38 project members (active and non-active) and 44 non-member households. The sampling process targeted all project members (active / inactive), while non-project households were randomly sampled within the neighbourhood of the participants of the irrigation projects (Muchara 2011). Questionnaires were completed during interviews with the 82 household heads.

Table 3.5 Sample overview for the first household survey at Willowvale, Eastern Cape, 2010

Site	No of project members	No of non-project members	Total
Foundation Community Project (FCP)	20	22 (Mbozi 7 & AA villages)	42
Ciko Santrini Community Project (CSP)	18	22 (Ciko village)	40
Total	**38**	**44**	**82**

A second field survey of 100 individual smallholder farms was conducted by four trained enumerators, together with FGDs and key informants interviews in Mbozi and Ciko communities in August 2010 (Arowolo, 2012). Of the 100 individual household farmers that were interviewed, 20 households were members of the two irrigation projects and 80 households were not members of either irrigation project. The 20 project members comprised 14 FCP members in Mbozi village and 6 CSP members in Ciko village.

FGDs were held in both community project sites. In addition, a checklist of questions was prepared for interviews with key informants in both villages (including farmers, sub-headmen, headmen, chief and sub-chief) as well as for officials in the Eastern Cape Department of Agriculture (DoA), the Department of Social Development (DoSD) and the Mbashe Municipal Manager. Information was also gathered through personal encounters with the farmers in the villages under consideration. The key informants from the local villages were very useful in understanding the nature of the assets and support available to the farmers, and ways in which cultural belief systems, norms, values and traditions influence the activities of smallholder farmers in the study area. FGDs were used as an exploratory method for discovering people's thoughts and perceptions. Some detailed information was also obtained through this means. Data were generated during interaction with, and between, members of the two groups. The FGDs afforded the project members the opportunity to share their experiences and highlighted some of the challenges that they faced.

3.3.1.2 Marina, Eastern Cape

This study was undertaken to allow for a comparison of large-scale commercial and smallholder banana production systems.

3.3.1.2.1 Small-scale banana producers

The main focus of the study was small scale banana farmers in the five villages of Marina, Seaview, Izikhuba, Plangeni and Vulindlela who were being supported by a development initiative of Lima. However, it was felt that it would be beneficial to consider their broader farming systems to allow all members participating in the various surveys / meetings to benefit from the cross-visits and joint experimentation so that commonly encountered challenges could be addressed.

An initial meeting was held on 14 June 2010 with the farmers participating in the Lima Master Farmer Programme. The objective was to introduce the WRC project properly (following earlier preliminary discussions facilitated by the Institute of Natural Resources) and explain the intention to focus on farmers involved in some level of banana production. Another matter discussed was the possibility of using local youths to assist with data collection. An arrangement was made for a follow-up meeting with the banana farmers on 29 June 2010. At the meeting on the 29th, the objective and nature of the research project was discussed and there were further discussions about the first phase of field work and use of local enumerators. There was also some discussion on key challenges relating to bananas. This meeting was also attended by extension officers from the Eastern Cape Department of

Agriculture. This was a strategic decision as their cooperation with the project was seen as mutually beneficial.. The meeting was used as an opportunity to identify households involved in banana production, and also to identify prospective enumerators. The requirement was for local Xhosa-speaking youths with a Grade 12, able to communicate in English. The questionnaire used at the Willowvale site was revised and translated into isiXhosa by a local person living in Marina.

A one-day questionnaire training workshop was held at Marina. This was attended by the enumerators as well as the local Lima master farmer and Lima field worker. Thereafter, 33 farmers were interviewed by the enumerators in August 2010. The farmers came from the following sub-wards: Vulindlela (7), Plangeni (2), Seaview (1), Marina (17) and Isikhuba (6). . The questionnaire data was captured on a spreadsheet and analysed. .Additional field work was conducted in 2011 and 2012 to gather more data pertaining to other aspects of the study.

The smallholder banana value chain was investigated by means of interviews with 11 growers, 8 of whom were participating in the farmer-managed experimentation being supported by INR[3]. They cover a range of farm scales and level of engagement in marketing. Interviews were conducted by a member of the INR team, together with a field worker from Lima. A structured questionnaire was used for the interviews. A subsequent meeting with farmers was arranged with the assistance of the KwaZulu-Natal Banana Cooperative (KNBC) to gather feedback on the supply of bananas to the Ugu Fresh produce Market, and additional information was collected at this meeting.. Based on scale of production, smallholder farmers have been classified as micro (<0.1 ha), medium (0.1-0.5 ha) and large (0.50-2 ha). The numbers of farmers interviewed in each category are shown in Table 3.6. In addition, interviews were held with three hawkers / traders.

Table 3.6 Summary of smallholder farmers interviewed for banana value chain mapping at Marina, Eastern Cape, 2011

Category of smallholder growers	Number of farmers interviewed
Micro (< 0.1 ha)	7
Small (0.1-0.5 ha)	2
Medium (0.5-2 ha)	2

An FGD was held in 2011 with a group of 20 farmers from the study site to explore collective and individual action. This group included eight (8) farmers who are participating in the farmer experimentation aimed at improving banana production. The other twelve (12) farmers were involved in various farming initiatives, including banana, vegetables and poultry. The discussion was intended to engage farmers on the following topics:

- Access to land and land tenure
- Access to, and management of, common water resources
- Collective versus individual accessing of inputs
- Access to agricultural equipment
- Assess to financial support
- Marketing of produce.

[3] Some technical experiments were also undertaken with smallholder farmers to investigate a number of factors that could affect their primary production, namely new planting material, mulching and the use of fertilizer.

The FGDs conducted with banana farmers in Bizana Local Municipality focused on aspects where farmers could exhibit individual or collective behaviour to understand what is currently happening. The discussions also identified possible opportunities that collective behaviour could address and challenges that such behaviour is likely to encounter. Additional information on aspects relating to access to land and land allocation was obtained from a member of the Traditional Authority (TA). The open ended discussion with a representative from Traditional Authority was aimed at helping the INR team to understand the role of the TA in land allocation processes as well as the use, management and governance of resources such as water and wetlands. The report was also informed by a meeting with the Chairperson of the Natal Banana Association (NBA) to discuss collective action in the commercial banana sector and to compare and contrast the commercial and smallholder production systems. Meetings were held with the following representatives of the relevant local, provincial and national government departments in Bizana:

- Department of Agriculture – Chief Agricultural Development Technician.
- Department of Social Development – Community Development Supervisor and Community Development Practitioner.
- Community Development Department of the Bizana Local Municipality – Agricultural Development Officer.

The following topics were discussed:

- Farmer support programmes implemented by each department
- Nature and type of support for cooperatives or individuals
- Key challenges relating to financing or supporting cooperatives
- Previous smallholder success experiences.

Subsequently, a list of key themes and associated questions was compiled, in consultation with the project team members, to develop a common understanding of what social and physical capital *is* and the role it plays in enhancing or retarding the development of food value chains in Bizana Local Municipality. Two separate weeks of field work were conducted in July and August 2012, with modification of the approach in between. The fieldwork consisted of structured and unstructured interviews with individual farmers and farmer groups, with additional FGDs to elaborate on selected themes. The field work sought to compare and contrast successful and less successful projects in order to evaluate the role of social and physical capita. Participants in the following projects or groups were interviewed:

- The Bizana banana commodity group (Successful)
- The Mahlathini vegetable project (Social / physical challenges)
- Mpunzi Drift Irrigation Scheme (Social challenges) – a group of 25 with 10 active members
- Amahomba Women's Project (Successful) – a group of 15 members, formed in 1998
- Thuthukani Vegetable Project (Social / physical challenges) – a group of 10 members
- Nodaka project (Social / physical challenges)

In addition to these groups three smallscale banana growers and three hawkers/traders were interviewed. Where possible, case studies highlighting the influence or use of social and physical capital (and effects of lack thereof) were captured.

3.3.1.2.2 Large-scale commercial producers

The commercial farmers that were included in this project farmed in the vicinity of Port Edward in KwaZulu-Natal. They are members of the KNBC. For the commercial value chain investigation, interviews took place with two commercial farmers and the manager of KNBC, the marketing company for commercial bananas produced in southern KZN. In addition, DAFF banana growing guideline documents and COMBUD figures from KZN DoA for banana production were also used to provide additional information.

A small experiment was undertaken to determine the acceptability of smallholder bananas, which also assisted in describing the commercial value chain to smallholders. Three farmers contributed to 5 boxes that were delivered to the KNBC. These followed the standard marketing route and gave the farmers a realistic indication of the prices that they would receive if they sold to formal markets. Feedback was provided to a group of smallholder farmers at a meeting in September 2011.

3.3.1.3 Mooi River Irrigation Scheme, KwaZulu-Natal

Research at the Mooi River Irrigation Scheme (MRIS), in the Msinga Local Municipality, was conducted from 2011 to 2014.

3.3.1.3.1 Exploratory phase

The initial exploratory phase was undertaken as the first step in the process of identifying different categories of farmers from which samples could be drawn for surveying. FGDs were conducted with block committees of MRIS. The views of participants were assumed to represent community perceptions about agriculture in the area. Governance issues of the scheme were also highlighted during these discussions. Key informants were identified through informal discussions with extension officers and during FGDs. Critical information relating to scheme operations and underlying principles were gathered through key informant interviews. In addition, certain activities of members and non-members of the irrigation scheme were established through direct observations. Direct observations helped to reveal some critical information that the community might not have been able to articulate to the researchers. Multi-stage sampling[4] was adopted to meet specific research objectives. The target groups of the fieldwork on farmers' needs and aspirations at MRIS are presented in Table 3.7 Grouping of block committees was done in order to avoid repetition of information during the data collection process. The first group comprised committees for Blocks 1, 2, 3 and 4, which were located on the upper section of the scheme. The second group comprised of middle blocks namely Blocks 7, 8 and 9. The third group included Block 14 and 15 committees. Analysis of data was based on these groupings as well. The other factor considered during the grouping process was that some committees overlapped across blocks: for example Block 14 and 15 were represented by one committee, while Blocks 7, 8, 9 and 10 had one chairperson who worked with committee members selected from the respective blocks. In addition to the block committees, there was a scheme committee, which oversaw the entire scheme.

[4] Multi-stage sampling: this is where sampling is done sequentially across two or more hierarchical levels, such as block level, scheme level, community level and ultimately at district or even national level

Table 3.7 Sample overview for the exploratory phase at the MRIS, KwaZulu-Natal, 2011

Target Groups	Number of interviews	Composition/ Description	Number of participants	Data Collection Tool
Scheme committee	1	Scheme chairperson	1	Key informant interview
Block committees	3	1 for Blocks 14 & 15 1 for Blocks 7,8 & 9 1 for Blocks 1,2,3 & 4	7 6 9	Focus group discussions
Extension officers/ Technicians	Multiple	1 For block 14 &15 1 For blocks 1-13	1 3	Key informant interview
Traditional Authority	1	All traditional leaders in the area	5	Focus group discussion
Chief headman (*Nduna nkulu*)	Multiple	Chief headman	1	Key informant interviews

3.3.1.3.2 Preliminary fieldwork for value chain analysis

For the preliminary fieldwork, a combination of both Stratified Random Sampling[5] and Cluster Sampling[6] techniques were used for collection of information. As in the exploratory phase, the scheme was subdivided into three main sections: Block 1-5 (upper), Blocks 6-10 (middle) and Blocks 11-15 (tail-end). The main purpose was to ensure that a representative sample could be drawn that had the ability to explain variation in production and marketing patterns based on position of the block relative to the entire scheme. The sample was drawn using a systematic pattern – that is every fifth member from an randomly selected point within each of the three sections (block) was selected. This was repeated until the required number of sample units were selected and interviewed. Table 3.8 shows the breakdown of respondents who participated in the survey. Along with the survey, three FGDs were conducted with 4 to 8 participants in each session for in-depth understanding of selected key issues related to production, marketing, trading, processing, customs, as well as constraints / opportunities and potential interventions to remove the constraints and take advantage of the opportunities.

Key informants were identified and interviewed in the target areas using a checklist to guide discussions. They provided a variety of information ranging from general socio-economic data to specifics related to the tomato, maize and cabbage value chains. An attempt was made to collect relevant documentation related to specific data for the value chains especially with regards to markets that smallholder farmers utilise. This proved to be a challenge of its own, as there was not sufficient written information available about quantities of produce procured from MRIS by the different market actors (i.e. traders, retailers, brokers etc.). A summary of the sample is provided in Table 3.8.

[5] Stratified Random Sampling involves dividing members of the population into homogeneous subgroups before sampling. The strata should be mutually exclusive: every element in the population must be assigned to only one stratum e.g. based on farming activities, location, age, gender, etc.

[6] Cluster Sampling Technique is a type of sampling that involves dividing the population into groups (or clusters). One or more clusters are chosen at random and everyone within the chosen cluster is sampled

Table 3.8 Sample size for the preliminary survey at the MRIS, KwaZulu-Natal, 2011

Blocks	Ha	Total number of farmers	% of total	Sampled farmers	Percentage representation
Block 1-5	57.5	148	17.96	14	19.7
Block 6-10	167.4	286	34.7	24	33.8
Block 11-15	376.2	390	47.3	33	46.5
Total	**601.1**	**824**	**100**	**71**	**100**

3.3.1.3.3 Comprehensive rural household survey

Based on the findings from the preliminary study, the main fieldwork activities were undertaken in 2013. Multi-stage sampling was used to draw the sample. Pre-survey discussions with community leaders revealed that farmers were allocated plots in blocks closer to their homesteads, except where plots are not easily available, when farmers have to take up plots in more distant blocks. Again, to ensure that a representative sample was drawn, the scheme was stratified into three segments (upper, middle, and tail-end) based on the positions of individual farmers' irrigation plots along the main canal. This ensured variability from respondents across the scheme. The upper segment of the MRIS comprised members farming in Blocks 1 to 5, the middle segment comprised members farming in Blocks 6 to 11 and the tail-end segment constituted Blocks 12 to 15. Respondents were proportionally selected from each of the three sections based on the number of farmers in each segment of the scheme. Besides block position, a second stratum of sampling considered scheme membership.

For the purpose of this study, scheme members were regarded as farmers who held plots within the MRIS and were currently using these for agricultural activities. However, people who were not formally scheme members, but who were using plots allocated to members unable to use them were also included, although some of these people attended FGDs specifically for non-scheme members. Generally non-scheme members (NSMs) were households who did not own plots or had not been allocated plots inside the scheme. Although the major focus was on irrigation farming activities, pre-survey focus group discussions and key informant interviews revealed that dryland farming in the community was very limited and some NSM households actually irrigated plots that were outside the scheme boundaries but within the scope of the canal. It was therefore necessary to include these NSM respondents to gather data on resource access and use by households outside the scheme. Sampling was therefore done in a way that allowed this, but excluded NSM households who did not derive any direct use value from the canal. It is important to note that the NSMs who met the stated criterion were those that stayed within the vicinity of the MRIS main canal, while those that stayed some distance (approximately 4 km) away had low or no access to canal water, and hence did not form part of the sample. A total of 307 households were sampled, comprising 246 scheme members and 61 NSMs. Since the actual number of NSMs was not known, a simple random sampling technique was adopted to identify 61 respondents from households within the vicinity.

A household questionnaire was used to extract data from the 307 sampled farmers. Interviews were conducted at farmers' homesteads to ensure easy tracing of the farmers by use of homestead numbers and mobile telephone numbers. In addition, key informants provided qualitative data that was useful to verify the information derived from the interviews.

3.3.1.3.4 Study of spill-over effects of the scheme and non-irrigated farming activities

Although a large amount of information was generated about the activities in the irrigation scheme, little was known about rural activities outside the scheme. FGDs and key informant interviews were conducted to gather information about non-scheme farming activities by scheme members and non-scheme members, spill-over effects (the effects of the scheme that did not relate directly to crop production) as well as collective behaviour. The data collection tool used for the FGDs and key informant interviews used both closed and open ended questions, and diagrams were drawn where necessary to clarify a particular concept. Persons in any leadership position (preferably people with extensive knowledge of the institutions that govern the community, and individuals that interact with farmers), were considered key informants and were interviewed individually outside of the FGDs. This was to avoid their influence on the FGDs participants. Telephone interviews were useful in clarifying certain concepts. Various telephone interviews were conducted: one with the Local Manager from the provincial Department of Agriculture (DoA), one with an owner of draught animals and several with the extension officer from Ward 10.

Four FGDs were conducted: one NSM group and one scheme member group for each of the two municipal wards (Wards 8 and 10) associated with the MRIS. One checklist was developed for both scheme members and NSMs to allow for an iterative and consistent process, thereby reducing errors in the field. Both men and women participated in the FGDs, which provided qualitative information. The respondents were community members involved in some form of rain-fed agriculture, either homestead gardens, dryland crop or livestock production, as the intention was to collect information about rainfed agricultural activities outside of the irrigation scheme. The selection of individuals to participate in the FGDs was systematic and based on three criteria: 1) Whether a scheme member or non-member; 2) Ownership of homestead garden, dryland field or livestock; and 3) Absence of a leadership position within the community. Ultimately, the most important criterion was their involvement in rain-fed agriculture, both for NSMs and scheme members participating in the FGDs.
Table 3.9 shows an overview of the 42 people who were interviewed during this phase of project. A database of scheme members and NSMs was collated by two assistants from the area. From the database it was possible to identify areas that had NSMs, as in some villages all households had scheme members. During the subsequent field work, the local person arranging the FGDs targeted these villages for NSMs. FGDs were conducted separately to avoid any influences or intimidation by members of a different group. Key informant and telephonic interviews were also conducted separately depending on the availability of the individual.

Table 3.9 Sample overview of respondents in Wards 8 and 10 at Msinga Local Municipality interviewed about spill-over effects of the MRIS, 2012

Target Groups	Number of interviews and data collection tool	Description	Number of participants
Community	1 (FGD)	Non-scheme members	6
Community	1 (FGD)	Scheme members	11
Community	1 (telephone interview)	Draught animal owner	1
Community	1 (FGD)	NSMs	15
Community	1 (FGD)	Scheme members	5
Traditional Authority	Multiple (key informant interviews)	*Induna nkulu* (Chief-headman)	1
Municipal office	1 (telephone interview)	Agricultural manager	1
Agricultural advisory	Multiple (key informant interview and telephone interviews)	Ward 10 extension officer	1
Scheme Committee	2 (key informant interviews)	Scheme chairperson	1

3.3.1.3.5 Exploration of goat and cattle value chains

With the assistance of extension workers and Animal Health Technicians from KZN DoA meetings with the local traditional authorities and representatives of the Livestock Associations, a list of farmers keeping livestock was compiled for further the survey. The scheme was sub-divided into three major areas, based on proximity to the MRIS. A total number of 90 households that owned cattle and/or goats were selected as follows:

- Beginning of the scheme: Ntanyana Community (30 households)
- Middle of the scheme: Madulaneni Community (30 households)
- End of the scheme: Nxamalala Community (30 households).

The data was collected through individual interviews with livestock farmers using a pre-tested questionnaire and by direct observation of livestock management practices. Interviews were conducted by the research team. FGDs were organised within the communities and key informant interviews was conducted with major stakeholders including KZN DoA, Msinga Livestock Association, Livestock Agents & Auctioneers (AAM), other livestock owners within the community and officials from DRDLR and KZN DoA. This also helped to verify data obtained through the questionnaire interviews.

3.3.1.3.6 Determining water supply relative to crop demands

Since there were no water measurement devices in the scheme under study, more intensive methods to estimate quantity of water were required. The methods allowed the generation of both secondary and primary data for the study. Firstly, SAPWAT 3 (a computer program), was used to generate secondary data of estimated seasonal crop water requirements. The estimation is based on statistical methods and biophysical models that govern water uptake and use, with the advantage of producing accurate estimates once it has been calibrated for a specific area (van Heerden *et al.*, 2009).

Secondly, field research assistants were hired to measure quantity of water applied to the crop using a Global Water Flow Probe to generate primary data. The Global Water Flow Probe relies on the velocity-area method, which involves measuring mean velocity of water at various cross-sections along a channel (Gomo *et al.*, 2013). For this study, selection of the velocity area method was based on availability of the required instruments to the researchers and the ease of computing the outputs. The main focus of the study was infield water application; hence, measurement was done along infield canals that feed directly to individual crops. The discharge (Q) of a canal is the product of its cross-sectional area and the mean velocity of the water passing a given section, which is determined by the following equation:

$$Q = V \times A \qquad (1)$$

where Q = discharge [$m^3.s^{-1}$], V = average velocity [$m.s^{-1}$], and A = flow area [m^2].

The Global Water Flow Probe gives direct velocity readings (m/s^{-1}). The canals in the MRIS are parabolic in shape and hence flow area was calculated following Gomo, 2012:

$$A = 2/3\ (TY) \qquad (2)$$

where A is the area (m^2), T is the top width of flow, and Y is flow depth; all measured in metres.

Water measurement also included recording the duration of the irrigation cycle in hours, which was done by the field assistant every time the farmer was irrigating. The quantity of water applied to the crop per irrigation cycle was estimated by multiplying discharge (Q) by the duration of the cycle. Therefore, multiplying water applied per cycle by the number of cycles from planting to harvesting of the crop gave the estimated quantity of water applied to the crop. Average quantity of water applied by a farmer per cycle was used, acknowledging the challenges of keeping track of recording multiple fluctuations in flow per each time period (0.5 hour or hourly) during the irrigation process. Such precision could not be attained during the study due to time constraints and the cost associated with the data collection procedures required to monitor such fluctuations. Although it was beyond the scope of this study, the use of automated permanently fixed water measuring devices along the canal instead of the portable Global Water Flow Probe, could have enabled more precise monitoring of flow fluctuations.

3.3.2 Data analysis methods

In order to accomplish the general purpose, the study drew from a number of proven, workable approaches for planning and executing value chain analysis for smallholder agricultural enterprises. Three analytical approaches were adopted in the design and analysis of data, i.e., (1) Sustainable Livelihoods Framework (SLF) (2) Value Chain Analysis and (2) Residual Value Method. Although presented sequentially, it should be observed that some of the steps might have been undertaken concurrently. Others might have been repeatedly revisited, as more knowledge was gained during the analysis process. A combination of qualitative and quantitative data was used at specific stages of the analysis.

3.3.2.1 Sustainable Livelihoods Framework

Communities or households, rely on a range of assets or resources to achieve their livelihood outcomes (Ahmed *et al*., 2008). A sustainable livelihoods framework (SLF) is a tool for understanding how households make use of their assets, including their capabilities (also known as their human capital), to develop livelihood strategies, while taking into account the effects of local and external actors and processes. It provides a structure for collecting and analysing data to assess the impact of interventions on livelihoods (Simpson, 2007). Through the use of the framework it is possible to identify ways of enhancing livelihoods, strengthening asset bases and reducing vulnerability (de Satge *et al.,* 2002; Ahmed *et al*., 2008). Simpson (2007) cites a number of authors in summarising the possible livelihood impacts that an intervention, such as an irrigation scheme, can achieve. He mentions the creation of employment and economic opportunities as well as non-financial impacts such as strengthened community organisation, which can also decrease the vulnerability of households and communities. He considers both the assets (the typical five forms of capital described below) as well as the ‘transforming structures and processes’, which influence the vulnerability of households as well as their asset base.

The SLF was employed in order to facilitate a detailed understanding of the various existing and non-existing capital in the study area. In developing the SLF framework, Scoones (1988) identified five assets or types of capital (natural, human, financial, physical and social) that can be used to describe the livelihood condition of smallholder farmers. The SLF assessment can be used in a variety of ways from project through to programme and policy level. It provides information to help understand the main factors that affect poor people’s livelihoods, and the relationships between these factors, and this could help in facilitating policy, planning and implementation, which could lead to effective development interventions.

3.3.2.2 Value chain analysis approach

The study adopted the value chain analysis technique. As such, multi-stage sampling was used to collect data from value chain actors. Initially, data were collected from farmers (producers). Interviews with input suppliers and market intermediaries also identified other actors and institutions influencing the value chain, Following Vermeulen *et al*., (2008), six key components were considered during the

VCA. While some of these overlap with the set of activities suggested by Kaplinksi and Morris (2008), they do give a concise summary of the aspects to be considered, namely:

- Mapping out the value chain by identifying the main actors and the flows of products, money and information
- Establishing the key drivers, trends and issues affecting the value chain and its actors (where drivers' influences change in the chain and trends indicate the directions of change such as prices and marketing channels)
- Exploring future scenarios in relation to uncertainties about drivers and trends and their implication on small-scale producers within the selected study sites.
- Identifying the options for better inclusion of small-scale producers
- Developing strategies for supporting change of policies and institutions within the public, private and civil society sectors.

The value chain analysis undertaken in this study has drawn on both qualitative and quantitative data relevant to the understanding of the value chains. The first stage of the analysis was to identify the actors and product flows within specific value chains, including input supply, production, processing, and marketing activities. The results are presented in a value chain map or flow chart. The study also identified marketing channels and compared prices at the different stages (reflecting the value-addition) of the marketing channels to determine marketing margins for the various market intermediaries. Value chain support structures were also identified and qualitative analysis on their roles presented. These were also explicitly explained as transformative structures under the SLF.

3.3.2.3 Residual value method approach

Smallholder farmers in the Mooi River Irrigation Scheme (MRIS) are confronted with an increasing shortage of irrigation water, which manifests in the form of poor access to water at scheme scale and unequal distribution at individual plot scale. The recurrent challenges of accessing irrigation water at plot scale among the MRIS farmers has led to many crop failures and increasing underutilisation of irrigable land. Irrigation failures at smallholder plot scale expose households to food insecurity (Sinyolo *et al*., 2014). In MRIS, there is no volumetric measurement of irrigation water at scheme scale, which would allow efficient management of the water resource. Water application to crops was based on traditional irrigation scheduling techniques such as visual assessment of the soil and the "feel" method, where water is applied when the soil is presumed dry. Given the above challenges pertaining to irrigation water access and management, the Residual Value Method was applied to evaluate the efficacy and variability of water use by individual farmers across the scheme by estimating the average water values.

According to Young (2005), the estimation of an unpriced input entails isolating the portion contributed by the specific input to the total value of the output, from the contribution of other inputs that go into the production function. The total value of output is allocated against each of the resources (inputs) used in the production process, including water as a residual input, and the results are an estimation of average values because the total value is divided by the quantity of water used (Berbel *et al.*, 2011). Some assumptions underpinning the use of the Residual Value Method (RVM) are based on the economic theory that: (i) producers aim to maximise profits, and (ii) the total value of the product may be assigned to each input according to marginal productivity (Young, 2005).

The mathematical expression of output (*Y*) with respect to a vector of inputs (X) is shown in equation 1.

$$Y = f\ (X_{m,} X_{h,} X_{f,} X_{l,} X_{w,} X_e X_{ld}) \qquad [1]$$

Where

Y	= Output (Yield/ha)
X_m	= Machinery/ha
X_h	= All agrochemicals except fertilisers (herbicides, pesticides etc.) /ha
X_f	= Fertilisers/ha
X_l	= labour/ha
X_w	= Water/ha
X_e	=Transport/ha
X_{ld}	=Land (ha)

Expressing the function in terms of total value of production, equation 1 is written as:

$$(Y^*P_y) = [(VMP_m{}^*X_m) + (VMP_h{}^*X_h) + (VMP_f{}^*X_f) + (VMP_l{}^*X_l) + (VMP_w+X_w) + (VMP_e{}^*\ X_e) + (VMP_{ld}{}^*X_{ld})] \qquad [2]$$

VMP is the value marginal product of each input (X_i). In order to operationalize equation 2, Young (2005) posited three assumptions, namely: the value of the product be assigned to each input according to the marginal productivity except the input under investigation (water); the opportunity costs of non-water inputs are given by their market prices; and profit maximising behaviour occurs at farm level.

$$(Y^*P_y) = [(P_m{}^*X_m) + (P_h{}^*X_h) + (P_f{}^*X_f) + (P_l{}^*X_l) + (P_w+X_w) + (P_e{}^*X_e)) + (P_{ld}{}^*X_{ld})] \qquad [3]$$

Where (Y^*P_y) represents the value of product (*Y*) computed for a unit surface (hectare) equated to the total cost of all inputs. The residual value of water (RV_w) is calculated as the difference between the total value of output (Y^*P_y) and the costs of all non-water inputs.

$$RV_w = (Y^*P_y) - [(P_m{}^*X_m) + (P_h{}^*X_h) + (P_f{}^*X_f) + (P_l{}^*X_l) + (P_w+X_w) + (P_e{}^*\ X_e) + (P_{ld}{}^*X_{ld})] / X_w) \qquad [4]$$

Hence;

$$RV_w = \frac{TVP - \sum P_i X_i}{X_w}$$

Although the RVM can derive meaningful results, Scheierling *et al*., (2004) and Young (2005) highlighted the possibility of over- or under-estimation of the value of water. Over-estimation occurs when returns that should be allocated to other inputs are allocated to water (Young, 2005). This could also happen when any input (variable or fixed) is left out due to data constraints. Similarly, misallocations of returns from water to non-water inputs result in under-estimation of the value of water (Haab and McConnell, 2002; Lange and Hassan, 2006). The RVM is sensitive to variable omissions and use of inaccurate prices (Speelman *et al*., 2008; Al-Karablieh *et al*., 2012). The other challenges of RVM can emanate from assigning prices to inputs and outputs, measuring and pricing inputs and outputs, and the problem of measuring labour and human effort (Hussain *et al*., 2009). In order to improve data precision and reduce estimation error, the present study used data collected on a weekly basis by field assistants from selected farmers and plots over a full cropping season. However, the inputs captured were not exhaustive, hence a possibility of over-estimation exists. For instance, farm management could not be captured because of the difficulty of separating family labour and management operational cost at a smallholder level. The cost of depreciation of scheme infrastructure could not be attached to individual farmers because of the communal ownership of the scheme. However, as the cost of depreciation was excluded across all sampled farmers, the outcome still achieves the objective of explaining variation in water use and management among farmers in the scheme. The values derived in this study therefore reflect variation in water management and not necessarily the price of irrigation water.

3.4 SUMMARY

Across the sites, there were generally similarities in data collection methods and data collected. The use of structured questionnaires, key informant interviews, focus groups discussions (FGDs) and direct observation were common to all. However, some differences were also evident: At Marina, it was important to understand the commercial banana value chain in order to determine the barriers and opportunities for smallholder growers; At MRIS, there was a deeper focus on institutional factors affecting the operation of the irrigation scheme as well as an attempt to understand water use at a plot level by monitoring the activities and inputs of 60 smallholders growing potatoes.

Different combinations of tools were used to gather data to address the various specific objectives of the study. The household surveys provided a large amount of data that was used to quantify livelihoods and classify farmers. The surveys also contributed to the achieving of the other objectives. FGDs and key informant interviews were used to collect qualitative data to further understanding of collective and individual actions. The investigation of irrigation infrastructure was mainly through direct observation and key informant interviews.

In many cases, field work built on outcomes of previous data collection processes, exploring certain aspects (such as social capital and social embeddedness) in more detail. This generally involved the use of checklists to guide discussions rather than structured questionnaires. At Marina, some of the concepts were investigated with agricultural projects outside of the immediate study area in order to strengthen the team's understanding of the factors that impact on smallholder participation in formal food value chains.

Analysis of data was undertaken using MS Excel as well as a number of statistical packages that analyse the relationships between different factors. For example at MRIS, this was the method used to identify factors impacting on the effectiveness of water use across the scheme.

4 ASPIRATIONS AND NEEDS OF FARMERS

This chapter addresses the Sub-objective 3 of the study: To investigate empirically the aspirations and needs of human capital with reference amongst others to:

(1) Description and quantification of rural livelihoods;
(2) Classification of farmers as subsistence, emerging or commercial;
(3) Definition and explanation of goals of farmers in each category;
(4) Investigation of expressed interests to enter informal and/or formal markets.

4.1 DESCRIPTION AND QUANTIFICATION OF RURAL LIVELIHOODS

This section considers the livelihoods of smallholder farmers at the three study sites, namely Willowvale (Mbashe Local Municipality), Marina (Bizana Local Municipality) and Mooi River Irrigation Scheme (Msinga Local Municipality). More in-depth descriptions of their farming activities are provided in the next section.

4.1.1 Willowvale, Eastern Cape

The study at Willowvale focused on two small irrigation schemes and the villages where their members resided. The two irrigation schemes were Foundation Community Project (FCP) and Ciko Santrini Community project. Both projects fall within the the Mbashe Local Municipality, which is one of the eight local municipalities of the Amatole District. Foundation Community Project was located in Mbozi village, which is 17 km East of Willowvale town and approximately 52 km from Idutywa town. Other nearby small towns included Elliotdale and Butterworth. At the time of the study, FCP had a 10-year lease on land belonging to Mbozi villagers. While a total of 66 hectares was available to the project, only 5 ha was fenced and cultivated. The project started with 13 members in 2005 and was officially launched in 2007. At the time of the study a total of twenty members (16 active members and 4 non-active members) were working on the project (comprising 13 women, 4 men and 3 youths). According to the members, the scheme was established to:

- Ensure food security among the members and the community at large
- Alleviate poverty in the community
- Provide employment to the local community members
- Improve health and nutrition in the community
- Ensure economic development through regular sale of produce to outside markets
- Ensure empowerment of the youth.

Since the official launch in 2007, the project has received the bulk of its funding (R250 000) from the Department of Social Development The funds were used to purchase and install sprinkler irrigation infrastructure, fence a 5 ha plot, construct site structures (such as storerooms, a nursery, and a pit latrine) and for input procurement. The project made use of sprinkler irrigation and water was pumped directly from Shixini River using a diesel pump. The project was managed by a committee and benefited from an active project coordinator. A wide range of crops, including cabbage, spinach, butternut, broccoli, pumpkins, potatoes, green peppers, carrots and maize (green mealies), was produced. The project was not a member of any Water User Association, and as such, did not pay for water usage. One of the key challenges that affected the project was poor accessibility because of the bad condition of the road to the site.

Ciko Santrini Community Project started in 2008 and had access to a total of 20 ha at the time of the study, of which 10 ha was fenced. A total of 23 members joined and formed Ciko Santrini Community Project. At the time there were 18 active members (16 women and 2 men) who were cultivating 2.5 ha when first visited in 2010. The project was started by community members who pooled their individual rain-fed fields to do collective farming as a means of securing government funding. The project received a R350 000 grant from the Department of Social Development. As with FCP, the project was not a member of any Water User Association, and therefore did not pay for water usage. Water was pumped directly from the Shixini River (which is perennial) for a sprinkler irrigation system. The project had a committee elected by the members, but, unlike FCP, they did not have a project coordinator. They produced a wide range of crops including cabbage, spinach, potatoes, onions, carrots and tomatoes.

4.1.1.1 Demographic information

Household demographics play a pivotal role in determining the behaviour of farmers. As such, a set of household variables were analysed and quantified for both Ciko and Mbozi villages. Table 4.1 shows that the household heads of 34% (28) of the 82 randomly sampled households were male, while 66% (54) were female . The average age of the sample was 55.29, and age ranged from 18 to 80.A Age of the household head is an indicator of the potential benefits of the experience of the older person or the risks inherent in the attitudes of younger farmers (Makhura and Mokoena (2003) cited by Nkhori, 2004).

Table 4.1 Household demographic characteristics at Willowvale, Eastern Cape, 2010

	N	Mean	Std. Deviation	Min	Max
Age of household head	82	55.29 years	15.156	18	80
Household size	82	5.04	2.202	1	10
Household head gender	**82**	**Male 34% (28) : Female 66% (54)**			

Table 4.2 shows the marital status of the respondents divided into four main groups, namely single, married, widowed and divorced. Studies have shown that female-headed households have limited access to productive resources and are usually poorer than male headed-households (Spring, 2000 as cited by Nguthi, 2007). This could be one of the reasons for the low availability of resources in both Ciko and Mbozi villages. The combined survey data for both Ciko and Mbozi communities are given in Table 4.2. The results show that 43.9% of the respondents were married and living with their families, while the balance were widowed (35.4%), single parents who never got married (17.1%) or divorced (3.7%). Marital status of the household head is critical in African societies, as it determines the stability of families. It is believed that married household heads tend to be more stable farmers than those who are unmarried, with obvious consequences for agricultural production and marketing.

Table 4.2 Marital status of the sampled respondents at Willowvale, Eastern Cape, 2010

Marital category	Number	Percentage
Single	14	17.1
Married	36	43.9
Divorced	3	3.7
Widowed	29	35.4
Total	**82**	**100.0**

4.1.1.1.1 Education and training

The education level of the household head contributes to the human capital and the ability to cope with modern farm decision-making processes. Mather and Adelzader (1998) noted that people with higher education are more able to interpret information than those who have lower education or no education at all. In particular, the interpretation of agricultural market trends demands a certain level of literacy. There was therefore a need to investigate the educational levels of the household heads. The results are depicted in Figure 4.1.

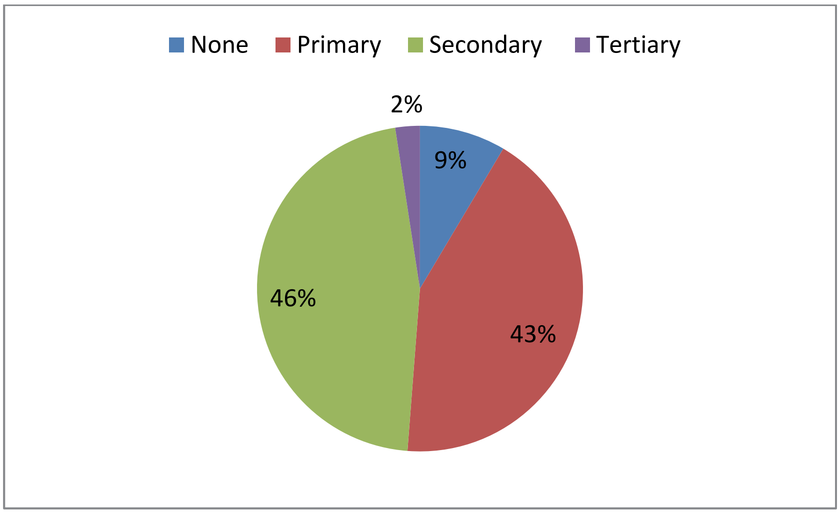

Figure 4.1 Education level of household heads, 2010.

Figure 4.1 shows that the expected literacy rate for the household heads is high as 91% attended at least primary school (though literacy may have been lost due to lack of application). However, it is doubtful whether the 43% with only primary school education would be able to engage with the latest skills and techniques necessary to improve farming practices. The 46% of farmers with secondary education would potentially benefit from any specialised training at their disposal. Lack of professional employment could also be linked to the educational levels in the communities. The second household survey conducted in the same villages (n=100) revealed that 26% had specialised training in agricultural practice such as home gardening techniques, farm record keeping and so on (Arowolo, 2012). Training remains a critical function of human capital development. This factor is, however, not getting attention in either of the communities. Villagers indicated that government extension officers only offered support to cooperatives and not to individual farmers. This was substantiated by training gaps identified through the survey in almost all farm operations, including herding, dipping, planting and crop spraying. It should be noted that the coordinator of the FCP, who was actually a qualified teacher, was the only person encountered through the study who had attended formal short courses run by the Eastern Cape Department of Agriculture in crop management practices. More information regarding training and mentorship is provided in Chapter 7.

4.1.1.1.2 Household size and farm labour availability

The availability of labour for agricultural operations was expected to be proportionate to household size. Hence data on household human capital was collected from the sample populations in Ciko and Mbozi villages (See Table 4.3).

Table 4.3 Profile of household human capital (in terms of labour provision), (n=82), 2010

	Mean	Std. Deviation	Minimum	Maximum
Household size	5.04	2.202	1	10
Number of household members who perform agricultural operations	2.01	1.374	0	7
Chronically sick household members	0.12	0.427	0	3
Members too young to work in agriculture	1.80	1.427	0	5
Members too old to work in agriculture	0.25	0.582	0	4

Out of the 82 sampled households, the minimum household size was 1 and the maximum was 10, with an average of 5 members per household. The household size is fairly large, but this does not reflect in the labour force available for agricultural purposes in the communities, which remains low. The mean number of agricultural workers per household was 2, with a minimum of 0 and a maximum of 7. The major challenge is the imbalance between active workers and passive consumers who do not contribute directly to the production system. This could lead to serious food insecurity within communities in the long run.

Larger household size discourages selling because the household must satisfy household consumption before it can sell the surplus for cash. A further challenge arises where the household is comprised of either very old or very young members who cannot assist with farming operations. Such a scenario was witnessed in Mbozi and Ciko villages, where marketing of agricultural produce was minimal and high rates of dependency (young, old, sick and the unemployed who are not willing to work in farming) characterised the two communities.

Figure 4.2 shows that the communities relied more on family labour than hired labour. Furthermore, livestock-related activities were solely dependent on family labour, while there was a mixture of hired and family labour for crop-related operations. This could result from the limited scale of livestock production in the area, in contrast to the timeliness demanded by crop production if it is to benefit from the relatively short rainy season.

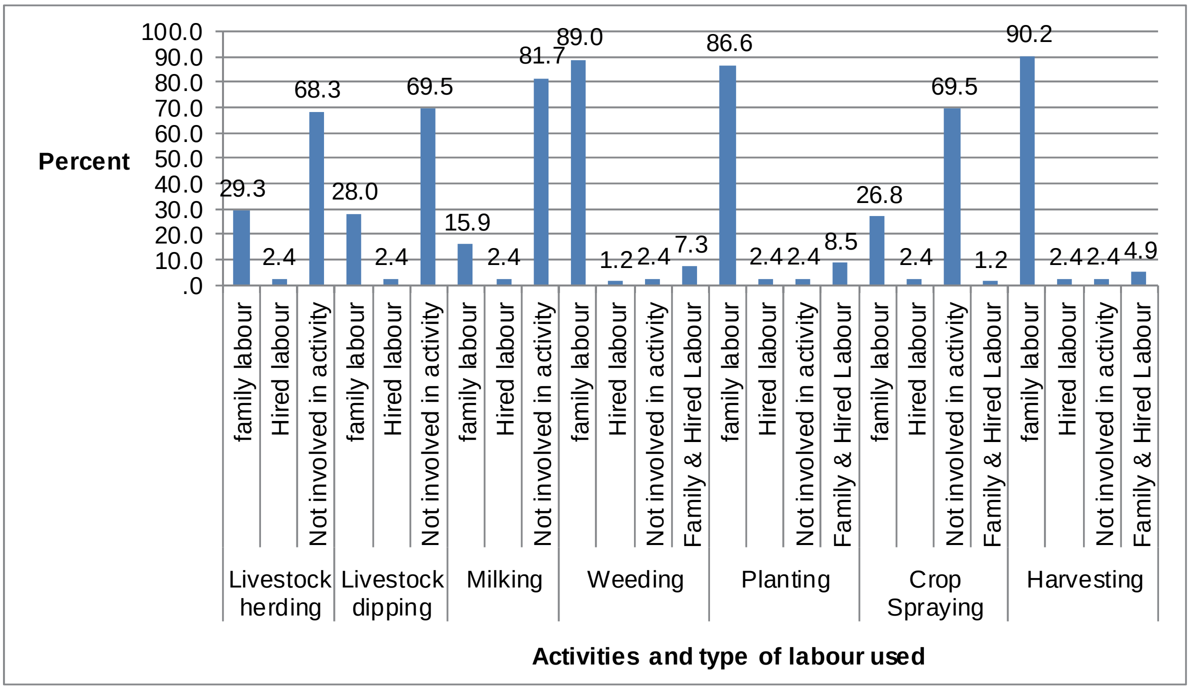

Figure 4.2 Sources of labour for farm operations at Willowvale, Eastern Cape, 2010.

Figure 4.3 below shows the agricultural activities performed by different household members. It is evident that women dominated crop production operations (crop harvesting, planting and weeding), but were less active in livestock-related operations such as herding and milking.

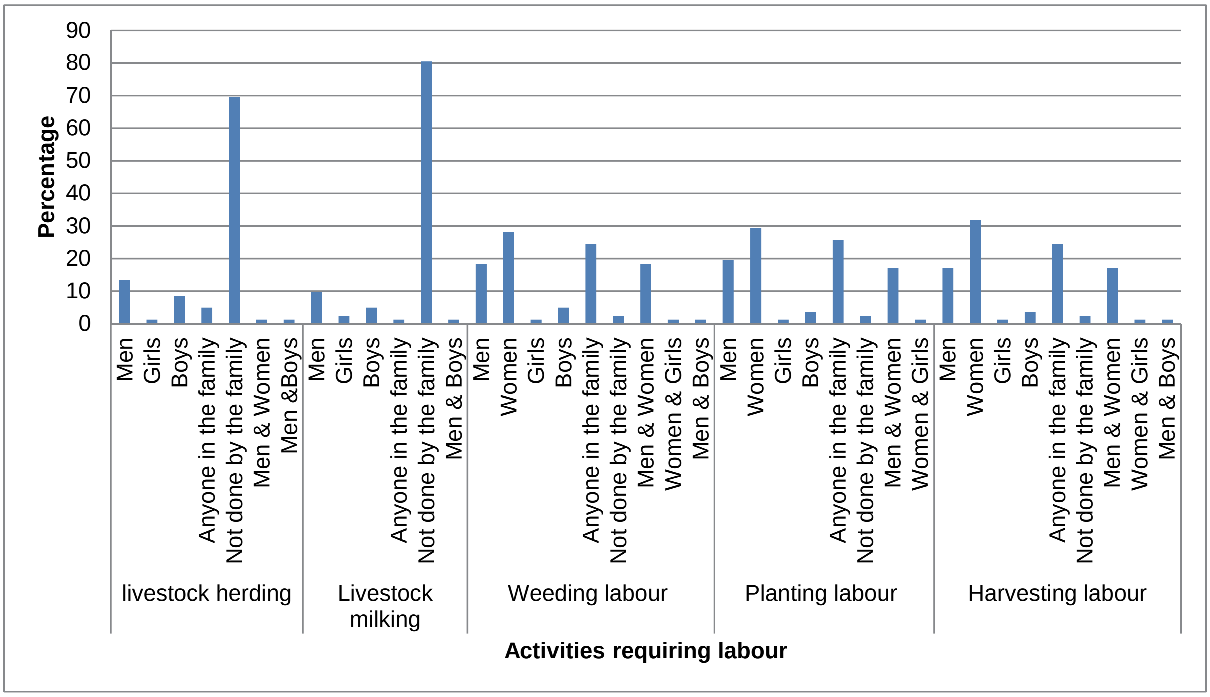

Figure 4.3 Involvement of family members at Willowvale, Eastern Cape in household farm operations, disaggregated by gender, 2010.

In terms of human capital, the second household survey found that the two villages shared some similar characteristics (see Table 4.4). While the percentage of household heads too old to participate actively in farming was relatively low (9.8% and 35.6% in Ciko and Mbozi respectively), the study revealed that a relatively large percentage were very sickly / physically challenged (43.9% and 52.5% in Ciko and Mbozi respectively). This had implications in terms of their ability to provide labour for their farming activities. It was evident from the study that the household heads in both villages lacked specialised skills/training in farming activities with 75.6% in Ciko village and 72.9% in Mbozi having indicated no skill / training. As with the first survey, the study revealed that the major source of labour for both villages were household members, which is shown in Table 4.4. This was the case in 68.3% and 71.7% of households respectively (Arowolo, 2012).

Table 4.4 Frequencies for human capital variables by village site at Willowvale, Eastern Cape, 2010

<table>
<tr><th>Variable Type</th><th colspan="2">Ciko (N=41)</th><th colspan="3">Mbozi (N=59)</th><th colspan="3">Total</th></tr>
<tr><td></td><td>N</td><td>%</td><td>N</td><td colspan="2">%</td><td colspan="3"></td></tr>
<tr><td colspan="6">Too old to farm (60+)</td><td colspan="3"></td></tr>
<tr><td>Yes</td><td>4</td><td>9.8</td><td>21</td><td colspan="2">35.6</td><td colspan="3">25</td></tr>
<tr><td>No</td><td>37</td><td>90.2</td><td>38</td><td colspan="2">64.4</td><td colspan="3">75</td></tr>
<tr><td colspan="6">Sick/Physically challenged</td><td colspan="3"></td></tr>
<tr><td>Yes</td><td>18</td><td>43.9</td><td>31</td><td colspan="2">52.5</td><td colspan="3">49</td></tr>
<tr><td>No</td><td>23</td><td>56.1</td><td>28</td><td colspan="2">47.5</td><td colspan="3">51</td></tr>
<tr><td colspan="6">Sources of Labour</td><td colspan="3"></td></tr>
<tr><td colspan="4">Hired Labour</td><td>13</td><td>31.7</td><td>17</td><td>28.3</td><td>30</td></tr>
<tr><td colspan="4">Family labour</td><td>28</td><td>68.3</td><td>42</td><td>71.7</td><td>70</td></tr>
<tr><td colspan="8">Have specialised skills in farming</td><td></td></tr>
<tr><td colspan="4">Yes</td><td>10</td><td>24.4</td><td>16</td><td>27.1</td><td>26</td></tr>
<tr><td colspan="4">No</td><td>31</td><td>75.6</td><td>43</td><td>72.9</td><td>74</td></tr>
</table>

According to Backeberg (2009), one of the mechanisms for increased future food production in South Africa is investment in human capital and empowerment through development of knowledge and skills. The reason is that productive use of soil and water for food production depends on the education, health and practical skills of the women and men cultivating the land. This empowerment is urgently required because of widespread household food insecurity and under-nourishment currently experienced in rural areas (WRC, 2010). The current study shows that 74% of the respondents lacked access to specialised skills and 50% were sick/physically challenged. This hampers their effective participation in farming operations.

It is important to stress that age, gender, level of education, use of hired labour, household size, as well as other factors, are useful measures of human capital that provide an indication of how new technology, for example, would be accepted by farmers. Studies have shown that older farmers are often reluctant to adopt new technology as they tend to depend on their experience rather than adopting new ways of farming. On the other hand, older farmers might have the experience and the authority that would help them to decide positively on the adoption of new technology (CIMMYT, 1993).

4.1.1.2 Economic status

4.1.1.2.1 Employment status

The employment status of household heads was investigated and is shown in Figure 4.4. According to the responses obtained, more than 40% of household heads perceived themselves to be full time farmers. The need for life skills to improve the welfare of the communities through self-help projects could be an important dimension to consider.

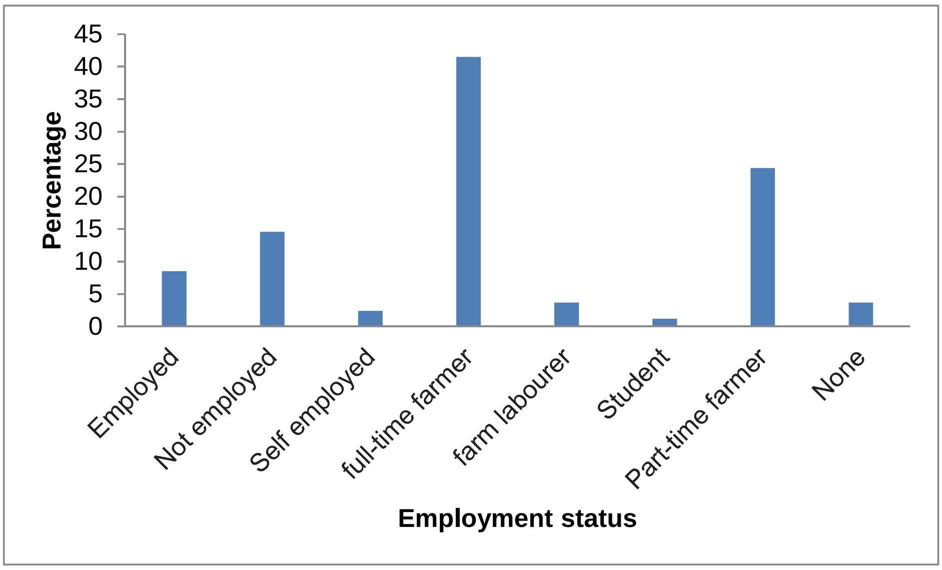

Figure 4.4 Employment status of household heads at Willowvale, Eastern Cape, 2010.

It is clear that while rural community members at the Willowvale site relied more on government grants (See Table 4.5 below) than on agricultural activities to generate income, many did in fact see themselves as full-time farmers.

4.1.1.2.2 Household income

The respondents were requested to list their sources of income as well as the amount of income obtained from each source. Table 4.5 below shows a breakdown of the major income sources for the Ciko and Mbozi communities. Villagers in both communities cited agricultural activities as a major source of income, although 80.5% indicated that government grants (pensions and child support grants) were their major income source.

Table 4.5 Village and household income sources (cross tabulation) at Willowvale, Eastern Cape, 2010

Village	Household income sources							Total
	No income	Family remittances	Casual labour	State grants	Spaza shop	Casual labour & grants	Agriculture	
Mbozi	2.38%	7.14%	9.52%	80.95%	0.00%	0.00%	0.00%	100%
Ciko	0.00%	12.50%	2.50%	80.00%	2.50%	2.50%	0.00%	100%
Number of households	**1**	**8**	**5**	**66**	**1**	**1**	**0**	**82**

From later discussions with respondents, it became clear that in both communities, people did in fact earn some income (generally unquantified and irregular) from crop and livestock production. Such a lack of realisation by communities of the potential role of agriculture in generating income could be the stumbling block for agricultural development and poverty eradication among rural dwellers. The second household survey found that 2% of the individual household farmers derived their source of income from farming alone, while a further 17% derived their income from a combination of farming and social grants. The reliance on agriculture was considered very low given the rural nature of the community and the opportunities that the natural resources provided for agricultural activities. Factors such as over-dependence on social grants and old age could contribute to the small role that agriculture plays in terms of income generation. The study showed that 60% of the sampled household farmers depended solely on social grants as a source of income. This may reflect the age and incapacity of respondents, and could also explain why a significant percentage of them relied on support from their children or relatives in bigger cities (Arowolo, 2012).

4.1.1.2.3 Access to credit

Access to credit was found to be very low. The percentage of households in Ciko and Mbozi without access to credit was 61.9% and 62.7% respectively. Households accessing credit facilities were generally limited to local informal savings groups (often referred to as *stokvels)*. The majority of farmers lacked physical assets that could readily be converted to financial capital.

4.1.1.3 <u>Land availability and tenure arrangements</u>

Land tenure in the Willowvale area is traditional or communal, and this affects the type of farming that can be practiced. Three types of smallholder farming were identified. Each of these can be considered both as a response to a particular household objective, and as ultimately affecting the livelihood of the household. Farming types and their characteristics are shown in Table 4.6.

Table 4.6 Land tenure in the Willowvale area is traditional or communal, and this affects the type of farming that can be practiced. Three types of smallholder farming were identified. Each of these can be considered both as a response to a particular household objective, and as ultimately affecting the livelihood of the household. Farming types and their characteristics are shown in Table 4.6.

Table 4.6 Agricultural land use and tenure patterns at Willowvale, Eastern Cape, 2010

Agricultural land use	**No. of h.holds**	**Mean area (ha)**	**Ownership /Tenure system**
Home gardens	80	0.71	Dominant tenure was traditional ownership, through allocation by local leadership. No title deeds were held by individual famers.
Dryland fields	21	2.76	Dominant tenure was traditional ownership, through allocation by local leadership. No title deeds were held by individual famers.
Grazing land	14	Not known	All farmers benefited from the communal grazing system in the area.

Note: No households interviewed had access to individual irrigation plots

Homestead gardening was the main type of farming in the Ciko and Mbozi communities (Table 4.6). The majority of villagers had at least a piece of land within their homestead for farming purposes, with a combined average of 0.71 ha per household. Survey data showed that all households utilised their entire homestead garden, with 84.1% indicating that their gardens were fully fenced. The remaining 15.9% had their gardens partly fenced or not fenced at all. An example of a typical homestead garden is shown in Figure 4.5.

Figure 4.5 A typical homestead garden at Willowvale, Eastern Cape.

Only 21 (25.6%) out of the 82 respondents had access to arable dryland fields (see Table 4.6). The average field size was 2.76 ha per household. This is a small area, given the relatively low yields expected from small-scale dryland crop farming in South Africa. Dryland farmers could theoretically increase their production cultivating more hectares. However, 95% of farmers with access to dryland fields were no longer cultivating them, for reasons such as lack of inputs, draught power, erratic rainfall and lack of will.

Household irrigation plots were not part of the communities' system of farming, and no household had an established garden under irrigation. The only access to irrigation facilities in the community was through participating in one of the two irrigation projects. Again, lack of resources and knowledge were cited as the major deterrent to irrigation development in communities. The terrain of the area restricted access to the nearest river (Shixini River) especially households at Mbozi village, hence even manual irrigation of crops was not practiced.

Grazing land was communally accessed and managed in both Mbozi and Ciko villages, and usage was not restricted. The challenge in both communities is the steep terrain that was not favourable for livestock production, especially sheep. In addition, the area of grazing land was not well documented and the recommended stocking rate was neither known nor adhered to. This might not have affected the community in the short term given that only 18.3% of the respondents indicated that they had grazing livestock. Hence pastures were not over-utilised at the time of the study. The grazing land was not fenced, which was a problem for many crop farmers because of crops were damaged by straying animals.

The survey revealed that 84% of the people used land for agricultural purposes. The results in Table 4.7show that 92.7% of individual household farmers in Ciko had 1 ha or less land, while 81.2% had the same type of land size in Mbozi. This implies that farmers were generally in possession of limited areas of land. It would seem that the only way to expand production would be through collective land usage, where land holdings are consolidated for a common purpose.

Table 4.7 Land sizes at Willowvale, Eastern Cape, n=100, 2010

Land size	Ciko (n=41)	Mbozi (n=59)
>1 ha	7.3%	18.6%
0.5-1 ha	58.5%	62.8%
<0.5 ha	34.2%	18.6%

4.1.1.4 Water access and utilisation

Water availability for both domestic and agricultural purposes is one of the key elements in determining the agricultural potential of an area. Rainfall is critical for dryland crop and animal production. However, perennial rivers and dams are important domestic water supplies in rural communities. Population pressure, climate change and increased industrial and agricultural usage of water have created an ever increasing demand for this scarce resource.

The survey in Mbozi and Ciko communities established varying levels of understanding by the communities with regard to the water situation in their area, and the best methods to maximise benefits from the limited water they receive (See Table 4.8).

Table 4.8 Opinion on water availability and usage at Willowvale, Eastern Cape, (n=82), 2010

Response	Is rain water adequate?	Use of infield water harvesting techniques?
	Percentage	Percentage
Don't Know	2.4	2.4
Yes	40.2	4.8
No	57.3	92.7
Total	100.0	100.0

A snapshot survey revealed that 57.3% believed that the rain water they received in the area was not adequate for sustainable agricultural production, while 40.2% said that water was adequate. The long term mean rainfall for Mbozi and Ciko villages ranges between 999 mm and 1023 mm and is generally satisfactory for dryland crop production. The major challenge in Willowvale could, however, have been the consistency and timeliness of rainfall, which might have delayed planting, thereby affecting crop production. Although many of the respondents recognised the shortage of agricultural water, only four made use of infield rain water harvesting techniques to preserve moisture. Mulching was the most commonly mentioned method of conserving ground moisture for crop production. Rain water harvesting into tanks off rooftops was very common for domestic uses.

4.1.1.4.1 Water for domestic use

In terms of domestic usage, 40% of the people used communal taps as the major source of domestic water. However, it emerged from discussions that communal taps could not be used for washing clothes, so dams and rivers were important for this purpose (See Table 4.9 below).

Table 4.9 Different sources of water for domestic use, (n=100), 2010

Sources of domestic water	No. of households
River	7
Communal taps	40
Harvested water	3
River and communal taps	19
Communal taps and harvested water	18
River and dams	1
River and harvested water	2
River, communal taps and harvested water	8
Dams and communal taps	1
River and municipal water tanks	1

The two communities had access to clean water, with majority of the households using more than one source of drinking water. The dominant sources were taps (piped water) and rainwater tanks, however households were exposed to unsafe water sources such as rivers and dams when there were interruptions in the treated water supply. The survey also revealed that the Mbozi community had no clean water from November 2009 until January 2010, because of a burst pipe along the main delivery line. For the duration of this period, residents were forced to draw water from small dams, or the Shixini River and its tributaries. The second household survey also found that access to water from the municipal water tanks and household tap water was problematic for the smallholder farmers. In Ciko village, 88.1% confirmed that municipal water was inconsistent, while 94.9% of the smallholder farmers at Mbozi stated that there was inconsistency of supply from municipal water sources (Table 4.10).

Table 4.10 Consistency of municipal water supply at Willowvale, Eastern Cape, 2010

Variable Type	Ciko (N=41)	Mbozi (N=59)
	Percentage	**Percentage**
Consistent (daily)	4.8	3.4
Inconsistent	88.1	94.9
None	7.1	1.7

4.1.1.4.2 Water use by individual households for agricultural purposes

Water use by individual households for crop production was investigated. The survey indicated that 91% of the people in both villages used water for crop production, while 80% used water for livestock production (including household poultry). This suggests that there were slightly more farmers involved in crop production than in livestock farming. Different sources of water were mentioned by the farmers interviewed, namely: rivers, dams, communal taps, harvested water and municipal water tanks. One or more combinations of these sources were used for crop production practices. The degree of utilisation is presented in Table 4.11 below. It was found that the most common sources of water were communal taps (62 % of respondents) and rivers (49% of respondents). Water harvesting off roofs was mentioned by 28% of the respondents.

Table 4.11 Sources of water used by individual households for crop production (n=100), 2010

Sources of water	Frequency
River	16
Dams	1
Communal taps	25
Harvested water	4
River and communal taps	18
Communal taps and harvested water	2
Rivers and dams	4
Rivers and harvested water	2
Rivers, communal taps and harvested water	8
Dams and communal taps	9
River and municipal water tanks	1

Figure 4.6 Water harvesting off roofs and a communal tap at Willowvale, Eastern Cape.

It was a very daunting task for farmers interviewed to state the exact volume of water used. Some were able to estimate the volume used on a daily basis to water their crops, and their estimates ranged from 10-200 litres/day. However, 35% indicated that they had no idea how much water they used daily for cropping.

Water for cropping purposes was only available throughout the year at the project sites with irrigation facilities. Of the households, 60% did not have access to a regular water supply and depended on rain water. During the dry season they used water from the municipal water tanks, the river and communal taps. The survey revealed that there are constraints to water accessibility for crop production – 72% of the respondents stressed that government needed to be more focussed on ensuring that the problems of water scarcity in the study area received more attention. Of the respondents, 93% stated that water supply was inconsistent in their community.

57% of respondents reported that water resources for crop production were shared by the community. This could be referred to as communal water use rather than collective water use, as the water source is shared, but utilisation is by individuals. The survey further revealed that nobody paid for water in either community.

Livestock obtained drinking water from the Mbozi, Shixini, Ciko and Qwaninga Rivers and small earth dams constructed in the village. The villages also benefited from piped water pumped from the Qwaninga River by the local municipality. Homesteads were generally located within a distance of two hundred metres from the nearest water point. Besides providing water for the two irrigation schemes, the perennial Shixini River is used as a domestic water supply in emergencies. The different sources of water used by the farmers for watering livestock are summarised in Table 4.12 below. Rivers and communal taps appeared to be the most important source of water for livestock (48 and 47 responses, respectively). This may be because livestock included chicken and these were being supplied with water from the taps.

Table 4.12 Sources of water for livestock production at WIllowvale, Eastern Cape, (n=100) 2010

Sources of water	**Percentage of respondents (%)**
River	18
Dams	3
Communal taps	22
Harvested water	1
Rivers and communal tap	18
Rivers and dam	4
River and harvested water	2
River, communal tap and harvested water	5
Dams and communal taps	1
River, Dams, Communal taps and harvested water	1

4.1.1.4.3 Water usage by the project groups for crop production

Water use efficiency is the corner stone to successful agriculture in South Africa, where water scarcity is increasingly becoming a topical issue both at policy level and consumption / utilisation level. It is obvious that South Africa, as an agro-based economy, needs to ensure that sustainable water usage and allocation policies are adhered to, to ensure sustainable agricultural and economic growth.

The irrigation infrastructure, as well as its location adjacent to the Shixini River, meant that water was available for irrigation purposes at both sites. Besides irrigation, project members were also allowed to use project water for washing clothes and drinking. However, there were challenges associated with the irrigation systems at both sites. These included shortages of sprinklers, breakdown of irrigation pump and lack of technical know-how on the part of project members on how to maintain and service it. The irrigation pump at FCP was maintained by the project members from the proceeds of the money generated by the project. Members suggested that a second pump would assist so that they could continue irrigating when the first pump was being repaired. Sometimes there were no funds to purchase fuel for operating the pumps. The other challenge was waterlogging. The problem was more pronounced during the rainy season as there were no drainage systems in place at either of the two project sites. The drainage problem was greater at the Ciko project site, mainly because of the topography of the village.

Changes in water use patterns and production systems were investigated qualitatively through FGDs with members from the two projects. Eleven members participated at Ciko Project and 13 members participated at the FCP. Table 4.13 summarises water usage by the two communities before and after the launch of the irrigation schemes.

Table 4.13 Water usage before and after the launch of Ciko and Foundation Projects, 2010

<table>
<tr><th colspan="2">Ciko Sentrini Community Project</th></tr>
<tr><th>Water usage before project</th><th>Water Usage after project</th></tr>
<tr><td>• Community members used buckets to water their gardens, with water from the Shixini River.
• There was no restriction / control over water access. Anyone could use water from the river, as long as it was available.
• People concentrated on maize production and did not grow other crops.
• They used very little water because of the effort required in using buckets.</td><td>• The members used a diesel pump to irrigate their crops.
• There was still no restriction / control over water use for any other members of the community.
• Project members had diversified their crops by including butternuts, cabbages, cauliflower and spinach instead of concentrating on maize only.
• Farmers believed that the launch of irrigation had increased their income as they were selling their produce, which they did not do before.
• The project was not a member of a Water User Association (WUA)
• Daily water used was not measured; hence total volume used per given period was not known.</td></tr>
<tr><th colspan="2">Foundation Community Project</th></tr>
<tr><td>• Because of the distance involved, the community did not use the Shixini River for any cropping activities, but used the Mbozi River instead (using buckets).
• No controlled access to water.
• The Shixini River mainly catered for livestock watering and for washing.</td><td>• With the provision of a diesel pump, the project members started using the Shixini River for irrigation purposes because it was perennial.
• No control over access to water.
• More diversified crop production, especially vegetables such as broccoli, cauliflower, potatoes and green pepper was initiated after the scheme was launched.
• The project was not a member of a Water User Association (WUA)
• Daily water used was not measured; hence total volume used per given period was not known.</td></tr>
</table>

The summary above in Table 4.13 shows areas where existing water policies and legislation were not being implemented. Such policies include the requirement for all commercial water users to be members of a Water User Association and the need to account for all water usage for commercial and domestic purposes through appropriate measurement techniques and procedures.

Table 4.14 Summary of irrigation costs at Ciko and Foundation Projects , 2010

Cost Item	**Foundation Community Project (5 ha) – Sprinkler Irrigation System**		**Ciko Sentrini Community Project (2 ha) – Sprinkler Irrigation System**	
	Rates	**Cost (R) / Month**	**Rates**	**Cost (R) / Month**
Fuel costs	40 litres / week @ R8/litre	R1,280 [R256/ha]	20 litres / fortnight @ R8/litre	R320 [R120/ha]
Maintenance labour	• Project members worked the fields and operated the irrigation. • Repairs were done by the project coordinator. He anticipated that experts could be hired in case of a major breakdown but no major breakdown had occurred.		• Project members worked the fields and operated the irrigation system • Repairs were done by hired help – a self-taught man in the village undertook repairs at R40/day (Approx. 3 days per month = R120).	
Water levies	No levies were paid		No levies were paid	
Sprinklers and pipes	Had not been replaced since installation		Had not been replaced since installation	

The system for charging water levies is enshrined in the White Paper on a National Water Policy for South Africa (DWAF, 1997). This states that the price of water varies according to location and is calculated on a system, catchment or sub-catchment basis. The price has to include operating, maintenance and capital costs, where appropriate, as well as a water resource management levy and a resource conservation charge. The levy may include charges for effluent disposal and significant interception as a result of land uses such as afforestation or agriculture. DWAF (1997) states that disadvantaged individuals and communities should be supported through specific measures for beneficiaries of land restitution, land reform or other programmes of corrective action. These may include periods during which the full cost of water will not be charged. This would be a form of establishment support in the case of newly established enterprises. Where the imposition of the full water price discourages the use of available water, provision may be made for some elements of the tariff, including capital and depreciation costs in existing Government water schemes, or the resource conservation charge, to be suspended for a limited period of time (DWAF, 1997). Discussions with various stakeholders revealed that water prices are generally low for emerging farmers. For instance, a discussion with project members at the Harcop Irrigation Project (Amatole Municipality, Eastern Cape), which belongs to a Water User Association that oversees the abstraction of water from the Kat River, indicated that the project paid R35/ha/annum for using water for irrigation. The levy was fixed and did not take into account individual or cooperative usage of water. The levy came from the sales revenue at the project and not from individual contributions. The principle behind such low rates could be to promote utilisation of the commodity by the poor for productive purposes. While low prices are seen as a means of ensuring that resource-poor farmers can participate in the sector, inefficient water pricing has always been a challenge when it comes to conserving the resource and preventing the undesired effects of overuse such as waterlogging and salinity. Visible signs of waterlogging and salinity were already surfacing at both Ciko and FCP. These signs included salt patches and heavy presence of ‘water-loving’ plants/weeds in the fields. The cost of water was not a factor that was affecting the use of this scarce resource and hence smallholder farmers who had access to a perennial flow of water had no push factor to encourage them to save water. Again, this had resulted in farmers not investing in any water-conserving technologies.

There was a major challenge of determining crop water use efficiency in crop production at both Ciko and FCP. This was because of the absence of water meters and proper record keeping. It was not possible to determine the volume of water being used per crop. Irrigation was rather *ad hoc* and not based on specific crop requirements, stage of growth or soil conditions. Furthermore, the irrigation schemes normally grew at least four crops at a given time and irrigation was done concurrently so that water used per crop could not easily be determined. Generally, infield water management at scheme level was weak. None of the farmers exercised objective irrigation scheduling methods. They used a combination of plant observation (i.e. signs of wilting or distress), soil observation and a method of feeling the soil to assess how moist / dry it was in order to determine when there was a need to apply water to crops. According to the project members, irrigation application rates of 3 hours every 3 to 4 days (to all portions of the garden that were under production) were a common practice. Irrigation schedules were generally constant regardless of crop type and growth stage. There was therefore a possibility of over-irrigation during early stages of crop growth where the plant required less water and under-irrigation at full growth stages where water requirements for most crops are high.

4.1.2 Marina, Eastern Cape

At Marina, Eastern Cape, the study focused on banana growers in the five villages just south of Port Edward (KwaZulu-Natal), namely Marina, Seaview, Izikhuba, Plangeni and Vulindlela, which are within the Bizana Local Municipality. The study focused particularly on those farmers who were being supported by a development initiative of Lima Rural Development Foundation.

4.1.2.1 <u>Demographic information</u>

4.1.2.1.1 Household size and farm labour availability

For the 33 households that made up the study, household sizes ranged from 3-15 (n=32), with an average size of 7.28. When one investigated the number of family members able to provide labour for agricultural activities, numbers ranged from 1-10 per household, with an average of 3.19. As a percentage of family members, this was a range from 12.5% to 100% of household members (n=31), with an average of 45.32%.

The source of labour used in tasks related to crop production (planting, weeding, harvesting, etc.) and livestock raising (herding, milking, etc.) was investigated to determine household reliance on family labour. Weeding crops, one of the most labour intensive activities, used household labour in 28 cases, while 12 respondents indicated that they made use of hired labour. Of the interviewees, 21 indicated that they only made use of family labour for weeding, while 5 said that they used only hired labour, the remaining 7 used a combination of labour sources (See Table 4.15).

Table 4.15 Sources of labour for weeding, 2010

Source of labour for weeding	**No. of households**
Use family labour	21
Use hired labour	5
Combination of family and hired help	7
Total	**33**

Given the importance of family labour for the farming households in Marina, another factor that was investigated was the ‘fitness’ of family members to provide labour for agricultural activities. The interviewees were asked how many of the family members were fit for agricultural work. These figures were translated in percentage of total household size and it was found that percentages ranged from 14-100%, with an average of 65.65%. Those found not to be fit were mainly too young (75 individuals listed overall), although some were affected by ill health (20 people listed). Old age did not seem to be a serious limitation (only 12 individuals listed) although later in the survey quite a number of interviewees cited old age and lack of energy as challenges to expanding their enterprises. The reality is that many of the people who were farming were older people and while they were largely fit enough to engage actively, it is likely that their age did impact on their productivity.

4.1.2.1.2 Education and training

In terms of education, 53.13% had secondary education, while 12.5% had some form of tertiary education. In terms of training / skills development, there was very little mention of formal training, although five (5) interviewees referred to advice provided by Eastern Cape Department of Agriculture as well as Lima and two indicated that they had received training in vegetable production. One interviewee also indicated having received training in sugar cultivation.

Technical support and training are often cited as requirements for improving agricultural production. In the case of the banana farmers, 18 (54.5%) said that they had received support from Lima and DoA, while 15 (45.5%) indicated that they had received no technical support. Since most of these farmers were part of the Lima support programme, once would have expected higher numbers to have indicated that they had received technical training and support. This could be because support up to this point had not targeted banana production.

4.1.2.2 Economic status

An investigation of households' economic status was also undertaken to characterise their livelihoods. This covered dietary diversity of households, assets owned, use of credit and household income and expenditure.

4.1.2.2.1 Dietary diversity

Dietary diversity is an indicator of households' economic status because the number of different items that make up a family's diet, and the nature of those items, gives an indication of the amount of disposable income available to a household. The number of households who had consumed a particular food item the previous day are shown in Table 4.16. The study found that, for the 31 interviewees who responded, the range of different items used by households the previous day ranged from 2 to 14, with an average of 6.23. Of the 10 respondents who indicated that only two items were used the previous day, the items were: maize meal & potatoes (1 respondent), maize meal & beans (1 respondent), maize meal & potatoes (1 respondent), maize meal and meat (1 respondent), rice & beans (3 respondents), rice & potatoes (1 respondent), rice & fish (1 respondent) and rice & meat (1 respondent).

Table 4.16 Items consumed the previous day by different households at Marina, Eastern Cape (n=31), 2010

Food item	No. of respondents	Food item	No. of respondents
Maize meal	11	Vegetables	13
Rice	22	Sugar	10
Cereal	3	Oil/fat	19
Fish	6	Eggs	13
Bread	16	Fruit	9
Potatoes	18	Tea/coffee	13
Nuts & beans	14	Cakes/biscuits	3
Meat	16	Samp	7

It is interesting that there was much greater use of rice than maize meal as the staple carbohydrate. The lack of biscuits and cakes, which would be considered luxuries, was potentially an indication of a lack of extra money in these homes. The only item that scored highly in the table above, and which could be grown easily by the households were potatoes. It is of interest that the use of vegetables seemed somewhat limited, given that this was a farming community. This could have been because there was limited production due to water shortages (mentioned later) and limited purchases due to the perishable nature of vegetables. It is recognised that this was a once-off “snap shot” and only provides a very superficial indication of households’ economic status.

4.1.2.2.2 Availability of assets

From Table 4.17 below, it is clear that farming households around Marina had simple tools and equipment. They did not own tractors, although they did have access to hired ploughs. None of the households interviewed had vehicles although two respondents indicated that they had access to hired vehicles. Interestingly, none of the households had access to draught animals which shows that there was no access to this form of land preparation.

Table 4.17 Number of households having access to various assets at Marina, Eastern Cape (n=33), 2010

Asset	No. of households	Percentage
Hand hoes	33	100.0
Shovels	3	9.1
Ploughs	17	51.5
Wheelbarrows	27	81.8
Vehicles	2	6.1
Draught animals	0	-
General items		
Television	23	69.7
Fridge / freezer	21	63.6
Radio	27	81.8
Telephones	18	54.5

Note 1: these were hired vehicles

Note 2: available hand hoes ranged from 1-8 per household

Note 3: It is not clear whether telephones were landlines or mobile phones

In terms of household assets, it was clear that ownership of televisions, fridges/freezers and radios was fairly common. Telephones and radios provide access to some forms of information, while access to telephones allows farmers to access market information. These assets therefore do have implications for agricultural production.

4.1.2.2.3 Household income and expenditure

The purpose of exploring income and expenditure was to understand the reliance on agriculture for income as well as to explore the investment in agricultural activities. Interviewees were asked to list their three main regular sources of income. They were then asked to list items for which there was regular monthly expenditure, and to highlight the three main expenses. The main sources of income listed were government grants (social welfare grants such as pensions, disability grants and child support grants) and casual labour. It was found that 16 of the households listed social grants as their only form of income. This is a tendency which is thought to impact significantly on agricultural production by smallholder farmers in South Africa because small scale production often cannot generate income comparable with these grants, especially as t they require no physical input. Many households relied on a combination of income sources. Only three farmers listed hawkers as a regular source of income. There was no other reference made to income from agriculture. The reason for this could be that income from agriculture is seasonal and thus was not considered as a regular monthly contribution to households. The other possibility is that income from agriculture was erratic and while it contributed to households, was not a main source of income.

Table 4.18 Main sources of income at Marina, Eastern Cape (n=31), 2010

Source	No. of households
Government grants	25
Casual labour	13
Hawkers (agricultural produce)	3
Spaza shop	1
Remittances	1
Loans	1
None	1

The three biggest regular monthly expenses incurred by households are recorded in Table 4.19. The main expenses listed by households were groceries, burial levies and church contributions. Again, the question might have been misleading with interviewees listing regular expenses rather than largest ones. Transport was also listed by a number of households as a regular expense. Agricultural inputs were not listed amongst the main expenses that households regularly incur although seven respondents mentioned them when listing all regular monthly expenses. Again, this illustrates a fairly limited investment in agricultural enterprises despite being a rural community.

Table 4.19 Three biggest regular monthly expenses at Marina, Eastern Cape (n=32), 2010

Item	No. of households
Groceries	25
Burial levies	17
Church contributions	14
Transport	10
School fees	5
House rent	4

Note: Agricultural inputs were mentioned by 7 respondents under regular monthly expenditure, but never as one of the three biggest regular expenses.

4.1.2.2.4 Access to credit

Sources of credit used by respondents are shown in Table 4.20. From the survey it was found that only seven of the interviewees indicated that they had accessed credit, with 24 saying that they had not made use of it. The sources of credit included both formal options such as banks as well as informal options such as a *stokvel*[7]. The extent to which credit was used specifically for agriculture-related costs was not explored in the survey. However access to capital for inputs was listed as a challenge to agricultural production by a number of farmers.

[7]A stokvel is a local ‘savings scheme’, where members make monthly contributions and it is either shared out again on a monthly basis, or the funds are retained to be distributed at the end of the year. Some stokvels also make small loans available to members and other community members in order to grow their funds.

Table 4.20 Sources of credit listed by respondents from Marina, Eastern Cape, (n=31), 2010

Sources of credit	No. of households
Commercial banks	4
Stokvel	3
Money lenders	1
No use of credit	23

4.1.2.3 Land availability and tenure arrangements

Some information about land access was gathered during the survey to better understand the nature of rural livelihoods at the five villages in the vicinity of Marina in Bizana Local Municipality. All the interviewees indicated that they had home gardens, but only 11 (34.4%) indicated that they had dryland cropping fields. In terms of land tenure arrangements, 22 (68.8%) said that the access to the land for home gardens was through traditional land allocation, while two people referred to leasing of land for household production. Traditional allocation relates to the allocation of land for a homestead garden and building site by the local *Inkosi or Induna* (i.e. traditional leadership of the area).

Twenty-seven (84.4%) of the interviewees said that they had separate areas where they grew bananas, although later they stated that these were at home – but they apparently differentiated between their home gardens and their banana plantations. None of the interviewees had access to separate areas of land under irrigation, but 11 indicated that they had irrigation in their home gardens – and this was mainly restricted to hand watering with a bucket or watering can.

In order to understand the extent to which people were using available space, as well as any opportunities for expansion, the interviewees were asked what percentage of the home garden, cropping field, and so on was operational. In terms of home gardens, 68.75% of respondents said that they were fully operational. In the case of the 11 interviewees that indicated that their households had dryland cropping lands, six (54.54%) said that they were fully operational. When asked why households were not full utilising their home gardens or fields, the following reasons were cited:

- Stoney condition of the garden (1 respondent)
- Lack of fencing (2 respondents)
- Shortage of money (2 respondents)
- Space taken up by a graveyard (1 respondent).

4.1.2.4 Water access and utilisation

4.1.2.4.1 Domestic water use

Water supply for domestic purposes was explored and according to the respondents, none of the households had piped water and all relied on unprotected streams, wells, rivers and dams. A number of interviewees raised the issue of having to share water resources with livestock and they cited concerns that this could have health implications for them.

4.1.2.4.2 Water use for crop production

When the irrigation status of banana production was investigated, 8 (24.2%) respondents indicated that they irrigated their plants (and 7 of these had less than 100 plants in total), while 25 (75.8%) indicated that they grew bananas under dryland conditions, relying on rainfall. In terms of those households irrigating their bananas, 4 said that they used grey water, 1 said that they fetched water and 2 said that they either purchased water or hired someone to fetch water. It is clear that these options would not be suitable for larger scale production. When adequacy of water availability for crop production was investigated, water shortages were highlighted by most farmers (See Table 4.21). Some respondents said that water availability was adequate for maize production, but this was probably because it was recognised as a dryland crop.

Table 4.21 Adequacy of water availability for crop production at Marina, Eastern Cape, 2010

Adequacy of water availability	Bananas	Maize	Spinach
No. of households growing crop	*33*	*29*	*18*
Yes	0	8	1
No	31	14	14
No answer	2	7	3

Note: choice of data to display based on bananas being the focus of the study, maize being a staple crop and spinach being a common vegetable crop.

When asked what factors negatively affect access to water for crop production, farmers listed a range of issues which are summarised in Table 4.22.

Table 4.22 Factors negatively affecting access to water for crop production at Marina, Eastern Cape (n=33), 2010

Factor	No. of respondents
Water availability in winter / drought	17
Lack of taps in the area	6
Lack of irrigation infrastructure / capital for infrastructure	4
Distance to water	3
People share water with livestock	2
Insufficient dams	1
Need to fetch water with wheelbarrow or hire someone (and road is bad)	1
Have to fetch water from river because no taps	1

When the interviewees were asked what could be done to improve access to water, a common suggestion was for the project team to intervene in order to engage relevant parties such as the Municipality. A direct answer that was mentioned was the provision of big tanks and water, but more respondents saw the need for assistance in terms of unlocking this support.

Another water-related matter that was investigated was that of water harvesting. While only 2 of the farmers indicated that they harvested rainwater, a number of farmers made reference to activities that constitute rainwater harvesting. For example, 8 said that leaves were left on the soil and 1 referred to mulching with grass. All these options relate to mulching and thus conserving water in the soil and were further explored with farmers through some joint experimentation activities.

4.1.2.4.3 Water use for livestock production

When asked about the sources of water for livestock, interviewees responded that they relied mainly on dams and rivers (see Table 4.23). The majority of cattle owners indicated that water availability was not adequate. Slightly more than half of the respondents indicated a similar situation for chickens. Results are shown in Table 4.24.

Table 4.23 Sources of water for livestock at Marina, Eastern Cape, 2010

Sources of water	Cattle	Chickens
No. of households keeping livestock	**7**	**27**
Dam	3	*10*
River	3	15
Tap	0	0
Other	0	1
No answer	1	1

Table 4.24 Adequacy of water availability for livestock according to respondents at Marina, Eastern Cape, 2010

Adequacy of water availability	Cattle	Chickens
No. of households keeping livestock	*7*	*27*
Yes	1	11
No	6	16

Negative factors affecting access to water for livestock were also explored. A number of respondents said that there were insufficient dams or that they were too far away. Three raised the concern that it was not safe for people and animals to be using the same water source. Drought and shortage of water was cited by 9 people and one person said that the river dried up.

4.1.3 Mooi River Irrigation Scheme, KwaZulu-Natal

The Mooi River Irrigation Scheme (MRIS) is located in Msinga Local Municipality. At the time of the study, the scheme consisted of fifteen blocks that ran along the Mooi River (See Figure 4.7). The scheme benefited residents in Wards 8 and 10 of Msinga Local Municipality. The 15 blocks totalled 601 ha, which were irrigated from a concrete lined canal and benefited approximately 824 participants (See Table 4.25). The perimeter of the scheme was fenced to protect crops from livestock. Funding for infrastructure development (including fencing and irrigation canals) was provided by the SA government. Irrigation water was drawn from Mooi River and diverted along a concrete lined canal to gravity feed into fields – via balancing dams for the tail end blocks.

The origins of the scheme

The Muden and Tugela Ferry irrigation schemes arose as a result of promises from the English government at the time of the battle of Isandlwana. Issues linked to King Cetshwayo led to the British promising compensation as a gesture of goodwill following the losses to the Zulu people. The tribes of Mchunu and Mthembu at Msinga were to benefit by receiving assistance with irrigation (water provision) to their lands. As a consequence the Tugela Ferry and Muden schemes were designed and canals dug, seemingly around 1900. Much later during the early 1980's the military, through a "Com-ops" program, stationed people at Muden to line the canal with concrete. At some stage after this, the KwaZulu-Natal Department of Agriculture took over the assistance at the Muden scheme.

Source: Siegfried Haschke, KZN DoA, 29/07/13.

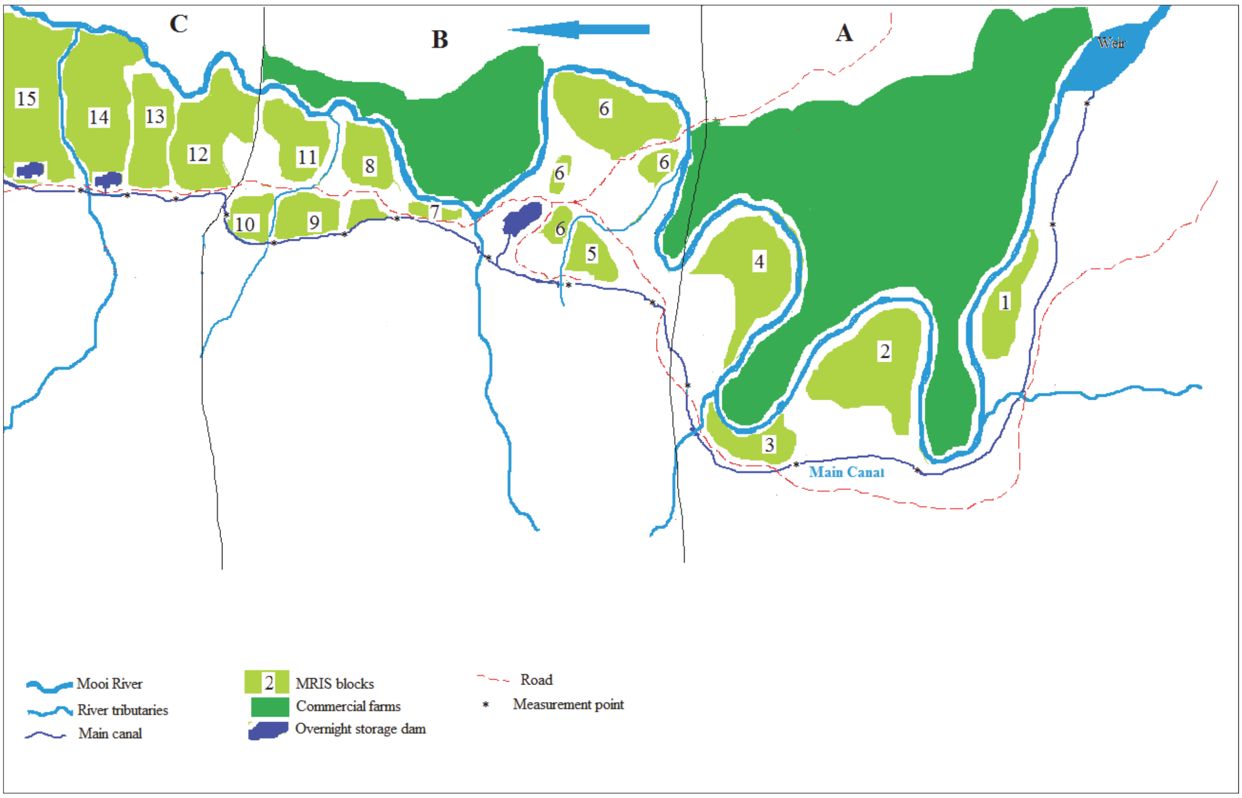

Figure 4.7 Sketch Map of the Mooi River Irrigation Scheme.

Source: Gomo, 2012

The smallholder scheme is across the river from approximately 20 private commercial farms (covering a total area of approximately 500 ha and ranging from 10-250 ha) that also irrigated using water from the Mooi River, diverted from the river into two earth (unlined canals). The commercial farmers then pump water from specific points along the canal (or directly from the Mooi River) to supply overhead sprinklers.

Table 4.25 The MRIS composition in terms of area and number of participants

Block	Area (ha)	Approximate number of farmers / Participants
1	5	15
2	15	26
3	9	29
4	26	76
5	2.5	2
6	64.8	113
7	4.4	16
8	33.6	35
9	14	31
10	50.4	91
11	39.2	68
12	62	76
13	71	86
14	58	57
15	146	103
Total	**601 ha**	**824**

Source: Gomo (2012)

The study found that both crop production at MRIS and marketing of produce was done individually, with some activities being coordinated by block committees and the overall scheme committee, comprising representatives from all the fifteen blocks.

4.1.3.1 Demographic information

Table 4.26 below presents the gender and marital status of household heads at MRIS. Table 4.27 gives an overview of the characteristics of the farmers sampled in a preliminary study in 2012, focusing on the demographic data and asset ownership patterns that were assumed to have implications for farm household behaviour with respect to household agricultural production. The age of the household head can be regarded as a variable to describe the farmers' experience in farming. It is a crucial factor since it determines whether the household benefits from the experience of an older person or has to base its decisions on the risk-taking attitudes of younger farmers (Makhura and Mokoena, 2003). The average age of the sample was 57 years which was an indication of old age among scheme members. The average household size was 5.58, with a minimum of one member and a maximum of 17 members per household. The household size has an effect on the amount of labour available for farm operations and consequently on the output and amount of marketed surplus. An average of 2 family members provided for farm labour. The percentage of female headed households was found to be very high at this site, and there were lower percentages of respondents married and more widowed.

Table 4.26 Gender and marital status of household heads at MRIS, KwaZulu-Natal (n=71), 2011

Variable	Percentage (%)
Gender of household head:	
Male	31
Female	69
Marital status:	
Married	25.4
Divorced	2.8
Single	31.0
Widowed	40.8

Table 4.27 Additional household characteristics of respondents at MRIS, KwaZulu-Natal (n=71), 2011

Variable	Mean	Min	Max
Age of household head (years)	57	23	77
Household size	5.58	1	17
Farm labour (available people)	1.97	0	7
Farming experience (years)	22.65	1	80

4.1.3.1.1 Labour utilisation in MRIS

Farmers in MRIS depended mainly on family labour for their daily farming operations. However, hired labour was used for certain operations such as planting, weeding and harvesting. Hired labour was sourced from the communities surrounding the scheme. Payment to hired labour was according to one of the following options:

- On a daily basis, where labour was paid R30 per day for weeding, planting and harvesting operations.
- Upon completion of task, where labour was paid approximately R90 for weeding, planting or harvesting a single bed to the satisfaction of the owner.

Regarding scheme members relying on family labour, there were concerns about the aging population (average age of respondents was 57 years) engaging in agricultural activities and the lack of interest in farming shown by the youth. The youth are more income oriented and therefore their interest may be stimulated by increasing the profitability of the farming enterprises. This could potentially be improved by improving smallholder market access as well as enhancing productivity per unit of land. Generally, labour was not in short supply in MRIS.

4.1.3.1.2 Education and training

The educational level of the household head was also considered as a variable that would influence the farmers' decision-making capacity and ability to understand both production and marketing trends. It is important to note that the ability to read and interpret market information minimises marketing losses as it improves resource use efficiency. Higher levels of education of household head often measures the ability of a farmer to perceive advantages and to utilize new technology efficiently, and are therefore associated with lower inefficiency effects (Mushunje, 2005).

The sampled farmers were found to have low levels of formal education, with an average of 2.5 years of schooling completed. Low level of education is closely associated with high average age in the community as many elderly people in South Africa did not have access to education during the apartheid era.

Human capital is about knowledge and skills. Many farmers and their families had adequate knowledge and skills for operating within the current level of technology. However efforts to intensify or diversify production require investments in new knowledge and skills. Many poor households did not have sufficient resources for making such an investment. In such cases, assistance might be provided by a public extension service or a private firm with an interest in boosting agricultural productivity. With regard to water in agriculture, the important enhancements in human capital that are required include knowledge of methods for improving irrigation water management.

Farmers' goals can only be met if the available agricultural resources such as land, water, machinery and finances are utilised efficiently. This calls for a certain level of skills endowment among the labour force. An assessment was made of how farmers accessed those skills that were deemed important for enhancing production and resource utilisation. Farmers who attended FGDs were asked to give an indication of how many farmers (i.e. none, few, most) had access to various agricultural skills. Results of skills rankings are presented in Figure 4.8. The discussions revealed that farmers had no formal training in irrigation scheduling and irrigation maintenance. Farmers recognised these as critical skills that they were lacking.

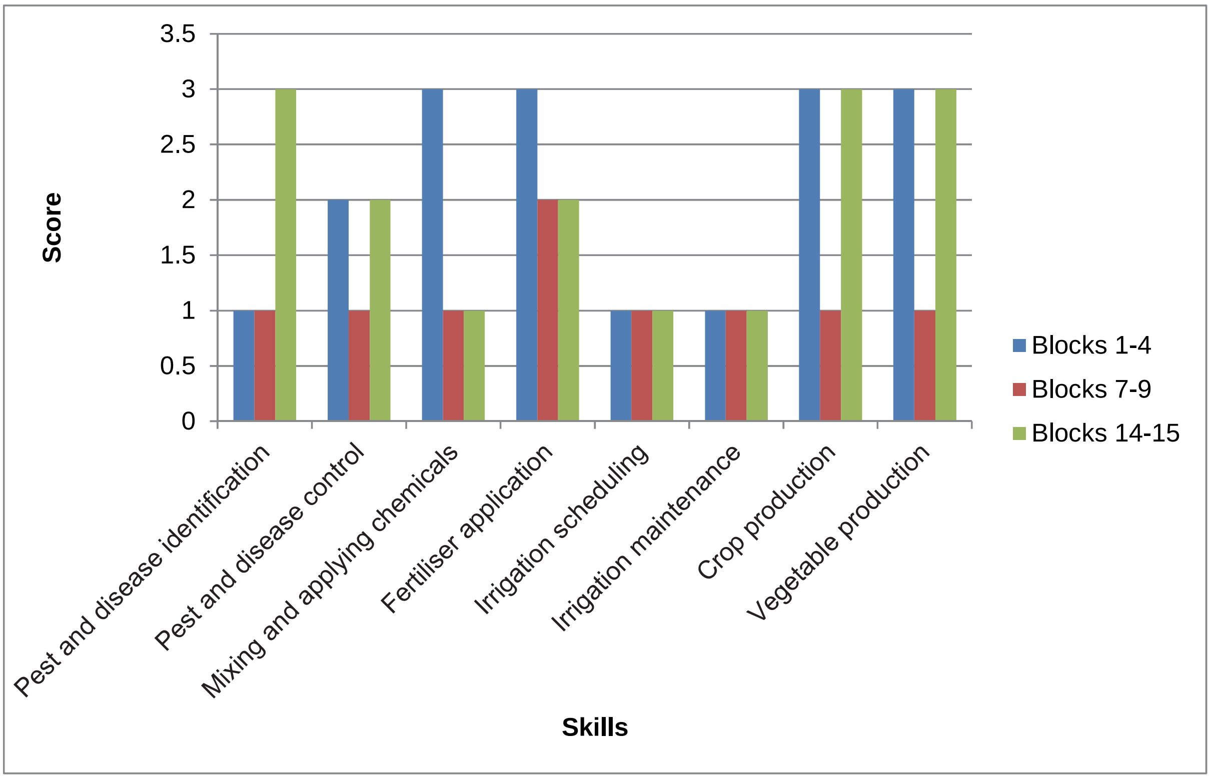

Figure 4.8 Access to farming skills by farmers at MRIS, KwaZulu-Natal, 2011.

4.1.3.1.3 Gender and youth

During the study it was found that only 11% of the respondents from the FGDs were male. This situation was discussed with the respondents and their perception was that women seemed more interested in gaining new information as they were responsible for meeting their households' needs and children looked to their mothers to put food on the table. Thus the higher proportion of women in the FGD reflected the higher proportion of women actively farming both within the scheme and in their home gardens. Like so many rural South African communities, the MRIS was largely made up of female farmers at the time of the study. The perception of FGD respondents was that, while most men had migrated to the cities seeking employment, others were either in the transport industry (driving trucks), are deceased or, unfortunately, in many cases, alcoholics.

Both the FGDs as well as the interview with the *Induna nkulu* highlighted the lack of involvement of the youth in agriculture. While the members of the FGD simply felt that there was a lack of interest in agriculture because of lifestyle changes and a perception that it is only for old people, the *induna nkulu* felt that it was because the youth lacked direction and might be interested if it could be shown that agriculture could generate income. It was highlighted that the younger generation opted for secure jobs or activities that provided readily available income such as driving trucks, the taxi industry or the retail industry. It seemed that the prospect of only reaping the rewards of one's labour after a time lag was very discouraging for the youth. The 'One house-one garden' project was seen as a project that is trying to get the youth involved in some way within the sector[8].

4.1.3.2 Economic status

A number of different factors that provide an indication of economic status were explored through the household survey.

4.1.3.2.1 Assets

In terms of agricultural assets, only 5% of the irrigation farmers owned draught animals, while 71.8% reported having access to a tractor for land preparation. Wheelbarrows were also critical assets used to transport inputs and produce from the field to selling points or for storage. However, only some 40% of the farmers owned wheelbarrows.

4.1.3.2.2 Household income

Rural livelihoods in the communities were diverse and encompassed both farming and non-farm activities. Communities utilised the MRIS to engage in agricultural activities. Farmers at MRIS produced a range of crops – mainly cabbages and maize, but also crops such as potatoes, onions, carrots and tomatoes. Discussion with extension officers indicated that members of the scheme were market-oriented, especially those producing vegetables. While crop enterprises were mainly irrigated, livestock production is done under extensive conditions on natural pastures. Livestock production was done by both scheme and non-scheme members and took place in the area outside the scheme. Due to poor veld condition, livestock farmers also herded their livestock on fallow (unplanted) areas of the scheme to supplement their nutrition.

[8]Lima was an NGO that was working within Msinga Local Municipality. They were involved with the government-initiated One-Home-One-Garden project. Their role was fairly limited and mainly related to provision of skills training. This project was headed by i*nduna nkulu* and employed local community members, particularly the youth, to physically prepare the land and plant crops during the establishment phase of the gardens. It was being implemented in both Wards 8 and 10. In the case of elderly, weak or disabled community members, these employees also returned to assist in the maintenance of the homestead gardens. They worked twice a week at a rate of approximately R480 a month. During the initial phase, Lima worked with local partners to develop systems and capacities required to execute the programme. Projects like these have uplifted the unemployed youth by keeping them busy and allowing them to earn a small income.

Non-farm income generating activities were diverse in the area and included brick-making, making *mbadada* (Zulu sandals), beadwork, woodwork and house construction. People undertook these activities independent of the scheme to earn a living. Furthermore, community members had guaranteed sources of income in the form of government grants. These include child support grants, disability grants and state old age pensions. A group interview with the Block 14 & 15 committee revealed that people perceived that, whilst government grants were a source of livelihood, people would earn more income if they fully engaged in farming activities in MRIS. However, income from marketing of agricultural produce was unpredictable and difficult to rely on. The committee indicated that agricultural markets were uncertain in terms of availability at a given time and product prices might not be favourable hence negatively affecting farmers' returns.

The contribution of different income sources was investigated in terms of how it differed for scheme and non-scheme members (Table 4.28). An F-test was also applied to establish the difference in financial means between scheme and non-scheme members.

Table 4.28 Average annual household income from different financial sources at MRIS, KwaZulu-Natal, 2013

Income source	Scheme membership	Mean per year (Rands)	Std. Dev.	Range (Rands) Min-Max	F-Value (p-value)
Income from livestock sales	Non-scheme member	258.2	2,016.581	0-15,750	3.116* (0.079)
	Scheme member	27.57	206.64	0-2,280	
	Combined average	73.39	916.546	0-15,750	
Income from irrigation farming	Non-scheme member	1,965.57	3,879.041	0-21,000	8.212*** (0.004)
	Scheme member	4,263.62	5,953.73	0-33,500	
	Combined average	3,807.00	5,672.27	0-33,500	
Total income from all agricultural activities	Non-scheme member	2,359.84	5,007.568	0-26,750	5.576** (0.019)
	Scheme member	4,308.66	5,941.724	0-33,500	
	Combined average	3,921.44	5,812.901	0-33,500	
Total non-farm income	Non-scheme member	19,315.08	18,710.483	0-120,000	1.101 (0.295)
	Scheme member	16,956.54	14,893.405	0-144,000	
	Combined average	17,425.18	15,720.303	0-144,000	
Income from remittances	Non-scheme member	670.49	2,173.733	0-12,000	0.004 (0.95)
	Scheme member	650.24	2,253.172	0-12,000	
	Combined average	654.27	2,234.122	0-12,000	
Income from government grants	Non-scheme member	7,089.18	8,976.593	0-46,560	0.624 (0.43)
	Scheme member	6,326.02	6,090.972	0-38,280	
	Combined average	6,477.65	6,752.561	0-46,560	
Income from pension	Non-scheme member	8,415.74	8,710.696	0-30,240	0.017 (0.896)
	Scheme member	8,258.54	8,296.966	0-30,240	
	Combined average	8,289.77	8,366.502	0-30,240	
Income from formal employment	Non-scheme member	2,510.16	15,582.179	0-120,000	0.358 (0.55)
	Scheme member	1,426.83	11,829.431	0-144,000	
	Combined average	1,642.08	12,642.625	0-144,000	
Income from informal employment activities	Non-scheme member	629.51	2,808.757	0-18,000	1.813 (0.179)
	Scheme member	296.12	1,338.412	0-12,000	
	Combined average	362.58	1,732.868	0-18,000	

Note: ***, ** and * mean significant at 1%, 5% and 10% levels respectively

The results (Table 4.28) indicate that there was a statistically significant difference in terms of agricultural and non-agricultural sources of income between scheme and non-scheme members. As would be expected, income from irrigation activities showed the most difference (significant at the 1% level). This was followed by the total agricultural income (significant at the 5% level). Income from livestock sales was significant at the 10% level. Non-scheme members received more income from livestock sales compared to scheme members. This makes economic sense, because non-scheme members might have been involved more in livestock farming as their major agricultural activity.

However, the higher overall income from agricultural activities by scheme members would have meant that scheme members had the means to buy livestock for rearing purposes. This was not, in fact, the case. The reasons were not clear, but could be enterprise specialisation (crop versus livestock) by the farmers, or demand for labour which might have restricted the farmers from effectively engaging in both irrigation and livestock farming. It is important to note that there was no significant difference in income from any other sources between scheme and non-scheme members. Clearly, this placed agricultural participation at household level as a major activity that could be used to enhance the forms of rural livelihood through a marginal increase in income. However, non-farm income remained higher than agricultural income. This is consistent with similar studies in rural South African communities and results from heavy dependence on government social grants. Financial differences between scheme members and NSMs might also have had an effect on the level of their participation in irrigation maintenance activities. The agricultural income levels were greater for scheme members than NSMs with an average of R3807 per household per annum. Irrigation scheme members received an average of R2298/year more than NSMs, which could be attributed to better farming practices and access to resources such as water.

Respondents were asked to reveal how much they were willing and able to contribute towards water infrastructure maintenance. Table 4.29 shows that scheme-members had a greater willingness to pay (on average R112.55 per farmer per year) than NSMs (on average R51.14 per farmer per year), even though the latter also benefited from the canal. However, the willingness to contribute might also have been influenced by household factors like family size, households' non-farm income and the perceived benefits emanating from such contributions. For instance, some respondents indicated they could only pay minimal amounts of between R10 and R20 at any given time. The reason given for this limited contribution was the lack of mechanisms to ensure proper accountability of all finances contributed to the block committee members. If farmers contributed more cash at a time, there would become a need for functional committees and bank accounts to ensure that surplus cash could be accounted for, lest the entrusted individuals put it to personal use. This highlighted the need to formalise the structures in MRIS – possibly through proper registration of cooperatives that could act as resource management bodies.

Table 4.29 Amount in Rands that members and non-members from MRIS, KwaZulu-Natal were willing and able to contribute annually for irrigation maintenance (n=307), 2013

Descriptive statistics	Total sample (n=307)	Scheme members (n=246)		Non-scheme members (n=61)	
	Mean	Mean	Std dev.	Mean	Std dev.
Irrigation area (ha) in the scheme	0.275	0.33	0.21	0.048	0.12
Total arable land (ha) including dryland	0.405	0.42	0.027	0.35	0.71
What farmers were willing and able to contribute for irrigation maintenance per year in Rands (April 2012-April 2013)	100.35	112.55	113.30	51.14	72.14

4.1.3.2.3 Access to credit

Many poor households had inadequate financial capital. This limits their ability to pay for water and the costs of operating and maintaining the irrigation system. Inadequate finance can also prevent households from investing in new methods of crop production and irrigation. In addition, many households are risk averse because they have limited financial ability to respond to unexpected shortfalls in income. Limited finance also prevents farmers from accessing all of the complementary inputs required to maximise the productivity of land and water resources. Farmers with access to affordable credit can purchase inputs. However, in many areas, the risk of a shortfall in production prevents farmers from using that option. This is particularly important in rain fed areas where crop yields can vary substantially with annual rainfall, as well as in irrigation schemes where water access and distribution is a challenge.

The respondents indicated that they were not accessing formal credit from financial institutions at the time of the study. This is consistent with literature on credit challenges among smallholder farmer farmers (Makhura, 2001). Besides being risk averse, land tenure in MRIS was through traditional allocation and no title deeds were issued. Therefore, lack of collateral was one factor that excluded MRIS farmers from participating in the credit market.

The most dominant credit schemes available to farmers at MRIS were informal and were based on trust and social relations. Farmers engaged in short term borrowing of small amounts of cash from neighbours, friends and family members. Borrowed money was often used to buy agricultural inputs. Most farmers paid back their borrowed incomes through grants, remittances or after selling their agricultural produce. The survey of MRIS farmers revealed that 64.8% of the farmers used some form of credit to finance their farming activities (Table 4.30). Finance from relatives and neighbours did not attract interest, while that from loan sharks and *stokvels* (which were not controlled or monitored in any way) came with excessive interest rates of between 20 and 50% per month. Farmers used credit to buy inputs or pay for tractor hire and for the hire of pick-up trucks to take produce to the market.

Table 4.30 Credit use by farmers in MRIS, KwaZulu-Natal, 2013

Use of credit by farmers	**Number of farmers**	**Percentage**
Use credit to finance farming	46	64.8
Do not use credit	25	35.2
Total	**71**	**100.0**

A further discussion of the farmers' perception on how a lack of credit affected their production and marketing activities revealed a perception that credit did not greatly affect farmers' production and marketing activities (Table 4.31).

Table 4.31 Farmer perception at MRIS, KwaZulu-Natal on lack of credit facilities, n=307, 2013

Perception	**Non-scheme member**	**Scheme member**	**Total Frequency**	**Percentage**
No effect	27	79	106	34.5
Don't know	17	71	88	28.7
Significant influence	13	32	45	14.7
Great influence	3	27	30	9.8
Very serious influence	1	37	38	12.4
Total	**61**	**246**	**307**	**100**

4.1.3.3 Land availability and tenure arrangements

Land tenure is a very important variable that influences farmers' output and the respective marketed surplus. About 64% of the respondents indicated that they were satisfied with the land size, while 36% showed dissatisfaction and wanted access to more land. This variable is an important indicator of the farmers' perception and eagerness to invest in a parcel of land especially if he/she anticipates better yields. The preliminary study (n=71) found that average land size per household was 0.268 ha (approximately 3 plots or beds), with a minimum of 0.1 ha and a maximum of 1.4 ha (14 plots or beds). Most farmers 'rented' beds from those not utilising the land productively. The cost of renting was R300 per bed per cropping season. Alternatively, tenants could pay the holder of the bed with a portion of the produce.

The main study, undertaken in 2013, investigated land access in more detail. Irrigable land was in short supply within MRIS, evidenced by a substantial amount of land under irrigation outside the scheme boundaries. The irrigated plots outside the scheme were held by both scheme and non-scheme members and the MRIS main canal was the main source of irrigation water (Table 4.32).

Table 4.32 Access to land in MRIS, KwaZulu-Natal (n=307), 2013

Agricultural Land categories (ha)	Number of respondents who own the land			Area (ha) (April 2012-April 2013)				
	Scheme member (n=246)	Non-scheme member(n=61)	Total	Range (ha)	Sum (ha)	mean (ha)	Land used (ha)	% Usage
Homestead garden	67 (27%)	23 (38%)	90	0-0.03	2.0	0.022	1.3	65
Dry land field	23 (9%)	10 (16%)	33	0-3.0	39.0	1.182	3.5	8.97
Irrigation within the scheme	246 (100%)	9 (15%)	255	0-1.5	84.3	0.329	70.9	84.1
Irrigation outside the scheme	15 (6%)	38 (62%)	53	0-1.2	19.0	0.358	13.0	68.4
Total land				**0-3.5**	**144.3**		**88.7**	**61.5**

Some of the land was also irrigated directly from the Mooi River, either using buckets or using small petrol water pumps. Although demand for land seemed to be increasing, there was under-utilisation of arable land. During the survey, farmers were asked to state how much of the arable land at their disposal had been utilised between April 2012 and April 2013. The results indicated that about 84.1% of the irrigable land inside the scheme had been utilised for at least for one crop cycle during the stated period. The high percentage was attributed to high usage of land during summer (November-January) when irrigation is supplemented by rains, resulting in fewer crop failures. The percentage might have been much lower in winter when most farmers whose plots were located in the tail-end blocks minimised planting due to water scarcity. Furthermore, some farmers did not want to give an impression that they lacked capacity to fully utilise their irrigable land, hence there is a possibility that they overstated the proportion of land that was fully utilised. Land under-utilisation was highest on dryland fields with a reported usage of 8.97% between April 2012 and April 2013.

There were relatively low numbers of households with home gardens. There are several explanations for this. Some homesteads were located uphill, with limited or no arable land around them. Other homesteads had no water supply or storage tanks that could possibly be used to irrigate home gardens. Furthermore, most of the respondents had some small irrigated plots that were located along the main canal or just outside the scheme, within reach of the canal. This is also supported by the high number of non-scheme members who held irrigation plots outside the scheme (62%). In trying to establish a link between land use and irrigation water availability, randomly identified key informants reported that there had been a gradual increase in water use outside the scheme over the years, which might be one of the reasons for the continued increase in water shortages in some sections of the scheme. The area around MRIS was so dry and rocky that production was limited to areas that could be irrigated with some ease. This was also evidenced by low utilisation of dry land fields (8.97%). As such, it can be argued that homestead location with respect to water source had a bearing on land access and the household's irrigation farming activities.

4.1.3.4 Water access and utilisation

Water access by households and within the MRIS was explored and is discussed below.

4.1.3.4.1 Domestic water

Although canal water was meant for irrigation, group interviews highlighted some additional uses of the water source. These included watering livestock, brick making and domestic uses such as washing of clothes.

Villages that benefited from MRIS also had access to tap water for domestic use, however availability of the water was not consistent. Block committee interviews from Block 1 to Block 11 indicated that there was no shortage of domestic water in the area, contrary to findings from Blocks 13 to 15. Visible queuing at water points was a clear sign of inadequate water in villages around Block 13 to 15 (See Figure 4.9).

Figure 4.9 Queuing for domestic water adjacent to the MRIS, KwaZulu-Natal.

The scarcity of domestic water in areas located on the lower part of the scheme (Blocks 13-15) was similar to the situation with irrigation water in the same area. In cases where domestic water became critically short, villagers resorted to using canal water for domestic purposes. This exposed the community to health risks, especially water borne diseases.

4.1.3.4.2 Irrigation water at MRIS

Water allocation within the scheme was done according to a weekly schedule, which was known to all farmers and controlled by the canal rangers. The main challenge in MRIS was compliance with the irrigation roster. Blocks on the upper part of the scheme (Blocks 1-13) were said to violate the schedule by irrigating daily since they had continuous access to water. This practice negatively affected water supply to the lower blocks (14 and 15) throughout the year. As a result of these challenges, the KZN DoA supported the scheme by installing a pump to supplement irrigation water in the critically water stressed blocks of the scheme, namely Blocks 13, 14 and 15.

Table 4.33 shows the relationship between membership of the irrigation scheme and other variables such as training in irrigation water management and perceptions about infield water distribution. The Chi-squared test of independence of categorical variables was used to determine if there was an association between scheme membership status of each household and water related variables such as training in water management. The statistically significant Chi-squared values mean that there was an association between households' scheme membership status and the respective variable.

Table 4.33 Description of household head variables that related to irrigation at MRIS (n=307), KwaZulu-Natal, 2013

Descriptive Statistics	Units	Total sample (N=307)	Scheme members (n=246)	Non-scheme member (n=61)	x^2-square
Categorical variables					
Training in irrigation water management	1=Yes	111 (36.2%)	101 (41%)	10 (16%)	0.00***
	0=No	196 (63.8%)	145 (59%)	51 (84%)	
Perception of infield water distribution	1=fair	105 (32.2%)	99 (40%)	6 (10%)	0.00***
	0=Unfair	202 (65.8%)	147 (60%)	55 (90%)	

Note: *** means significant at 1% level of significance

The results indicated that training in water management was closely associated with scheme membership status ($p<0.05$). Scheme membership proved critical as it offered the platform through which water users could access services, including training from government. There was a general perception that infield water distribution among block / scheme members was unfair.

4.1.4 Synthesis of findings across the three sites regarding rural livelihoods

A number of similarities in respect of rural livelihoods were identified across the three sites. Household demographics had implications for human capital as this is largely a reflection of people's capacity to do work / provide labour. Firstly, at all sites, there were more female-headed households than male-headed households. This has implications for resource access as women access land less easily than men under traditional leadership situations. The average age of the respondents was over 55, which shows that many farmers are nearing retirement. On occasions, farmers complained about the lack of energy as a factor impacting on their productivity. To some extent, the age of the respondents was linked to the levels of education. At Willowvale and Marina, approximately 50% of respondents had reached secondary schooling and were thus likely to be functionally literate. At MRIS, education levels were much lower, with the average number of years of formal schooling for respondents being 2.5. A lack of functional literacy impacts on farmers' capacity to participate in training sessions and read training material provided. The study explored the levels of specialised agricultural skills that existed amongst farmers. At Willowvale, the survey showed that approximately 75% of respondents had no specialised agricultural skills. At MRIS, there was a distinct lack of skills related to irrigation water management (indicated by 64% of respondents). Furthermore, support provided by Extension Officers focused on agronomic aspects and did not give attention to business-related skills such as marketing or pricing. Many farmers relied on skills that developed from experience (average of 23 years farming experience at MRIS for example) and from exchange with neighbours. At MRIS, input suppliers were also identified as an important source of knowledge.

Household sizes were fairly large (average sizes at the three sites were between 5 and 7.5), which should have positive implications for the provision of family labour, but which also have implications for the ability of households to move beyond production for ‘own consumption’ – though the benefits of households being food secure should not be underestimated. Marriage is seen as a measure of stability for rural families, At Marina and Willowvale, this characterised approximately 45% of the respondents, but at Msinga widows were far more prevalent, making up 41% of respondents – this could have been linked to the age of the people who are engaging in agriculture.

Availability of affordable labour is generally important for agricultural production – especially for crop production. The study found that households generally had 2-3 members who engaged in agricultural activities thus providing family labour. The alternative to family labour is hired labour – it was found that hired labour is mainly used for specific labour-demanding activities such as weeding or harvesting produce. Payments are made in case or in kind. In general family labour was said to be used more than hired labour – although respondents often referred to a combination of both. In Bizana, 64% of banana farmers interviewed relied only on family labour. The study also showed that many tasks have gender implications – for example, livestock related tasks are normally undertaken by men or boys, while many cropping activities are dominated by women. The extent to which family members were physically challenged (including too old) and thus not able to provide family labour effectively was explored. The age of respondents generally did not prevent them engaging in agriculture, but impacted on their productivity and the lack of involvement of youth is generally acknowledged as a challenge.

In considering rural livelihoods, it is important to recognise their diverse nature and the range of income sources on which households rely. While 40% of respondents at Willowvale saw themselves as fulltime farmers, some 80% mentioned government grants as a major source of income and for Marina, 48% said the latter was their only source of income. Agriculture was far less frequently mentioned as a source of income and at Willowvale only 2% said that farming was their only source of income, while at Marina, 9% of respondents said that they derived some income from hawkers buying agricultural produce. At MRIS, non-farm sources of income were substantially higher than income from agriculture. Average income from irrigation farming – which was the main source of agricultural income – was less than R4000 per annum, while non-agricultural income averaged close to R20 000 per annum.

Access to credit was another aspect of rural livelihoods that was considered. Generally the study found that most people did not make use of credit (63% of respondents at Willowvale and 73% at Marina respectively). Generally credit facilities were limited to informal facilities such as stokvels. At MRIS, 73% of respondents did not appreciate that lack of credit facilities impacted on their agricultural production, which implies that farmers do not even see this as a possible mechanism for addressing the challenge of procuring inputs.

Access to land for agriculture is another factor that impacts on rural farmers’ capacity to engage in agriculture. In addition, the study explored the extent to which available land was being utilised. It was generally found that dryland fields were underutilised for various reasons, while the situation with irrigated areas was more variable. The fact that a number of beds using canal water have been established outside of the MRIS boundaries seems to indicate that there is a shortage of available land within the scheme. The extent to which households make use of homestead gardens was also explored. These three sites were all within Traditional Authority areas, where land allocation is traditionally a role of the local headman / inkosi. Land sizes are generally small – 86% of respondents at Willowvale individually had access to areas <1 ha in size, while at MRIS the average land holding was 0.275 ha per household which increased to 0.4 ha when dryland fields were added. At Bizana, only 33% of households actually had access to dryland fields and of these only 55% of these were actually making use of their fields. Home gardens at Marina and Willowvale were common and were well utilised (69% of gardens at Marina were fully operational).This was not the case at MRIS, where climatic conditions limited the potential for homestead gardens unless households were located in the vicinity of the canal. In MRIS there was also low usage of dryland fields, with only 9% of respondents indicating that they were using their fields.

Access to water was also explored as an aspect of characterising rural livelihoods – both for agricultural purposes as well as for domestic purposes. In terms of domestic supplies, all three sites had complaints. At Marina, many respondents complained that they had to share water with livestock which had health implications. This was also mentioned at MRIS, where households sometimes had to use canal water for domestic purposes. Government water supplies are generally characterised as inconsistent, and households have to rely on other sources such as rivers, dams and the irrigation canal – in the case of MRIS. Farmers generally highlighted that rainfall was insufficient to support dryland production at the three sites and the canal water was unreliable at MRIS so this did not completely overcome the challenge of water shortages.

To summarise, the study found that rural livelihoods are diverse and not completely reliant on agriculture. Given the very limited scale of production possible based on allocated land and available resources – as well as the challenges related to accessing water, members of rural communities are forced to diversify their livelihood strategies. Skills and knowledge are limiting and the relatively old age of the respondents impacted negatively on their ability to do physical work. Furthermore the number of family members available to do agricultural work was found to be relatively low. The role of women in agriculture should not be underestimated given the dominance of female-headed households and the gendered nature of many agricultural tasks, especially crop-related ones.

4.2 CLASSIFICATION OF FARMERS IN THE THREE STUDY SITES

In an effort to classify farmers into different typologies, the first step was to explore the general farming system at each of the sites, as well as project activities – especially the marketing of agricultural produce. This also highlighted the challenges that farmers were facing. The next step to consider was access to agricultural assets, level of training and scale of production as factors for classifying farmers. A synthesis is provided across the three sites as well as the typology framework developed on the basis of the project findings.

4.2.1 Willowvale, Eastern Cape

4.2.1.1 <u>General farming system and project activities</u>

The initial exploratory visit to the Willowvale site in 2010 revealed that many rural residents of the Mbashe Local Municipality had mixed farming systems. Livestock rearing was dominated by chickens. The steep terrain meant that many of the households did not practice crop farming and production was generally limited to a subsistence level, being dominated by backyard gardens and medium-sized plots where terrain permitted. Production occurred mainly on the low lying areas that had deep, rich soils and was rainfed. Maize formed the dominant crop grown under the rainfed system. Though there was limited livestock farming taking place in the communities at the time of the study, there was some diversity in terms of the types (and combinations) of livestock owned (See Table 4.34).

Table 4.34 Livestock combinations owned by households at Willowvale, Eastern Cape, 2010

Categories of livestock	**No. of households**	**Percentage**
Chickens only	23	28.05
Cattle only	10	12.20
Goats only	2	2.44
Chickens and cattle	3	3.66
Chickens and goats	3	3.66
Goats and cattle	1	1.22
Chickens, goats and cattle	7	8.54
No livestock	*33*	*40.24*
TOTAL	**82**	

While 40% of households indicated that they had no livestock at all, a further 28% indicated that they only owned chickens. Chicken keeping was the most dominant activity in the two communities. This is also illustrated by information presented in Table 4.35, which shows that 43.9% of households interviewed owned chickens, 25.6% owned cattle and 15.9% owned goats. The high number of households owning chickens could be related to the dominance of female headed households within these communities as well as the relatively low income levels, which could have precluded households from purchasing larger livestock. The fact that more households owned cattle than goats conflicts with this theory however. The mean herd / flock sizes owned by households (4.8 for cattle, 9.15 for goats and 10.91 for chickens) gives an indication of the general scale of production. The ranges in herd size are also shown in Table 4.35.

Table 4.35 Ownership of different livestock types at Willowvale, Eastern Cape, 2010

Livestock type	**Percentage of households owning livestock**	**Mean flock/herd size (min and max size)**
Cattle	25.6	4.81 (1-15)
Goats	15.9	9.15 (2-25)
Chickens	43.9	10.91 (2-56)

Table 4.36 summarises household participation in either crop or livestock enterprises or a combination thereof. The results were encouraging given that 57.3% of the households realised the benefits of combining crop and livestock enterprises at a household level. Economically, this is a food security strategy and a way of spreading risk (in case one enterprise fails, such diversified farmers always have an enterprise to sustain the household) and it also allows for linkages (inflows and outflows) between the enterprises. It was suggested that more support was, however, required from the Eastern Cape Department of Agriculture in terms of fencing grazing areas and fields in order to allow the co-existence of livestock and crop farming within communities. What was also interesting was to find that 2.4% of these very rural households indicated that they did not engage in any agriculture.

Table 4.36 Household participation in crop and livestock activities at Willowvale, Eastern Cape, 2010

Category	**No of households**	**Percentage of households**
No agricultural activities	*2*	*2.4*
Both crops and livestock	47	57.3
Crops only	31	37.8
Livestock only	2	2.4
TOTAL	**82**	**100**

The field survey in Ciko and Mbozi villages revealed that most farmers had limited access to crop and livestock inputs, which included seed, fertilisers, labour and finances. This was supposedly one of the major causes of small yields among smallholder farmers in the two villages under study. Below is a list of challenges that Ciko and Mbozi farmers highlighted during the individual interviews:

- Lack of finances to fund agricultural activities – this was also cited as the major drawback in farm asset ownership.
- Destruction of crops by stray animals.
- Poor transport infrastructure – especially bad gravel roads that are inaccessible during the wet season.
- Livestock theft, which was also a deterrent factor for cattle and goat production in both Ciko and Mbozi villages.
- Shortage of tractors for land preparation – farmers in both communities cited challenges in hiring a tractor for land preparation due to a requirement that a minimum of ten (10) households must hire a tractor to prepare their land. (Problems of coordination have sometimes resulted in failure to make a group of 10 households).
- Lack of draught power – the limited number of people who owned cattle in Ciko and Mbozi communities supports the view that there was a shortage of draught power in the area. (Worsening the challenge of animal draught was the limited availability of alternatives such as tractor power).
- Access to resources for joining irrigation projects – access to irrigation opportunities was said to be limited by the need to pay a joining fee, which farmers claimed they could not afford.
- Pests and diseases were cited as a major threat to crop production in Ciko village.
- Tick infestations on cattle – due to inconsistent dipping in both communities.

Besides agricultural activities of individual households, project activities and challenges were also explored. Foundation Community Project (FCP) produced a wide range of crops under sprinkler irrigation. These included cabbage, spinach, butternut, broccoli, pumpkins, potatoes, green peppers, carrots and maize (green mealies). Project members decided on the crops to be grown at any given time after a certain crop had been harvested or concurrently depending on land availability. A combination of four crop enterprises at any given period was usually followed. The crops grown at FCP are shown in Table 4.37.

Table 4.37 Crops grown at Foundation Community Project during 2009 and respective markets, 2010

Crop	Quantity x Units	R/Unit	Total	Major markets
Butternut	50 x 10 kg pockets	R28/10 kg	R1,400	Local shops (Super Spar)
Spinach	150 bunches	R3.50/bunch	R525	Local shops (Super Spar), Villagers
Maize	735 uncooked cobs 140 cooked cobs	R2/cob R4/cob	R1,470 R560	Hawkers, Villagers
Potatoes	82 x 10 kg pockets	R28/10 kg	R2,296	Fruit and vegetable shops (Ngumbela & George's)
Pumpkins	38 units	R5	R190	Villagers
Cabbage	400 heads	R5	R7,220	Local shops (Ngumbela & Georges)
Carrots	3 bunches	R3	R9	Villagers
Cauliflower	30 heads	R4	R120	Local shops (Ngumbela & Georges)
Green peppers	42 peppers	R1	R42	Villagers
Total			R13,790	

Source: FCP Project coordinator's records (2010)

During initial discussions with members of FCP, they indicated that their major aspiration was to increase production and marketing of crops, as a stepping stone towards full commercialisation of their operations.

Table 4.37 shows that their current level of operation was very small, but it was envisaged that with extensive support, there was hope to increase their future market participation. The output figures were not exhaustive, since they did not show any quantities shared among project members or donated to charity. There was also no quantification of the field losses due to bad weather and lack of markets. It was encouraging to note that in 2009, produce from FCP went beyond the Mbozi village, as they supplied to supermarkets as well as fruit and vegetable shops. The project coordinator played an active role in approaching potential markets and negotiating prices.

Ciko Community Project produced a wide range of crops under sprinkler irrigation. The project produced cabbage, spinach, potatoes, onions, carrots and tomatoes. Enterprise selection was done by project members after a particular crop had been harvested and also depending on the availability of input resources. Table 4.38 shows a breakdown of major crops grown at Ciko Project in 2009.

Table 4.38 Crops grown at Ciko project during 2009 and respective markets

Crop	Quantity x Units	R/Unit	Total	Major markets
Potatoes	17x10 kg pocket	R35/10 kg	R595	Local villagers
Spinach	No records	R5/bunch	-	Local villagers
Onions	No records	R6/bunch	-	Villagers
Tomatoes	No records	R5/(6-8 tomatoes)	-	Villagers
Cabbage	No records	R5	-	Local villagers
Carrots	No records	R4	-	Villagers

In 2009, yields at Ciko community project were low, hence their reliance on the local market for disposal of all their produce. The greatest challenge at Ciko project was record keeping for all project activities. No production was recorded and quantities marketed were not known either. This posed a lot of questions as to how the project calculated its profit or loss for the purposes of sharing the proceeds. The research team felt that in the medium term, this project would face viability problems especially after exhausting the R240 000 funds which were at their disposal at the time from the Department of Social Development.

Another key problem affecting the project was the incidence of waterlogging and inadequate crop protection strategies at the scheme. The project lost most of a cabbage crop through rotting (Figure 4.10). At the time of the study it was felt that urgent agronomic intervention was required, coupled with farmer training on proper irrigation scheduling to prevent waterlogging. The projects are located on flood plains, so both irrigation water and rain water could have caused waterlogging at both study sites. As such, proper and strict water management systems needed to be put in place to minimise crop and soil damage due to excess water.

Figure 4.10 Waterlogging resulted in crop losses at Ciko Community Project, Willowvale, Eastern Cape.

Focus group discussions were conducted at each of the sites, i.e. Ciko Santrini Community Project and Foundation Community Project. Both sites practice collective production and marketing of produce. Below is a list of challenges that were brought up during the discussions:

- No modernised equipment such as boom sprayer, dibbler, ridger and planter.

- No contracts with established buyers and fresh produce markets.
- Cash shortages for input procurement.
- Poor transport system due to poor road condition.
- No electricity at the irrigation sites, hence use of diesel pumps for irrigation.
- No proper packaging for delicate produce such as broccoli and cauliflower, hence limited production of these specific vegetables.
- Ciko Project had no tractor and relied on hiring.
- Shortage of technical expertise to maintain irrigation infrastructure hindered efficient running of the system.
- Inadequate training of project members on such aspects as pest and disease identification, chemical mixing and application, irrigation scheduling and irrigation maintenance.
- Poor drainage and waterlogging had caused loss of cabbage crop at both Ciko and Foundation Community projects.
- Nut-grass (a sedge) infestations of lands was seriously affecting project plots and urgent attention was required to control the weed.

The following opportunities were identified by respondents during the FGDs:

- Perennial flow of the Shixini River – hence expansion of the existing irrigation projects was not constrained by water availability.
- Free water had the potential to offer farmers greater returns – up to a point when they start paying for irrigation water.
- Free land also offered good growth opportunities for cooperative farmers
- Proximity to the towns of Willowvale and Idutywa offered a good market for the produce, hence a need to improve road transport system in the area.

The following points were potential solutions identified by respondents for overcoming challenges rather than opportunities *per se*:

- Farmer training to re-orientate their goal towards commodity marketing was seen as a stepping stone in developing agriculture in both communities.
- The need to support the projects with implements such as ridgers, boom sprayers and tractor-drawn trailers to improve production and marketing of produce.
- Road improvement and maintenance, especially to Foundation Community Project, was seen to have the potential to greatly improve the project's accessibility by buyers of fresh produce.

4.2.1.2 Farmer typologies in Willowvale, Eastern Cape

The following factors were considered when classifying farmers as subsistence, emerging or commercial:

- Access to agricultural assets
- Level of training
- Scale of production

Households generally had few agricultural assets. Those most commonly mentioned were shovels and hoes and respondents from 55 (67.1%) and 79 (96.3%) households said that they had access to shovels and hoes, respectively. Thirty-nine (47.5%) said that they had access to wheelbarrows and 8

(9.8%) said that they had access to ploughs (with 6 having their own ploughs and 2 indicating that they borrowed ploughs).

Skills level was another factor used in classifying farmers. Training gaps were identified through the survey in almost all farm operations including herding, dipping, planting and crop spraying. Most respondents indicated they used their own knowledge (developed through experiential learning) to perform farm operations, but there were certain operations, such as crop spraying, that none of the respondents were implementing. This was due to a lack of knowledge and resources as well. It compromised crop yields and quality, and consequently farmers' participation in markets.

While land area utilised by individual farmers was relatively small, community members did not mention the need for additional land. This was supported by the under-utilisation of the dry land fields in the area, with some households having willingly volunteered their fields for the collective use by Foundation Community Project, even though the majority were not members. Thus, in terms of size of land holdings, farmers in both Mbozi and Ciko villages could be classified as subsistence farmers. They were also characterised by low output per hectare and very limited marketing of agricultural commodities. None of the households surveyed had reached emerging or commercial scales of production at individual household levels.

4.2.2 Marina, Eastern Cape

4.2.2.1 General farming system and agricultural activities

In order to characterise the farmers at the study site, an investigation of their agricultural activities was undertaken. The purpose of this was to understand the mix of activities, and their scale, as well as the extent to which households generally engaged in various common activities.

Figure 4.11 A typical homestead of a smallholder banana farmer at Marina, Eastern Cape, 2010.

Combinations of crops and livestock offer opportunities for linkages: for example, livestock produce manure that can be used to improve soil fertility, while by-products from crop production can be used as feed inputs. As the focus of the study was on households that grew bananas, it is obvious that all respondents grew bananas. Table 4.39 below shows the frequency of households growing various other crops, of which maize and potatoes were the most common.

Table 4.39 Frequency of households growing various crops at Marina, Eastern Cape (n=33), 2010.

Crop	No. of households	Percentage
Bananas	33	100.0
Maize	29	87.9
Potatoes	21	63.6
Spinach	18	54.5
Beans	15	45.5
Cabbage	12	36.4
Onions	12	36.4
Dry beans	7	21.2
Butternut	6	18.2

In terms of livestock, many households (81.8%) owned chickens. The numbers of households having cattle and goat was much lower (21.2 and 15.2% respectively) and none of the households interviewed had sheep (See Table 4.40).

Table 4.40 Frequency of households owning livestock at Marina, Eastern Cape (n=33), 2010

Livestock types	No. of households	Percentage
Chickens	27	81.8
Cattle	7	21.2
Goats	5	15.2
Sheep	0	-

Apart from the extent to which households were involved in livestock keeping, it was also necessary to explore the scale of livestock production that is characteristic of the area. It is clear from Table 4.42 below that herd / flock sizes for all cattle and goat owners were small. The size of households' chicken flocks was fairly variable. This did not include any broiler chickens, although there are a number of broiler projects in the area.

Table 4.41 Information pertaining to the scale of livestock production, 2010

Livestock information	Cattle	Goats	Chickens
Range of herd/flock size	2 to 13	3 to 7	2 to 40
Average herd/flock size	5.85	4.8	15.38

The farmers at the study site were characterised by mixed farming systems. An investigation of enterprise combinations was conducted to clarify the nature of farming systems (see Table 4.42). From the tables above, it is evident that most households had chickens, maize and bananas. The table below, which focuses on those households that had either cattle or goats, explores this mix further. It is clear that households that had livestock also grew a range of crops, which illustrates the mixed nature of the farming systems. While all households surveyed had bananas, some had very small number of bananas that were simply part of a mixed farming system (See Figure 4.12).

Table 4.42 Mix of agricultural activities (for the 7 households that had cattle and 5 that had goats), 2010

Agricultural enterprises	Household No.
Goats, chickens, maize, bananas	4
Cattle, chickens, maize , bananas	5
Cattle, maize, bananas	1
Cattle, goats, chickens, maize, bananas	1

Figure 4.12 Bananas were frequently just one crop in a mixed farming system at Marina, Eastern Cape, 2010.

When interviewees were asked what factors negatively affected agricultural production (including both crop and livestock production), a range of issues was raised (Table 4.43).

Table 4.43 Factors affecting agricultural production at Marina, Eastern Cape (n=33), 2010

Factors affecting agricultural production	No. of respondents
Water shortages	17
Insects	8
Ants	7
Crop diseases	6
Lack of fertilizer / compost	6
Poor grazing for livestock	5
Lack of knowledge and training	3
Diseases (general)	3
Lack of dams	2
Shortage of feed for chickens & livestock	2
Lack of irrigation systems	1
Poor quality soil	1
Lack of resources	1
Animal diseases	1

A number of factors listed in the table are closely linked. For example, lack of irrigation systems could be coupled with water shortages, as could the lack of dams. It is clear from this that water shortages were a key challenge facing these farmers. Lack of resources could be seen as closely aligned with lack of inputs such as fertilizer and feed. Access to resources would also assist with the control of pests (insects and ants). A lack of knowledge and training could address a number of the problems identified, especially control and treatment of diseases in crops and livestock. Poor soil and poor grazing are natural resource limitations for crop and livestock production, respectively. However, both could be improved through access to knowledge and training as well as access to resources. When asked what could be done to address the challenges that impact on agricultural production, the respondents talked mainly about obtaining access to inputs (fertilizer and chemicals), access to water and irrigation infrastructure, tools and fencing. Access to capital was seen as a means of securing access to many of the above resources. In addition, there were a number of farmers who mentioned the need for provision of training. The responses are summarised below in Table 4.44.

Livestock damage to crops

A female banana farmer at Seaview said that cattle often entered her garden and damaged crops. Although she complained to the livestock owners and the local *induna*, nothing was done as the *induna* said that livestock owners would not listen and no longer respected crop farmers or the traditional authorities.

Table 4.44 Summary of interventions to address agricultural challenges (n=33), 2010

Interventions	No. of respondents
Provide access to water	14
Provide access to chemicals and fertilizer	10
Provide training, information and workshops	9
Provide fencing	6
Provide access to irrigation systems	4
Provide access to capital	4
Provide access to tools	2
Provide access to chicken feed	1

4.2.2.2 Farmer typologies at Marina, Eastern Cape

The factors explored in developing farmer typologies at Marina included:

- Scale of production
- Investment in agricultural activities.

Investment in agricultural activities is a strong indicator that can be used to characterise farmers as subsistence, emerging or commercial. An attempt was undertaken to quantify the annual expenditure on inputs. The questionnaire did not allow this to be explored in detail, but some interesting results were obtained. Only two farmers put figures to their expenditure: the first was a farmer with 1.5 ha who mentioned an amount of R1200/annum. The second farmer was one who had 3 ha and indicated that he spent R1000 annually on fertilizer and chemicals. While there were many gaps in the data, 12 farmers said that they purchased packaging material/cases (3 said that they did not); 12 farmers said that they bought fertilizer (3 said that they did not); and 10 said that they bought chemicals (5 said that they did not). It gives an indication that the group of banana farmers consisted of those who did not invest in their bananas and those who purchased inputs and invested in their crop. Many farmers indicated that they had no money to invest in their bananas.

The scale of production was the other aspect of banana production investigated. It was not possible to visit each household and measure the area under production, and many farmers were not able to estimate their production area accurately. However, the data in Table 4.45 provides an indication of scale.

Table 4.45 Summary of scale of banana production at Marina, Eastern Cape (n=33), 2010

Scale of production	No. of respondents
Production limited to a number of plants / measured in metres	7
0.25-0.3 ha	11
0.5 ha	8
1 ha	4
2 ha	2
4 ha	1

From the table it is clear that most of the banana producers in the study area had limited areas of production (78.8% respondents had ≤ 0.5 ha bananas).When numbers of plants rather than areas of production were investigated, the following estimates were obtained: 18 households had 2-99 banana plants, 10 households had between 100 and 1000 bananas, while only 5 households had > 1000 plants. It should be noted that under commercial production, a plant population of 2200-2222 plants/ha is established.

4.2.3 Mooi River Irrigation Scheme, KwaZulu-Natal

As with Willowvale and Marina, a typology framework to classify farmers was developed, based on farming systems and other factors.

The history of the MRIS area is useful in understanding the general farming system. According to several farmers who participated in the FGDs, as well as the *Induna nkulu*, a substantial amount of dryland farming had taken place at the time when agriculture was the only source of income and people grew their own food. However, by the time of the current study, dryland production in the area adjacent to the irrigation scheme had decreased, seemingly because of reliance on social grants and remittances. The *Induna nkulu* could recall growing up with no concept of money and shops, “Unlike now, back in the day food was in abundance in every household”. The timeframes over which this change took place is not known, nor are the real reasons for the decline.

Studies conducted elsewhere have found a number of reasons for the observed abandonment of arable lands. According to Aliber and Hall (2010), as much as 75% of land in ex-Bantustans is underutilised, although this is complicated by the fact that substantial variation does occur between consecutive years. Andrew *et al*., (2003) recorded large-scale abandonment of previously cultivated land in KZN and Eastern Cape – especially in areas where people were resettled through government programmes known as ‘betterment schemes’. Amongst other impacts, betterment planning has resulted in increased distance between households and fields as well as the lack of flexibility in land-use (Fay, 2009).

Reasons for abandoning lands in other places include low potential of the soils resulting in poor yields; uneconomical maize production in years with lower maize prices; moving to homestead gardens to reduce the risk of theft and benefit from lower production cost (Manona, 2005). Drimie *et al*., (2009), investigated agricultural production in the Greater Sekhukhune District of Limpopo. They suggest that the rural poor are becoming less involved in agricultural production because of biophysical factors (such as declining fertility) as well as poor access to agricultural land and inputs(including labour). The situation is exacerbated by a decrease in agricultural knowledge, inappropriate extension services, poor credit facilities, HIV/AIDS, and poverty reducing the ability to invest in agriculture. Other reasons include: the shortage of labour (with migrant workers); lack of oxen for land preparation and manure for soil improvement; a shortage of capital for purchasing inputs; difficulties in accessing tractor services and agricultural inputs locally; soil erosion due to poor cropping practices; the risk of livestock damage (one reason being the lack of fencing); a lack of markets for produce; competition from the commercial sector; the loss of cooperative/collective activities that previously supported agricultural production (Andrew *et al*., 2003).

Manona (2005) identified a number of institutional factors that could contribute to the decline in cropping activity on arable land. He found that the systems for land allocation in the Eastern Cape had deteriorated and that 74% of people with households in the area did not, in fact, own arable land. In addition, he found that arable land changes allocation through inheritance along the male line from one generation to the next and is often held by people with no interest in farming. These land owners often 'hold onto the land' as a type of insurance policy for the future, which means that this land has been taken out of production. Aliber & Hall (2010) also refer to institutional challenges, in particular tenure-related challenges, having contributed to the abandonment of fields. They noted that there was a lack of mechanisms authorised by Traditional Authorities that allowed land to be lent, or leased out to others, without the risk of losing it.

4.2.3.1 General farming system and agricultural activities

A description of cropping and livestock activities is provided below.

4.2.3.1.1 Cropping within MRIS

Farmers at MRIS produced a variety of crops under irrigation for marketing and household consumption purposes. Maize was the most dominant grain crop while cabbage, tomatoes, potatoes, beans, spinach and garlic were the commonly grown vegetable crops (Table 4.46).

Table 4.46 Relative importance of crops grown by farmers in MRIS, KwaZulu-Natal, 2011

Crop	Percentage of people who grew the crop
Maize	95.8
Cabbage	32.4
Tomatoes	25.4
Potatoes	16
Beans	11
Other vegetables (spinach, garlic, onions etc.)	12

Maize was mainly being sold as *green mealies*. The rest was used as grain. The bulk of the vegetables were marketed for income generation purposes, with a small fraction being consumed at household level.

Replies to the question on land preparation revealed that 62% of the farmers used hired tractors to prepare land during the period August 2011 to September 2012. Farmers cited cost and tractor availability as the major challenges affecting land preparation at MRIS. As stated earlier, a further challenge was the unequal distribution of water between upstream and downstream users. This problem resulted from non-compliance with the irrigation schedule, but no effective solution was suggested, although traditional leaders agreed that the problem existed.

The initial FGDs were used to investigate farmers' perceptions of production-related factors. Direct and indirect impacts of these factors on farmers' output are presented graphically in Figure 4.13. Variables are ranked on a scale of 1 (no effect), 2 (moderate effect) and 3 (critical effect). Blocks were grouped according to whether they are in the top, middle or bottom sections of the irrigation scheme.

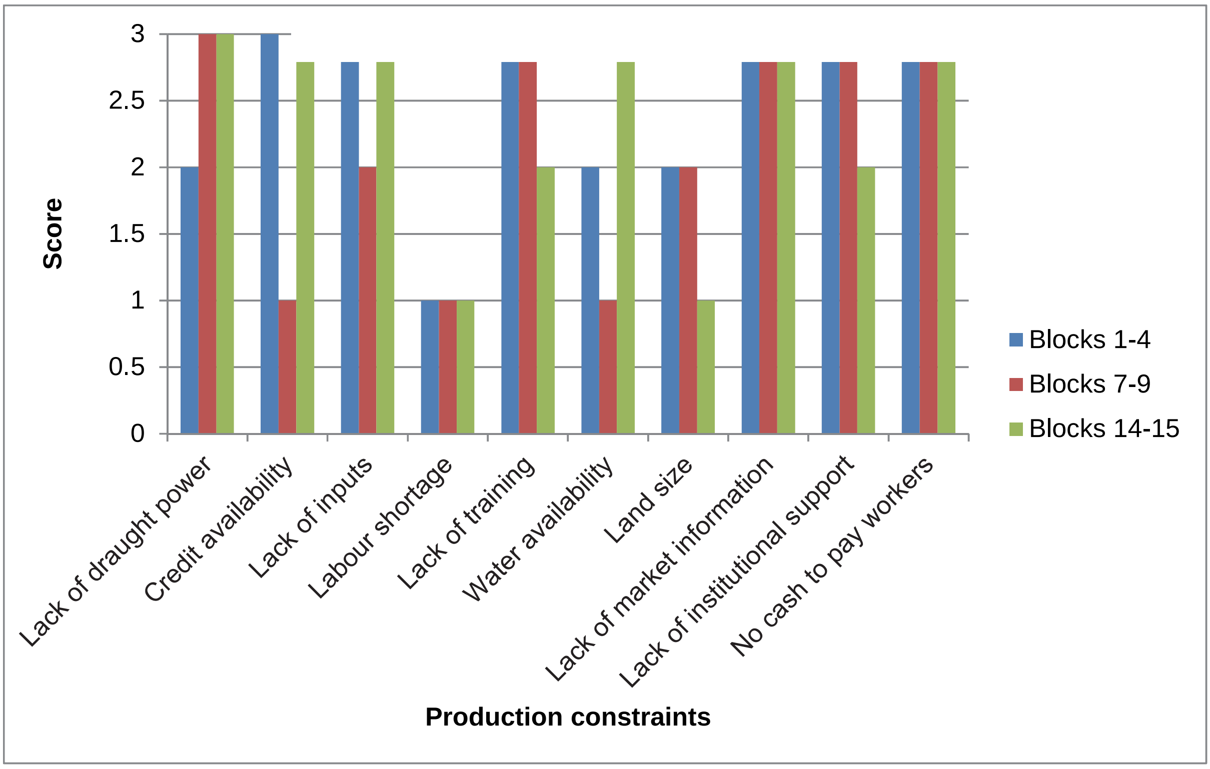

Figure 4.13 Perceived effect of production related factors on output at MRIS, KwaZulu-Natal (1 = no effect, 2 = moderate effect, 3 = critical effect).

The results show that all farmers in MRIS ranked the lack of finance to pay for hired labour as a critical factor affecting their output. Although labour was not in short supply in the area, financial means to pay workers posed a real production challenge. Lack of market information on prices and demand was another drawback at MRIS. Water access was generally not a critical factor for Blocks 1-13, but was cited as the major factor affecting crop production in Blocks 14 and 15 (at the tail end of the canal).

Spill over effects of the scheme

The impact of the scheme on the larger local community surrounding the MRIS was also explored. People living in this area can be categorised as follows:

- Members of the scheme, who have a bed registered under their name and surname.
- Members of the scheme, who have beds registered in the name of a parent or grandparent (often deceased) who had given permission for them to use the bed. Although the user's name is not officially listed, they are still perceived to be scheme members.
- Non-scheme members (NSMs) who have no beds registered in their name and no rights passed on to them from an older family member.
  - Many NSMs are using beds of members who are not able to use them. So even in FGDs with NSMs, some of the participants are actually using beds.
  - Some NSMs have no beds and just provide labour to scheme members or NSM with

access to beds.

A large proportion of the community was found to have beds in the scheme. It was the perception of the FGD participants that the scheme provided most of the employment for NSMs, especially for the older generation. The method of payment was generally a share of the produce.

An additional scenario existed: There are some people with beds outside the scheme, but adjacent to it, who use canal water. This was especially common in Ward 8. Sometimes water was diverted through breaks in the canal wall and sometimes water was manually removed from the canal to irrigate crops. There was some discussion about whether or not the manual removal of water from the canal was reported to any authorities. However, it seemed that it was acceptable for people to remove water to wash clothes, so drawing water from the canal was not illegal *per se* , and this made it difficult to identify and report people who were irrigating illegally. During subsequent discussions, some farmers voiced their dissatisfaction with this situation.

The study explored all types of spill over effects impacting on the local community. One anticipated impact was income generation through the supply of services by NSMs to farmers at the scheme (e.g. ploughing services and transportation of goods).

At the time of the study there were no active dryland fields in the area surrounding the irrigation scheme. The general sentiment was that “the irrigation scheme is the life of the place”. It quickly emerged that this community’s survival was perceived to rest on the irrigation scheme, with people either owning or using a plot on the scheme or being employed in the scheme.

The canal that supplied the MRIS was a common resource. Besides the irrigation scheme, livestock derived the greatest benefit from the canal, as a source of drinking water. Livestock belonging to homesteads further from the canal tended to suffer. In the Ward 8 FGD, the participants said that their cattle did not suffer from water shortages. However, water seemed an issue for people living in the surrounding mountains, who released their livestock so that they could walk some distance to the canals to drink. In addition, some farmers came down to the taps to collect water, which was assumed to be for their livestock.

The canal impacted positively on the livelihoods of households in close proximity to it in the following ways:

- School children used the canal to cool off on hot days.
- The water from the canal was used to water the homestead gardens, but normally this was “recycled” washing water or grey water that was originally removed from the canal using buckets.
- Water from the canal was used for domestic purposes, e.g. washing clothes.

The study did not reveal any spill over effects other than the job opportunities provided. However, it was evident that the entire community relied heavily on the scheme for food. It was apparent that trade started ‘at home’. In terms of the provision of tools and equipment by NSMs, the response from the FGDs was that people in the scheme already had tools or they borrowed from other members. In terms of provision of transport, it was found that people hired transport or used taxis, but the extent to which this benefited people in the wider community was not explored. Frequently, farmers from the scheme used wheelbarrows to take their produce (e.g. potatoes) to the road and then used taxis to transport them. Generally, it appeared that taxis were not hired specifically for this purpose, but farmers travelled as normal passengers with their goods.

4.2.3.1.2 Homestead gardens

According to the members of the FGDs, some 80% of the community had homestead gardens. This was determined by giving the groups ten pebbles representing homesteads and asking them to indicate how many of the homesteads had home gardens. The main crops were spinach, green pepper, onions, potatoes, beans, beetroot, and a range of other leafy plants. Most gardens were relatively small in size and could only produce enough for household use. A few farmers with larger gardens sold the surplus directly from their homes. A plastic shopping bag of spinach could fetch around R5. Homestead gardens were more convenient than the scheme because they were closer to the homestead, but were limiting as they were much smaller and mostly far from the water. Nonetheless, many women with home gardens, especially those in Ward 10, watered their vegetables with grey water that remained after washing their clothes. They fetched the water for washing clothes from the canal. In Ward 8, many of the home gardens were in close proximity to the canal and some people collected water specifically for watering their gardens.

Gardens were said to have contributed tremendously to food security and health. On average, people commuted less often to purchase food as vegetables were readily available in their own gardens. This had a positive effect on household disposable income by reducing transport costs.

Pebbles were also used to facilitate the discussion on income sources. Participants in the FGDs indicated that more than 85% of the community received social grants. Home gardens had allowed the farmers to divert a small portion of their grant money to food production. Examples mentioned included the purchase of inputs, especially seeds, and the purchase of fencing material by one woman, who was fencing her garden ‘little by little’. Health was cited as a factor contributing to the revival of homestead gardens. One woman from Ward 10 believed that her eyesight had improved dramatically because she had started eating carrots from her garden on a daily basis, while another woman stated that she did not have to wait for Sundays to eat a salad but prepared them regularly. Although these are only people’s perceptions, it was evident that people recognised the health benefits of eating vegetables and salads.

4.2.3.1.3 Dryland crop production

At the time of the survey there were very few fields under cultivation and only a handful of farmers were in the process of preparing their land. The trend in farming styles had changed drastically over the previous few decades, with little dryland farming occurring and most agriculture being limited to irrigated crop production within the scheme. From the FGDs, several factors were identified as contributing to the low level of agricultural activity outside the scheme, namely, unpredictable weather conditions resulting in flooding and drought; lack of fencing resulting from rusting (‘wear and tear’) and theft, the rocky terrain, lack of storage facilities and lack of interest in farming by the younger generation. The lack of dryland cropping was also recognised by the local community as having had a negative impact on livestock. During the FGDs and the interview with the *Induna nkulu*, it was highlighted that when dryland cropping was more intensive there was residue available for livestock. Since there was very little dryland cropping taking place in more recent times, there was less feed available for livestock. It was thought that livestock numbers had declined since the times when dryland cropping was more common.

4.2.3.1.4 Livestock production

Goats were the most common type of livestock (*i.e.* more households had goats than cattle), and very few households had sheep. A few households had donkeys. Herd sizes were generally small for all livestock types. Almost all households had Zulu chickens. Selling livestock was not a common practice, even with respect to Zulu chickens. In some instances farmers used the bartering system.

One example given in a FGD was the exchange of goats for a sack of *amabele* (sorghum). It was suggested that under extreme circumstances, or when there was a shortage of money in the home, livestock might be bartered or sold. Livestock was mostly used for cultural purposes such as weddings, funerals or *umsebenzi* (slaughter of animals to thank or communicate with the ancestors at events such as a coming of age ceremony (*umemulo*) or less traditional events such as when children have passed matric), or were consumed within the home.

The farmers highlighted that this area is not conducive to dryland crop production, having high temperatures, and very dry periods between rainfall events. They said that livestock suffered without dryland crops such as maize, to provide fodder during winter and during extended periods of extremely dry weather. One of the women in the FGD had had to relocate her entire herd of cattle to a relative's farm near Weenen because of this. According to the FGD members, livestock suffered the most during winter, because of shortages of natural fodder (veld), and most farmers being unable to afford supplements. Farmers indicated that they aspired to increase their livestock numbers, but fears of drought and lack of knowledge about markets had hindered this process. Livestock have contributed substantially to the lack of dryland crop production in the study area, as most households did not have proper fencing and used branches stacked around the boundary of their field or garden to deter livestock from damaging the crops. The branches were ineffective because they did not keep away all livestock.

The study found that livestock were not generally allowed within the irrigation scheme. However, they occasionally grazed around the edges of the scheme close to the fence and not within the beds. Normally this was supervised by herders, but this was not always the case. This practice was known locally as *ukukhothisa*, which translated means "to taste". Loosely, it means that during drought periods, livestock "get a taste of good food".

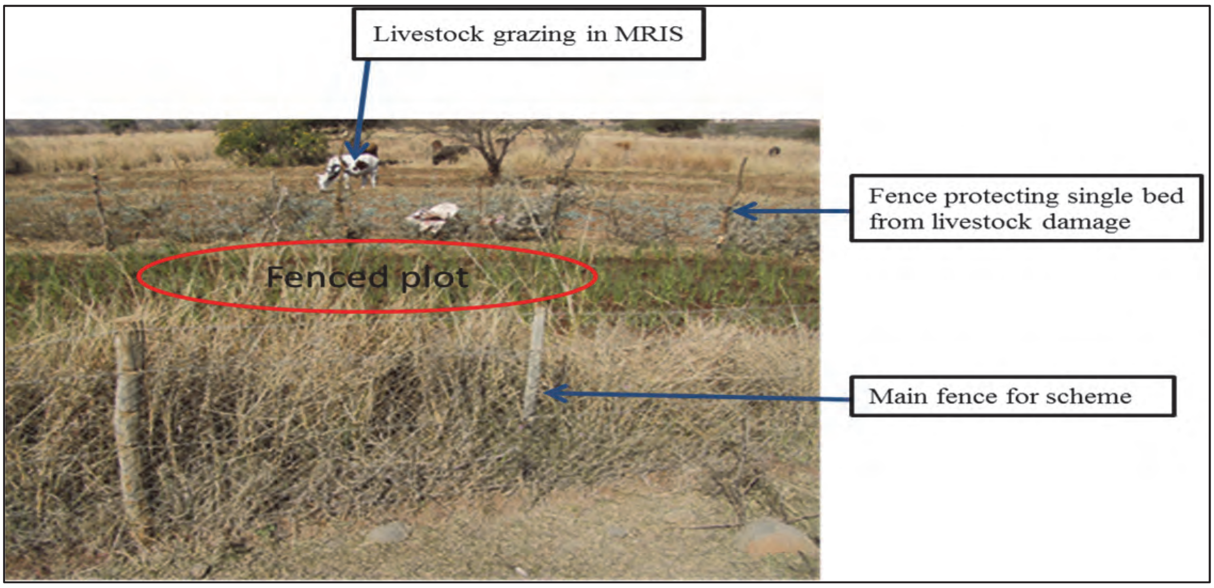

Figure 4.14 Fencing of individual beds to avoid damage by livestock grazing within the MRIS.

Discussion with scheme members revealed that NSMs took their cattle to the scheme to graze on the fallow fields. These community members claimed that they were not benefiting from the scheme since they did not own irrigation plots. Therefore, grazing their cattle within the scheme ensured that they also benefited. It was possible that some plot holders were also grazing their cattle in the scheme as the poor veld was a problem for all livestock owners. One woman recounted her personal experiences when her goats had grazed within the scheme unsupervised: on one occasion they were stolen, and on another occasion they were killed by people who were angry about the damage caused by unsupervised animals.

4.2.3.1.5 Challenges facing agriculture

The FGDs explored farmers' goals and aspirations, as well as the challenges they encountered. Most farmers interviewed in Ward 10 aspired to farm more intensively, especially the older generation, but highlighted the following challenges:

- The cost of hiring cars and taking taxis to purchase seeds in Tugela Ferry.
- The cost of purchasing seeds.
- General perceptions that one is greedy if one wants to increase production by acquiring more beds.
- Rain-fed agriculture was said to be unsustainable, because farmers lacked resources such as fencing and access to tractors.
- There were no structures in place to assist farmers in finding markets.

Farmers from Ward 8 were satisfied with the number of beds they had in the scheme and had no desire to acquire more. The respondents showed a lack of interest in dryland crop production, but they were mostly old and frail, and it is unclear whether their views were truly representative of the entire ward. They faced similar challenges with rain-fed agriculture as those raised by the Ward 10 farmers.

4.2.3.2 Typologies of farmers at MRIS, KwaZulu-Natal

A case study of farmers in MRIS was used to identify the overlap between the characteristics of subsistence and commercial farmers. In terms of technology use; farmers in MRIS hired tractors for ploughing their land and hoes were used for planting and weeding. However, the low-level of mechanisation could not be used in isolation to define the farmers as subsistence oriented. Production goals among MRIS farmers were both consumption and marketing. There was evidence of agricultural produce being sold in order to supplement household income and to raise income for input procurement.

Farmers in MRIS held on average 0.275 ha plots per farmer. The land holding was too small to categorise these farmers as commercial although some (perhaps many) were partially market-oriented. As there was no possibility of increasing land holding in the future, production could only be increased by increasing productivity per unit of land. Given this scenario, it was unlikely that farmers in MRIS would change their production trends in the near future. However, improved access to markets was feasible which would impact positively on profitability. Collective action might also provide an opportunity to improve marketing at MRIS.

It appeared that these farmers were mostly subsistence as their production objectives were multiple and were not distinct. These included objectives such as income generation and household food consumption. When asked about the major goal of participating in agriculture, farmers at MRIS indicated that food security was their major goal. Unlike commercial farmers who produce mainly for profit, farmers at MRIS produced for household sustenance. There were a few crops such as garlic and paprika that were produced by a few individuals (less than 5%) purely for marketing.

4.2.4 Synthesis of findings across the three sites regarding farmer classification

The literature review recognised that dividing farmers into three categories is only one step towards understanding the diversity of rural communities. State policies currently refer to subsistence, smallholder and commercial producers. However, various authors have suggested alternative typologies. Van Averbeke (2008) referred to different livelihoods based on the main source of income (i.e. pensioners can invest a little of their pension in their farming enterprises, while wage earners may have more resources to invest in their agriculture). In addition to livelihood typologies, there are also farmer typologies based on the scale and objectives of production and reliance on external inputs (i.e. profit makers or business farmers are market oriented, while food farmers may have multiple objectives, but are largely focused on household food production).

Some of the above criteria were considered for the three sites of the current study. However, it became clear that different types of farmers exist in each site. It is generally accepted that policies and programmes should address the needs and objectives of the different farmer types. The diversity of farming systems is conspicuous, as most farmers at the three sites do not specialise in one commodity, but have various combinations of crops and livestock. Livestock were generally not kept for income generation, except some limited broiler production at Marina. Certain crops were, however, grown for income generation (for example green mealie, tomato and cabbage production at MRIS).

There was a distinction between the objectives of project members own ‘individual activities’ and the objectives of the projects in which they participate. At Willowvale, both projects engaged in (or aspired to) marketing of produce either within the local community or at outlets in nearby towns, yet most members used their produce for home consumption only. It was difficult to detect differences between members of the group-based projects at Willowvale as they were growing and marketing collectively. However at MRIS it was clear that there were a diversity of farming styles mirroring the typologies suggested by Denison and Manona (2007) and van Averbeke’s (2008) farming styles. Almost all farmers at MRIS produced maize with the intention of selling a portion of it as green mealies if the opportunity arose, while some were more focused on producing a range of vegetables for home consumption and others, often those with more resources, grew crops specifically to sell. This variation was also characteristic of the banana farmers at Bizana, where just more than half only had a few plants and did not sell anything, while others supplied to hawkers as well as selling within the local community.

Scale of production, together with the level of mechanisation and investment in inputs, is often used when classifying farmers. In general, farmers at the three sites engaged in limited scales of production – although at Marina there were a number of larger smallholder producers who would definitely be categorised as undertaking ‘business farming’ (Denison and Manona, 2009) or being ‘profit makers’ (van Averbeke and Mohammed, 2006). At Willowvale, individual household land allocations for home gardens were comparatively large compared to Msinga (0.7 ha versus 0.4 ha), but production was still generally small scale. While the aims of both the MRIS and Willowvale projects might have been marketing, the land allocations were limited in both schemes and would never have allowed the members to rely completely on income derived from agriculture. All three sites involved land under the control of Traditional Authorities. This also had implications for farmers in that the reallocation of unused cropping / irrigation land to other households was restricted, so there were limited opportunities for individuals to expand their scale of production. Despite this, some individuals at MRIS had managed to access a number of beds on which they were producing vegetables for income generation purposes. Scale of production is also affected by the availability of hired labour. Although the correlation between farmers’ intention to market produce and his/her hiring of labour was not investigated, it would be expected that those with larger areas of production would hire help to assist with activities such as harvesting, while those focused on household production would rely more on family labour.

The limited skills and specialised agricultural knowledge at all sites could also suggest that farmers fall into the category of van Averbeke's (2008) Type 2 Food Farmers. The primary focus of these farmers is food production for own consumption although they also take some risks and invest in inputs for particular crops grown to generate income. For example, at MRIS, farmers use fertilizer and chemicals, and purchase hybrid seed. Similarly at Marina there were some farmers who did not buy any inputs for their bananas and others who invested in chemicals, fertilizer and packaging materials. Also, at Marina, nine farmers mentioned the need for training when asked how their challenges could be overcome, possibly realising that this would allow for transition from subsistence to smallholder production.

Ownership of assets has also been used in farmer typologies. Many households only owned hoes and wheelbarrows, but equally many made use of hired tractors for land preparation. Some households engaging in farming did not own wheelbarrows, yet they mentioned using wheelbarrows to take produce from fields to the roadside for selling. Some farmers had vehicles, and the ability to transport their own produce enabled them to grow cash crops with shorter shelf lives.

In summary, it became clear from the study that one cannot use a single label for all small-scale farmers in a particular area as there is variation in the assets owned, the extent to which produce is marketed, the scale of production, and access to off-farm sources of income that can be invested in agriculture. It is clear that both subsistence and smallholder producers, as defined by DAFF (2012), exist but there is some blurring of the boundary between these two groups with some subsistence farmers engaging in opportunistic but limited marketing. On the basis of the results, a classification of farmers is proposed, as summarised in Table 4.47:

Table 4.47 Typology developed to categorise farmers

Category	**Level of market participation**	**Examples of specific cases**
Category 1: Subsistence farmers	Farmers who only grow for own consumption (household use).	Some of the banana farmers at Marina, Eastern Cape had very few plants and thus did not have a surplus to sell. An exploration of vegetable farmers[9] at MRIS found that 22.80% of farmers consumed all their produce.
Category 2: Non-market oriented smallholder farmers	Farmers who market a portion of their produce if opportunity presents itself	Many of the farmers at MRIS, KZN consumed some of their produce but sold a portion if there were people that wanted to buy vegetables (note 50.16% of respondents sold less than half of their produce, consuming the remainder).
Category 3: Market-oriented smallholder farmers	Farmers who actively market their produce – though they may also consume a portion of it	Some of the larger banana farmers from Marina, as well as some of the potato farmers from MRIS were market oriented and sold a substantial portion of their crop. The study found that none of the 307 farmers growing vegetables marketed all their produce and only 27.04% sold more than half of their produce.

[9]Data collected from 307 farmers for the period April 2012 – April 2013

In any particular year or season, farmers may move between categories, depending on the amount of produce available. In a bad year, for example, farmers previously in Category 2 might move back into Category 1, while those in Category 3 might move back into Category 2. It should be noted that this typology is based on market participation and does not consider the level of resources available to the farmer. The latter should also be taken into account by official policies and programmes.

4.3 DEFINITION AND EXPLANATION OF GOALS OF FARMERS

The goals of farmers at the three sites were investigated as well as their aspirations to increase their scale of production. This investigation of goals also considered the extent to which the farmers were already marketing their produce and the extent to which they had an expressed wish to enter formal or informal markets.

4.3.1 Willowvale, Eastern Cape

The nature and scale of the current farming activities of individual households was investigated through the survey and is discussed below in terms of crop and livestock production. This section also discusses farmers' goals or objectives.

4.3.1.1 <u>Goals related to crop farming</u>

The goals or objectives of farmers in Willowvale are shown in Table 4.48. Of the 82 households interviewed, 80 grew crops at some scale (various combinations of maize, beans, potatoes and cabbages). Seventy-four of the crop famers (92.5%) in both communities produced only for own consumption, while 7.5% produced for both marketing and own consumption. None of the farmers interviewed produced specifically for the market, and hence they can be considered to be subsistence farmers. The sale of fresh produce by famers occurred "by chance" and therefore agriculture was not regarded as an income generating venture at household level.

Table 4.48 Farmers goals in terms of crop production at Willowvale, Eastern Cape (n=80), 2010

Farmers' goals in crop production	Frequency	Percentage
Marketing	0	0
Consumption	74	92.5
Marketing & Consumption	6	7.5
Total	**80**	**100**

A further analysis of farmers' goals in terms of crop production was done in relation to whether or not a respondent was a member of one of the two irrigation project (See Table 4.49). Neither project members nor non-project members farmed primarily for 'marketing' at their individual homestead plots. However, the 6 farmers whose goals included both consumption and marketing were members of irrigation projects. It is not clear whether their goal resulted from their participation in irrigation projects, or whether it led to their involvement in these projects.

Table 4.49 Cross tabulation of membership and household crop enterprise goals at Willowvale, Eastern Cape (n=82), 2010

Project membership	Major crop enterprise goals				Total
	No Crops	Consumption Only	Marketing and Consumption	Marketing only	
Non-project members	1	43	0	0	44
Members	1	31	6	0	38
Total	**2**	**74**	**6**	**0**	**82**

4.3.1.2 Goals related to livestock production

As with crop production, the key goal or objective for keeping livestock was domestic consumption (73.5%), with 20.4% targeting both marketing and consumption, and none focused primarily on marketing. The results are presented in Table 4.50.

Table 4.50 Farmers' goals in livestock production at Willowvale, Eastern Cape (n=49), 2010

Farmers' goals in livestock production	Frequency	Percentage (%)
Cultural Purposes	3	6.1
Consumption	36	73.5
Marketing & Consumption	10	20.4
Marketing	0	0.0
Total	**49**	**100.0**

The analysis was extended to consider the possible correlation between project membership and farmers' goals (See Table 4.51). Neither project member nor non-member households entered into livestock production specifically for marketing purposes.

Table 4.51 Cross tabulation of project membership and goals in livestock enterprise at Willowvale, Eastern Cape, 2010

Membership	Major livestock goals					Total
	No Livestock	Consumption only	Cultural purposes	Consumption & Marketing	Marketing Only	
Non-project member	*23*	16	2	3	0	44
Member	*13*	17	1	7	0	38
Total	***36***	**33**	**3**	**10**	**0**	**82**

4.3.1.3 Market participation by individual households

Farmers need to participate in a variety of different markets to add value to products, because of the varying demands of specific markets. Smallholder farmers in most developing countries generally enter into short value chains and supply raw or unprocessed products. Factors such as market access and the availability of market information hinder farmer participation in markets. Developing countries have been encouraged to focus on solutions to the access and transport problems both in terms of mobility and proximity of supplies, services and non-transport facilities (Edmonds, 1998). Market access has emerged as an important factor in assessing the growth potential of smallholder farmers, however, it is the farmer's goal that determines the final destination of his/her produce.

The results show that *no* farmer had the sole purpose of marketing. Marketing was always a by-product of the goal of own consumption in that farmers in both communities marketed what they could not consume in the short term. Therefore, it can be concluded that marketing of crop and livestock was "by chance" in both villages. The situation was different for production at one of the irrigation projects, where individual production was not involved.

4.3.1.4 Farmers' aspirations to increase scale of production

The driving forces in agricultural participation by farmers are their individual goals and aspirations. Table 4.52 gives a summary of famers' goals and their willingness to increase production in their respective crop enterprises. While 42.5% of the respondents that grew crops were satisfied with their production level, an encouraging 57.5% were interested in increasing their scale of production. Most of these villagers said that their current harvests were not sufficient to take them through to the next season and they therefore needed to increase production for food security reasons.

Table 4.53 summarises the aspirations of livestock farmers at Willowvale. In this case, most households (83.7%) indicated that they would like to increase their numbers, which potentially provides an opportunity to support farmers in livestock production.

Table 4.52 Summary of crop farmers' aspirations at Willowvale, Eastern Cape (n=80), 2010

Category	Frequency	%
Not willing to increase production	34	42.5
Willing to increase production	46	57.5
Total	**80**	**100**

Table 4.53 Summary of livestock farmers' aspirations at Willowvale, Eastern Cape (n=49), 2010

Category	Frequency	%
Not aspiring to increase production	8	16.3
Aspiring to increase production	41	83.7
Total	**49**	**100.0**

4.3.2 Marina, Eastern Cape

Farmers at Marina were asked for their main reason for growing crops or keeping livestock. Thereafter, they were asked specific questions relating to bananas, maize and livestock.

4.3.2.1 Goals related to crop production

The reasons that farmers at Marina engage in crop production are given in Table 4.54. Household consumption was cited by 31 of the farmers, while selling was only cited by 17. Sixteen of the farmers cited a combination of consumption and selling, while cultural reasons were cited by one respondent.

Table 4.54 Main reasons cited for crop production at Marina, Eastern Cape, 2010

Main reason	No. of respondents	Percentage
Selling only	1	3.03
Consumption only	15	45.45
Selling and consumption	16	48.48
Cultural reasons	1	3.03
Total	33	100.00

The ultimate goals for crop production are given in Table 4.55. There was very little change in the responses obtained, with 9 citing selling, 7 citing consumption and 9 citing a combination of the two.

Table 4.55 Ultimate goal for crop production at Marina, Eastern Cape, (n=33), 2010

Ultimate goal	No. of respondents	Percentage out of those growing vegetables
Selling only	9	36
Consumption only	7	28
Selling and consumption	9	36
No answer	8	
Total	**33**	

4.3.2.1.1 Goals related to maize production

In respect of maize, the respondents were asked whether they were achieving their goals, and whether they aspired to increase their scale of production. . At the time of the study, 29 farmers were producing maize. Of these farmers, 16 (55.2%) said that they wished to increase their scale of production, 6 did not wish to increase their production, and7 did not respond. They were asked to give reasons for their answers, and some of the responses are summarised in Table 4.56.

Table 4.56 Information pertaining to aspirations of farmers from Marina, Eastern Cape, to increase their scale of production of maize, 2010

Reasons for increasing scale	Interventions required to increase scale	Reasons for not achieving goals
Because it is a staple food at home	Supply of fertilizer (4)	No energy for planting
To help community and generate income	Assistance to be provided	Condition of soil is not good
To sell it		Lack of rainfall / shortage of water
To feed livestock and chickens		Place is not good for maize
To have maize to eat		Shortage of fertilizer
Insufficent amounts currently		Poor quality

4.3.2.1.2 Goals related to banana production

Of the 33 farmers asked about their goals for banana production, 17 respondents (51.5%) said they were achieving their goals, 14 (42.4%) said that they were not, and 2 (6.1%) did not respond. The farmers were asked for the reasons why they were not able to reach their goals. The following responses were received: lack of energy (possibly age-related), lack of space, lack of fencing, drought, livestock-related damage, insufficient banana plants, lack of fertilizer and poor quality of the crop.

When asked whether they aspired to increase their scale of production, 23 (69.7%) said that they did while 8 (24.2%) said that they did not. Those who responded positively were also asked why they wanted to increase their scale of production. Many of the farmers answered this in terms of what would be required for them to increase production. Some of the reasons given were (1) to be able to sell more, (2) to have more to eat, (3) because of not having enough and (4) to sell to the community, while interventions seen to be necessary to increase scale of production included access to seedlings, space, fencing, water and customers. Those who did not want to increase their scale of production said that it was because they lacked energy. This could be due to the age and health of many of the farmers.

4.3.2.2 Goals related to livestock production

With livestock, the respondents were asked to give their reasons for keeping livestock. The results are shown in Table 4.57.

Table 4.57 Main reasons why households at Marina, Eastern Cape keep livestock, 2010

Main reason	Cattle – No. of respondents	Goats – No. of respondents	Chickens – No. of respondents
No of households with livestock	*7*	*5*	*27*
Selling	2	1	3
Consumption	1	0	12
Cultural	1	0	2
Selling and consumption	2	4	7
No answer	1	0	3

More households kept chickens than either cattle or goats (27 compared with 7 and 5 respectively). Different reasons for keeping different types of livestock are evident in Table 4.57. With cattle, there was a spread of responses across the various categories. With goats, most respondents said that they kept them for selling as well as consumption. Unlike cattle and goats, most households keeping chickens only kept them for consumption.

Farmers already owning livestock were asked whether they aspired to increase their scale of production. Of the seven households owning cattle, six said that they wished to expand. For the 5 households owning goats, all said that they wished to increase their numbers. In respect of the 27 households owning chickens, 22 wished to expand and 5 did not wish to expand. The 5 who did not wish to expand owned 20, 7, 20, 4 and 10 chickens respectively, and used the chickens for household consumption.

4.3.3 Mooi River Irrigation Scheme, KwaZulu-Natal

4.3.3.1 Goals related to irrigated production at MRIS

The major goal of engaging in irrigation farming in MRIS was food security. Group discussions with block committees indicated that food security at household level was achieved through setting multiple objectives at household level. Firstly, farmers ensured that during the production process, they produced enough to consume at household level. Secondly, farmers ensured that surplus produce was sold to improve income earnings at household level. Thirdly, some farmers produced certain crops, such as garlic, specifically for selling, where less than 5% of the yield was consumed at household level.

4.3.3.2 Market participation of farmers at MRIS

Although the three major objectives were all important, it can be argued that marketing of agricultural produce allowed for a cash injection into the local community. It is important to ensure that all farmers in South Africa have equitable access to opportunities to compete in the market. This helps to promote the optimal utilisation of agricultural resources and also generates income and employment linkages in the market.

During the exploratory investigations, it appeared that more than 90% of the farmers in MRIS marketed a portion of their produce, either formally or informally. Farmers mostly marketed vegetables to raise funds to buy inputs for the following crop. Despite this fact, rural producers in MRIS did not have proper access to markets for their cash crops. Access to cash crop markets, from the rural producer's point of view, was hindered by many factors including policies with regard to financing. Even if producers could identify a potential market for their crops, lack of both sufficient household income and resources to access the market hindered their participation. The lack of income was again aggravated by the lack of any effective outside market link-up, which might have provided households with an outlet for their product. Reliable markets ensure a consistent flow of income from agriculture and hence farmers can financially commit their labour and resources to minimise migration and concentrate more on agriculture.

The agricultural output market in MRIS was dominated by informal participants. Hawkers also formed part of the informal traders. Focus group discussions with block committee members revealed that no formal communication structures existed between farmers and buyers. Farmers with ready produce had to employ their own initiative to ensure that their crops were sold timeously and to avoid infield losses. As such, farmers relied on personal contacts and relations with previous buyers (mainly hawkers) whom they called – either to come and buy or to spread the word about the availability of a specific type of fresh produce in the scheme.

Farmers from the MRIS were not active participants at the Mkondeni Fresh Produce Market in Pietermaritzburg. During the group discussions, two farmers indicated that they had once participated at the market in 2007 and 2008. However, they had discontinued participating, citing unprofitability of the market channel. They said that as smallholder farmers, they were "price takers" at the market and prices paid might not have covered their production and marketing costs. They said that the market dictated prices to the farmers and that farmers had no choice, given the potential losses if they were to take their produce back to MRIS. The two farmers indicated that the cost of transport to the market in Pietermaritzburg (100 km from MRIS) was a major deterrent to farmer participation at the market.

In terms of product transportation, farmers could be grouped in two main categories: (1) Those who had their own transport in the form of *bakkies* (light delivery vehicles) to ferry produce to the market and (2) Those without personal transport who relied on hiring vehicles or on traders coming to collect produce from the scheme. The first category of scheme members complained of unviable markets outside the scheme and that trading on roadsides using a bakkie (light delivery vehicle) consumed much time, which could have been used productively on the farm. The second category said that the cost of hiring bakkies was prohibitive (R150-R300 per trip to Greytown, which is 30 km from the scheme). In the end, both categories relied on infield trading of produce.

The MRIS is serviced by a gravel road (D1267) running along the entire 20 km stretch of the scheme, linking Muden to the R33 road, between Tugela Ferry and Greytown. Though the scheme could be regarded as highly accessible, it is not visible from the R33 provincial road. As a result of this, greater publicity and advertising is needed to improve its client base, especially along the R33 and at the junction of the road (D1267) leading to the scheme.

During focus group discussions, farmers' perceptions of market-related variables and their effect on farmers' market participation was considered. Ranking of variables was done on a scale of 1 (no effect), 2 (moderate effect) and 3 (critical effect) and findings are graphically presented in Figure 4.15.

Commodity marketing was a real challenge at MRIS. An analysis of Figure 4.15 indicates that all market-related factors except road accessibility, were perceived to have a critical effect on commodity marketing. It appeared that farmers in MRIS would have liked to market more if they could have secured a guaranteed market for their produce. However, the lack of efficient transport impelled farmers to sell to traders who collected produce from the farm.

A key informant interview with one commercial farmer about the general trends of agricultural commodity markets around Msinga Local Municipality revealed that markets were generally flooded. It appeared that most vegetable producers within and around MRIS targeted Greytown as the market for the produce. However, because of an oversupply of cabbages and tomatoes, the market was failing to absorb all the produce from farmers. This had a negative effect on production and the worst hit were the smallholder farmers at MRIS who were resource constrained.

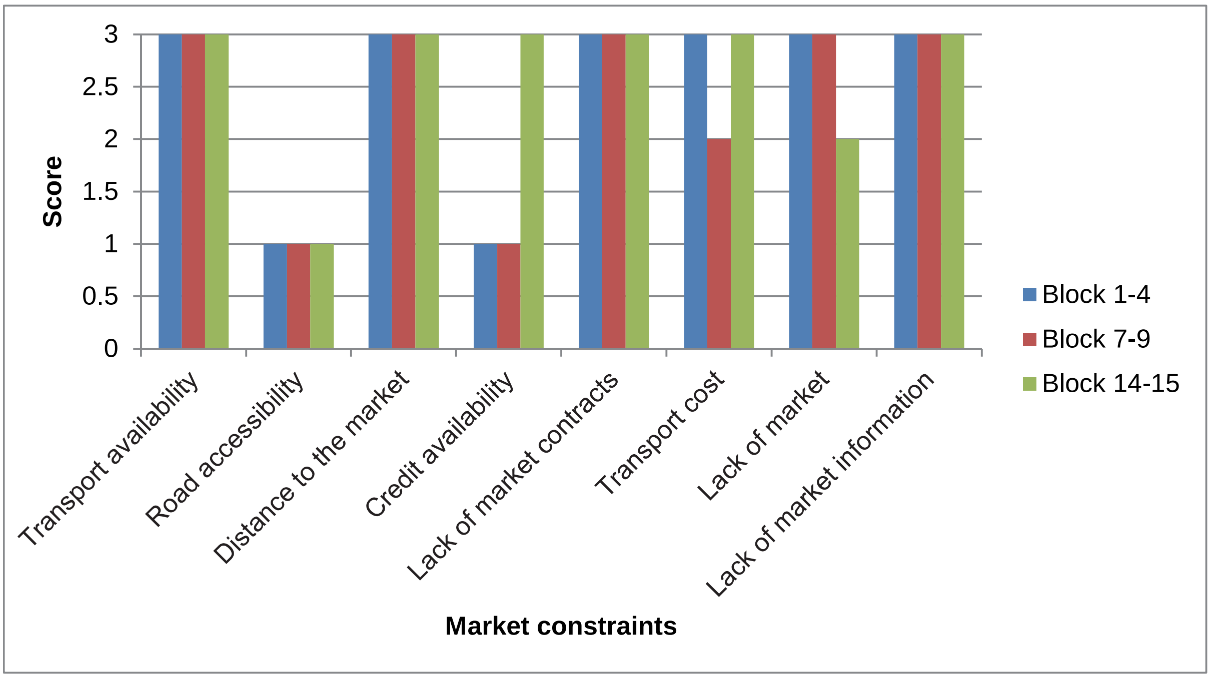

Figure 4.15 Perceived effects of market related factors on market participation at MRIS, 2013.

4.3.4 Synthesis of findings across the three sites regarding farmers' goals and aspirations

At Willowvale in the Eastern Cape, most farmers only engaged in agricultural activities for the purpose of meeting household needs, although some did sell surplus produce. There was limited scale of production and many farmers did not make use of available rain-fed fields for crop production. On the basis of this, the majority of farmers operating at this study site would be considered subsistence farmers in terms of their individual activities. At a project level, they did, however, recognise the need for, and benefit of, marketing. The projects provided access to finances, equipment and infrastructure as well as institutional support, which may all have been lacking in individual households.

At Marina, many farmers indicated a willingness to increase their scale of production, but cited a range of factors that prevented them from doing so, and which restricted them to subsistence level production. These limiting factors included shortage of water, lack of access to irrigation facilities, lack of technical support (specifically on banana production) and lack of access to markets. Some of the challenges that smallholder farmers faced appeared more difficult to address, such as the water shortages that were encountered. Provision of irrigation facilities at individual households, especially given the limited scale of production, is unlikely to be supported by the Municipality or any other government departments, and alternative approaches should be sought. Seeing that it is difficult to support individual farmers, larger scale banana projects where groups of farmers operate collectively could be established. In addition, interventions could involve investigating ways to improve access to water through in-field water harvesting techniques[10]. It is necessary for discussions to take place with relevant parties regarding the first option. It was also clear from the study that the challenges that farmers faced were not limited to one portion of the value chain. Lack of inputs for primary production, lack of technical skills for growing and delivering a high quality product and the ability to negotiate prices and deliver the product to the market, were all elements that needed to be addressed if farmers were to be able to enter the formal economy.

The goals and aspirations of farmers have already been considered as criteria for classifying farmers as subsistence or smallholder farmers. For example, it is generally accepted that subsistence farmers produce for own consumption while the extent of market participation of smallholders (previously termed emerging farmers), is variable and is generally complemented by household consumption to some degree. Farmers often have multiple goals (own consumption and selling), but interestingly when farmers at Marina, were asked to reflect on ‘ultimate goals for the future’, the number who aimed to increase production solely for selling increased. At Marina, goals were mainly a combination of own consumption and selling and only one respondent produced only for selling purposes.

It was interesting that there was some correlation at Willowvale between membership of projects and goals of household production, with those who engaged in some level of marketing also being members of the projects. Goals sometimes appear to be linked to scale of production – especially for livestock, where herds or flocks were small and they were generally not kept for selling. It was, however, interesting that when asked about aspirations to increase their scale of production, farmers at Willowvale showed a more positive response for their livestock enterprises than for their cropping activities – possibly because cropping is more labour intensive and is perceived to require more investment in inputs and infrastructure such as fences. At Marina, banana farmers generally aspired to increase scale of production, though some respondents did not, citing a lack of energy as well as land and input related constraints.

At MRIS, household food security was recognised as the main goal. However, the objectives were to produce food for home consumption as well as to sell some to generate cash income. Furthermore, MRIS and Willowvale clearly illustrated that the lack of reliable market outlets limits the extent to which farmers can meet their objective of marketing their produce. At MRIS, marketing was mainly to hawkers (bakkie traders). Farmers with their own vehicles marketed for themselves on roadsides but emphasised that this took them away from their farming activities, which was not favourable.

To summarise, much marketing that was taking place was ‘by chance’ when an opportunity arose, rather than as an active goal of the farmers. Many farmers had multiple goals and produced for own consumption as well as selling surplus produce when a market presented itself. Some farmers could be classified as profit makers or business farmers engaged in the production of commodities with the objective of marketing them and generating income. However, this was generally through informal markets rather than formal outlets such as fresh produce markets or retail outlets. In respect of smallholders’ interest in entering formal food value chains, it can be concluded that some farmers

[10]In terms of water harvesting, the effect on production was explored through a process of joint experimentation.

were interested in participating in more reliable markets (especially those already engaging in informal marketing), and many aspired to supply formal markets such as fresh produce markets. However, the constraints that currently exist (low yields, inputs, transport, lack of contracts etc.) preclude them from making this transition. Many households produced only for own consumption and have limitations in terms of human capital and financial resources., It is therefore unlikely that they could move into formal value chains, or would even be interested in doing so.

4.4 SYNTHESIS AND RECOMMENDATIONS REGARDING FARMERS' NEEDS AND ASPIRATIONS

In the light of the findings presented in this chapter, some recommendations can be made on the support needed to enable small-scale farmers to move beyond subsistence production and to participate in the mainstream economy:

- Programmes should consider that agriculture is one of a number of different livelihood strategies for most subsistence and smallholder farmers. The substantial variation between households in terms of sources of income and other activities should be recognized as this affects the resources (including time) available for investment in agriculture.
- Interventions should consider the characteristics of the farmers – for example, their age, gender, level of education and existing skills. These factors have social implications as well as defining the available human capital.
- Classifying farmers and their activities according to typologies allows organisations working with farmers to develop programmes that are suited to their objectives and resources.
- Human capital deficits related to skills and knowledge, as well as to work ability, should be addressed. Specific skills gaps (such as irrigation water management and business skills) should be addressed appropriately. Collective marketing may be one mechanism for addressing some weaknesses as it means that individual farmers would not need to access market information. Effective organisation of farmers could reduce constraints related to both agronomic and business skills.
- Farmers may strive to be more market oriented, but the importance of meeting household food needs simultaneously should not be underestimated. Marketing of produce within local communities should also be seen as an effective first step, as it overcomes the challenge of transporting produce to outlets further away. Steps should be taken to consider how farmers can meet local needs (e.g. through diversifying production) until the local market is no longer able to absorb production.
- Access to land and a reliable source of water – even within the schemes – limits farmers' ability to achieve their goals. Organisations (both government and non-governmental) supporting farmers need to work with local structures to strengthen the local institutions responsible for land allocation. Similarly, challenges such as those related to the inequitable distribution of water at MRIS need to be resolved through strengthening institutions and ensuring compliance.
- Possibilities for agricultural projects to act as catalysts, influencing the non-project related activities of their members, should be considered. For example, it might be possible for members to sell surplus produce from their home gardens through their projects' marketing channels. This could be a mechanism for increasing volumes available for sale as home gardens seem to be fairly well utilised.

In general, agricultural development programmes need to recognise the value of human capital that exists, as well as its limitations. Interventions should be varied to suit people's objectives, available resources and aspirations, with the understanding that in communal areas, households adopt diverse livelihood strategies and have multiple objectives with regard to their farming activities.

5 MAPPING OF FOOD VALUE CHAINS

This chapter addresses Specific Objective 4 of the study, which was to identify, to map and to investigate empirically appropriate food value chains in relation to water as a production input, with reference to, amongst others: (1) Different market outlets of food crops, animals and animal products; (2) Different attributes of the markets in these value chains; (3) Different standards within these food value chains; (4) Different opportunities and constraints of entering these food value chains.

5.1 VALUE CHAINS AT WILLOWVALE, EASTERN CAPE

A survey was carried out in Willowvale communities of the Mbhashe Local municipalities in January 2010 to quantify rural livelihoods of people participating at Ciko Sentrini and Foundation Community Projects and their respective non-project member villagers. This required assessment of the scale of agricultural activities by individual households, definition and explanation of goals of farmers in agricultural activities and an investigation of expressed interest to enter formal and/or informal markets. It was assumed that farmers' needs and aspirations influence their participation in crop and livestock agricultural operations at both production and marketing levels.

The results indicated that there was limited agricultural production by individual households, as many farmers did not make use of the available rain-fed fields for crop production and can largely be classified as subsistence farmers. Participation by Willowvale farmers in the commercial value chain through commodity marketing was minimal at a household level. Farmer involvement in specific food value chains for crop and livestock enterprises are discussed below. The value chain analysis covers the different crops grown indifferent seasons, and analyses the chain of activities and transactions that occur during production, transformation, storage, marketing and consumption of crop and livestock products.

5.1.1 Irrigated production at the project sites

The study covered Ciko Santrini Community Project (referred to hereafter as Ciko Project) and Foundation Community Project (referred to hereon as FCP). A variety of different vegetable crops were grown concurrently or in a cycle throughout the year. Profitability and market access for individual crops did not seem to receive sufficient attention in the decision-making process. Furthermore, crop water requirements and water use efficiency were not taken into account when deciding which crops to grow under the sprinkler system. A breakdown of revenue contribution for nine crops grown at FCP in the 2009 cropping season is given in Figure 5.1.

The results show that cabbage (52%) was the main crop grown at FCP (This was also the case at Ciko Project, unfortunately, record keeping at Ciko Project was poor hence quantitative data was not available and qualitative descriptions of activities have had to be used instead). At FCP, potatoes and maize contributed 17% and 15% of revenue respectively, while green pepper, carrots and cauliflower made a negligible contribution to the project's income.

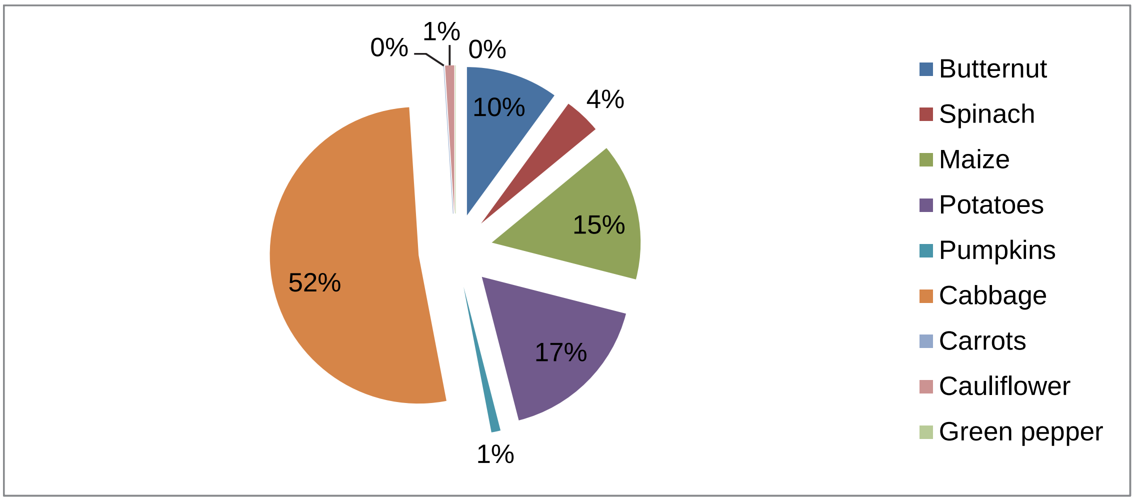

Figure 5.1 Relative importance of nine crops grown at Foundation Community Project in terms of revenue, 2009.

The multiple crop mix at both projects was an attempt to diversify the market options and to manage the seasonality of some crops. However, an effective mix requires a good understanding of profitable enterprise combinations. The cost of production and expected returns must be considered together with the farmers' technical knowledge of growing the selected crops.

Two value chains were investigated at the Ciko and Foundation irrigation projects, namely cabbage and maize production. These two crops were selected because they allowed a comparison of project participation in formal and informal value chains. Where the discussion relates to both commodities, their analysis has been combined to avoid duplication, but information specific to one crop is discussed separately. Summaries of the two value chains are described in the sections below.

Production inputs common to both crops included suppliers of seeds, fertilizers and herbicides. The other major inputs were water, irrigation pumping costs, labour and land preparation of the fields. Some villagers recycled seed from previous seasons to reduce seed procurement costs. This practice was common for maize, pumpkins and tomatoes but only at a household level. Seed recycling[11] was not practiced at either Ciko or FCP. Hybrid seeds were used for crops under irrigation at both schemes. Seed, fertilisers and herbicides used at FCP were procured mainly from East London, although some suppliers were also located at iDutywa, Butterworth and Willowvale (See Table 5.1 for distances from FCP). The major suppliers are Stark Ayres, Dumisk, Farmer Rama (S Maria's Guest Trading CC) and Terrafin in East London and Umtiza Farmers Co-op in iDutywa.

Table 5.1 Distance of towns from Foundation Community Project site at Willowvale, Eastern Cape, 2010

Town/Location	Distance from FCP
Willowvale	17 km
iDutywa	52 km
Butterworth	82 km
East London	226 km

[11] Recycling of seeds was practiced by project members at a household level

Despite its distance from the projects, East London was the preferred supply point because it offered more supplier options, thereby facilitating price comparisons. However, Umtiza Farmers Co-op at iDutywa was more strategically located to cater for the input needs of project members.

5.1.1.1 Cabbage

The cabbage value chain was very short, with a limited number of players. The project members used several different marketing channels to sell their cabbages, generally as loose heads. Markets included hawkers and supermarkets (which required transportation to town), as well as farm gate sales. Some cabbages were donated to needy families within the community. No value addition was undertaken within the community, although supermarkets sold processed cabbage products such as shredded cabbage, cabbage portions and cabbage salad (coleslaw). The benefit of the value addition did not accrue to the farmers, and can be seen as a lost opportunity.

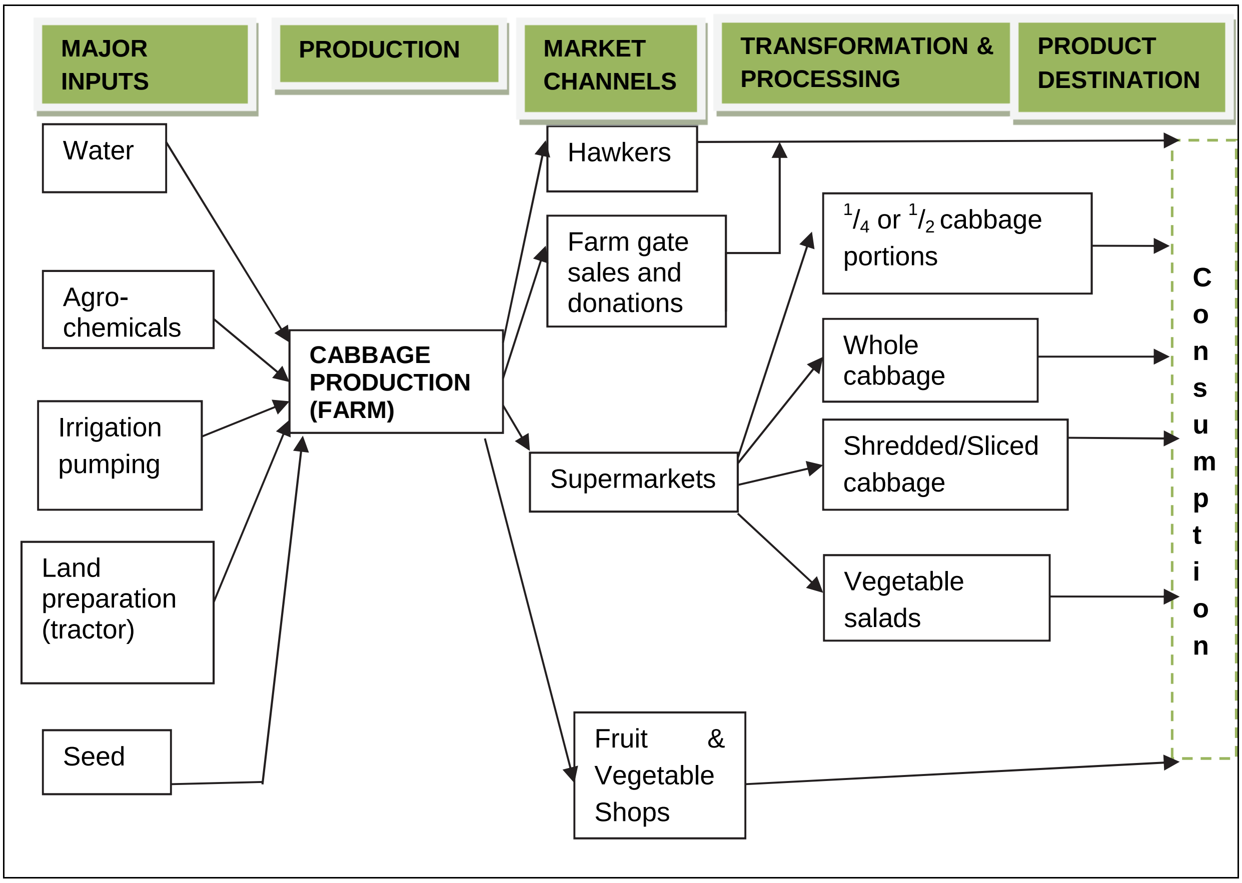

Figure 5.2 Product flow of cabbages produced at Foundation and Ciko Projects, Willowvale in the Eastern Cape, 2010.

5.1.1.1.1 Production

Cabbages were produced under irrigation at both Ciko and FCP. A number of factors affected this link in the value chain. Crop spacing was found to have a direct effect on productivity at FCP. Cabbages were planted at the unusually wide spacing of 1 m inter-row and 1 m in-row spacing, and produced a maximum yield of 10 000 heads per hectare. This is 41.67% of the 24 000 heads/ha possible from the recommended spacing of 0.9 x 0.45 m. The reason for the wide spacing was to maximise the size of each cabbage head, as size was considered to increase market demand for the product. No difference in market prices for small and big cabbages was evident. Cabbage prices tended to follow seasonal trends of supply and demand. Farmers could increase returns by increasing the plant population and producing more medium sized cabbages that could sell at a price slightly less than the R5/head received for larger heads, provided they can resolve their transport challenges (and assuming the market could absorb the additional cabbages). The minimum price received for the large heads was R3.50/head, giving a return of R50 000/ha on 10 000 plants/ha. If there were 24,000 plants/ha, the potential revenue is R84 000/ha. Wide spacing is thus costing the farmer R34 000/ha in lost revenue at minimum price of R3.50/head (see Table 5.2). The input costs for the two scenarios were relatively similar, apart from the cost of seed. . However, if the smaller heads only fetched a price of R2/head, then the return on 24 000 plants/ha would have been R48 000, and the wider spacing with the higher price would have been more profitable. It is therefore important for farmers to have a good understanding of the prices they can expect for cabbages of different sizes.

Table 5.2 Potential versus target returns per hectare for cabbages at FCP, Willowvale, 2010

Variable	**Crop Spacing**	**Yield/ha**	**Price/head**	**Revenue Estimates/ha**
Potential yield	0.9 x 0.45 m	24 000 heads	R3.50	R84 000
Project yield	1 x 1 m	10 000 heads	R5.00	R50 000
Gross loss / Gain		**-14 000 heads**		**-R34 000**

The under-utilisation of land and water has impacted negatively on the long term sustainability of irrigation projects. It is probable that the bulk of the water applied to widely spaced crops is lost through evaporation and runoff as the few plants cannot utilise all the water applied, except in the case of drip irrigation systems where water is applied to individual plants. However, proper agronomic trials are required to investigate the relationships between cabbage head size, plant population, water use efficiency, nutrient use efficiency and net gains to the farmer. It is also necessary to confirm that there is in fact a greater demand (and willingness to pay a higher price) for large cabbages to justify this practice.

5.1.1.1.2 Transportation and accessibility

Transportation of produce includes both the movement of produce from the field to the closest road, and transport from this point to the final market, which is generally one of the towns in the region. Ciko project members used wheelbarrows to transport their cabbages (and any other produce) from the field to the roadside – a distance of 1.6 km. From the roadside, hired transport collected the produce and carried it to the market in Willowvale town, which was 7 km from the site. It cost the project a minimum of R150 per trip to hire a small one ton van to transport their produce to the market. The lack of a guaranteed market at Willowvale meant that it was risky for farmers to harvest a large quantity of produce at once. Generally, some 40-50 cabbages were harvested for the market at any one time. These were sold for R5 per head. If 40 cabbages were sold on the market, the return was R200, so the profit (after paying for transport) would have been R50, excluding labour and input costs. It was therefore not viable to market small numbers of cabbages

FCP had the same problems of no ready market for bulk supplies, and therefore no means of minimising transport costs. Furthermore, FCP was also affected by a poorly maintained dirt road linking the project to the rest of the community and to the district road to Willowvale town. The dirt road was steep, bumpy and eroded, making the project inaccessible, especially during wet weather. As a result, the produce sometimes rotted in the field because the members could not move it out of the valley. To overcome the transportation problem, FCP borrowed a trailer from an independent farmer in the community on the understanding that the project tractor would plough his fields in return. The initial solution had been to tie bags of cabbages and green maize cobs on the hydraulics and the suspended plough, to transport them to the market.

5.1.1.1.3 Processing and prices

The average prices of cabbages sold in different forms by different retail outlets in Mbashe local municipality (Willowvale, iDutywa and Butterworth towns) is shown in Figure 5.3. The figure illustrates the importance of value addition in agricultural marketing. As the cabbage undergoes value addition and repackaging at the retail level, the marketing margins increase greatly from the farm gate price. The average selling price at the farm gate during the data collection period was R5/head of cabbage, with a lowest price of R3.50. A follow up on the cabbage value chain through discussions with representatives of Mega-Save Supermarket at Willowvale, Spar Super at iDutywa and many other supermarkets that operate restaurants or delicatessens, revealed that some form of processing is done to cabbage to increase its final value. In understanding the figure below, it is necessary to understand the product descriptions included and the amount of cabbage that they comprise (for mixed products), namely:

- Net weight of the cabbage was determined by removing the outer leaves so that only the usable portion remained
- The shredded mixed vegetables consisted of the following mixture of vegetables: cabbage (87%), carrots (10%), onions (2%) and green pepper (1%)
- Shredded/sliced cabbage was 100% cabbage (for use in coleslaw)
- Cabbage salads consisted of shredded cabbage mixed with salad cream
- Dried cabbage: 12 kg fresh gave 1 kg dried cabbage (done by AgriPark Agro-processor)
- Quarter (¼) cabbage portions: one cabbage was cut into 4 equal pieces and wrapped in cling-wrap film for sale
- Half (½) cabbage portions: one cabbage was cut into 2 equal halves and wrapped in cling-wrap film for sale.

It is clear from Figure 5.4 that the marketing margin increased as the cabbages underwent value addition. The widest margin occurred when the cabbage crop was traded as a vegetable salad (the greatest level of processing as the product is ready for consumption). Although labour, refrigeration costs and added ingredients were added to the cost of the cabbage, an average price value of R59.99/kg compared to R1.35/kg (R5 per 3.2 kg head) remains an increase in margin that cannot be ignored. By interpolation, one cabbage traded in the form of a processed ready-to-eat coleslaw salad would potentially give a return of R149.99 per head. The calculations were based on actual average cabbage weights in retail outlets.

Farmers at Ciko and FCP sold fresh, unprocessed cabbages. Many would have been sold on as fresh, unprocessed produce or consumed directly (especially those purchased by the local community). However, those sold to supermarkets or agro-processors, could have undergone value addition and product differentiation. At supermarkets, cabbages were cut into halves, quarters or shredded to make salads or stir-fry mixes. Each process increased the revenue from cabbage.

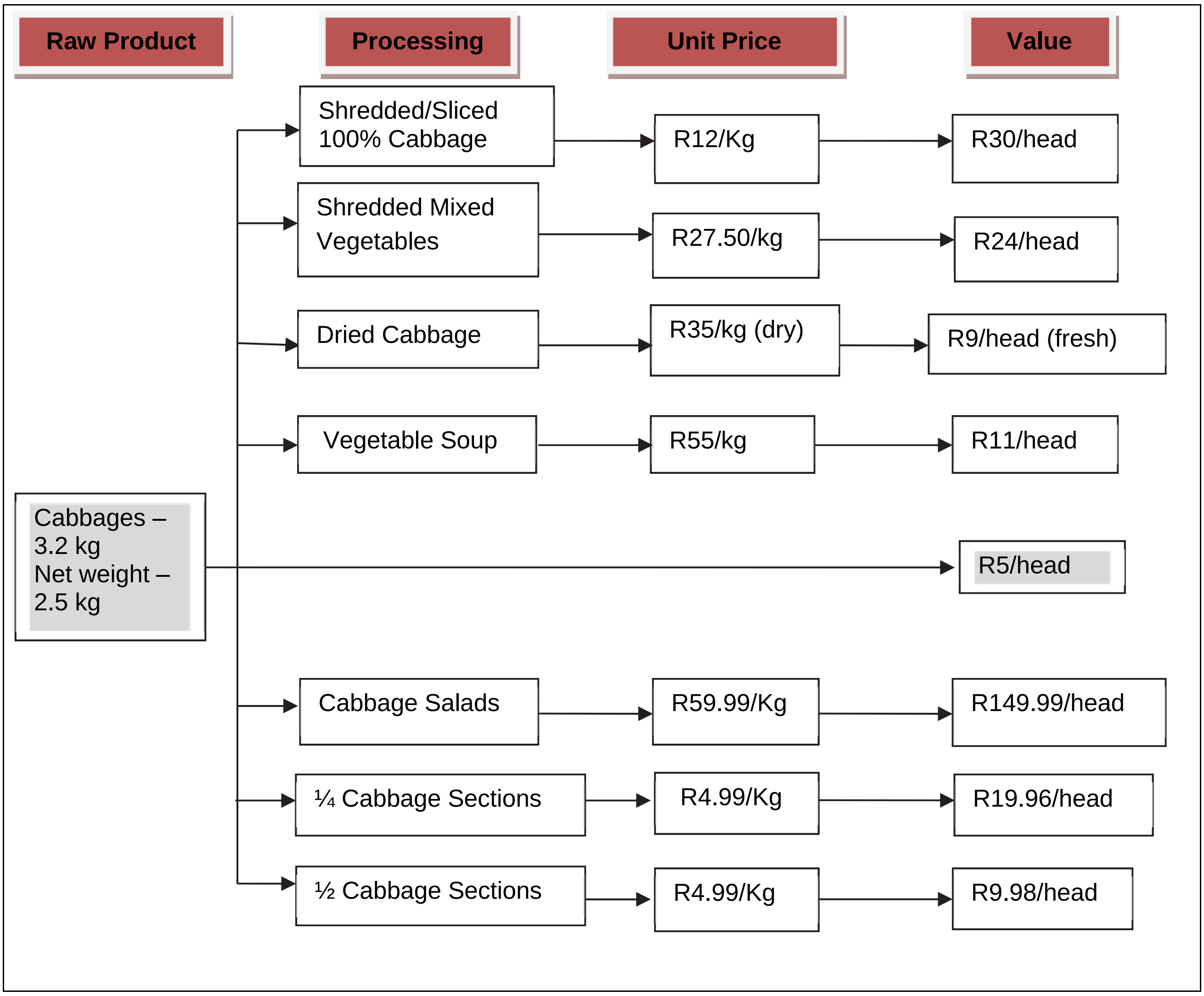

Figure 5.3 Cabbage value addition through the supermarket channel, 2010.

Agro-processors such as AgriPark[12] processed cabbages into a diverse range of products including soup, dehydrated vegetables and mixed vegetable packs that had a much higher market value. Such agro-processors were not being accessed by Ciko and FCP farmers. AgriPark, which was based at University of Fort Hare, had opened a processing plant at iDutywa Town to cater for smallholder producers in the surrounding communities. This could have been a useful opportunity for Ciko and Mbozi farmers, who were unable to take their produce to East London Fresh Produce Market (FPM) or Kei FPM in Mthatha. The increase in price associated with value addition in relation to the farm gate price, is shown graphically in Figure 5.4.

The incidence of such substantial price differentials requires that farmers be introduced to first level processing of their products into packed cabbage cuts and sliced vegetables to improve returns. This would of course have substantial implications in terms of the types of facilities required, which must meet standards of products used for human consumption. In addition, it would require a new skills set amongst the project members.

[12]AgriPark is an initiative of UFH

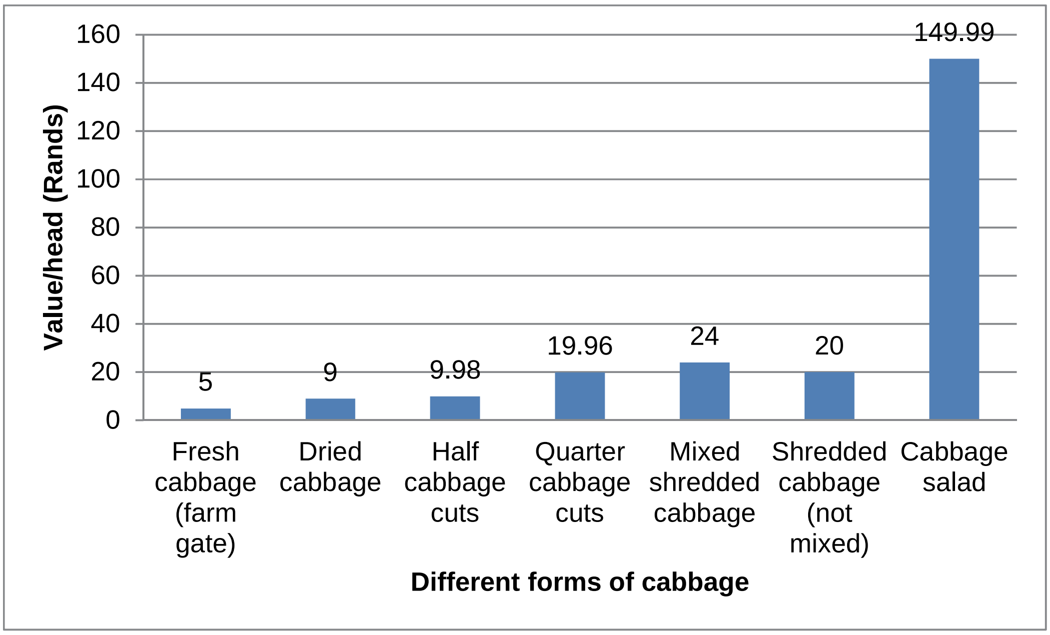

Figure 5.4 Comparison of farm gate prices versus prices obtained for processed cabbage, 2010.

5.1.1.2 <u>Maize</u>

Maize produced at both Ciko and FCP was sold mainly as green mealies (cobs). In fact, production focused on the green mealie market, which was dominated by hawkers and members of the local community. Supermarkets were not actively involved in green maize trading. Farmers at both sites preferred green mealie production to grain production. They cited high revenue potential as the major reason for their preference. The added advantage of the two projects was that maize could be produced at Willowvale in winter and irrigated during dry periods under irrigated conditions. Returns at these times were usually high, as these were periods when supply was generally limited and demand was high. The challenge, however, was to produce large cobs with a good length in order to sell the green mealies at competitive prices. Furthermore, the common practice was to plant 10 kg seed at a time to reduce transport problems associated with marketing large volumes of green cobs within the short period from maturity to drying off. Consumers and hawkers do not buy small cobs so small cobs were left to dry off in the field for use as maize grain, although this was not traded at either of the projects. At FCP, the project members shared the dry cobs and used them for home consumption, while some was donated to HIV/AIDS affected households in the village. Van Averbeke (2008) found that 85% of the maize produced at Dzindi during the 2001/02 season was grown for grain and the rest was harvested as green cobs. However, in monetary terms, green cobs contributed more than 40% of the gross value of maize production. This was not the situation at FCP, where maize grain production was not the core purpose of growing maize.

In January 2010, FCP traded uncooked green cobs at R2/cob and cooked cobs at R4/cob. Uncooked green cobs contributed 72% of maize revenue, while cooked maize contributed the remaining 28%. FGDs with project members revealed that most recipients of grain used it to feed their free range chicken (unprocessed) or processed it into samp or mealie meal, which was used for people and pets. Figure 5.5 below shows a comprehensive flow of maize at Ciko and FCP.

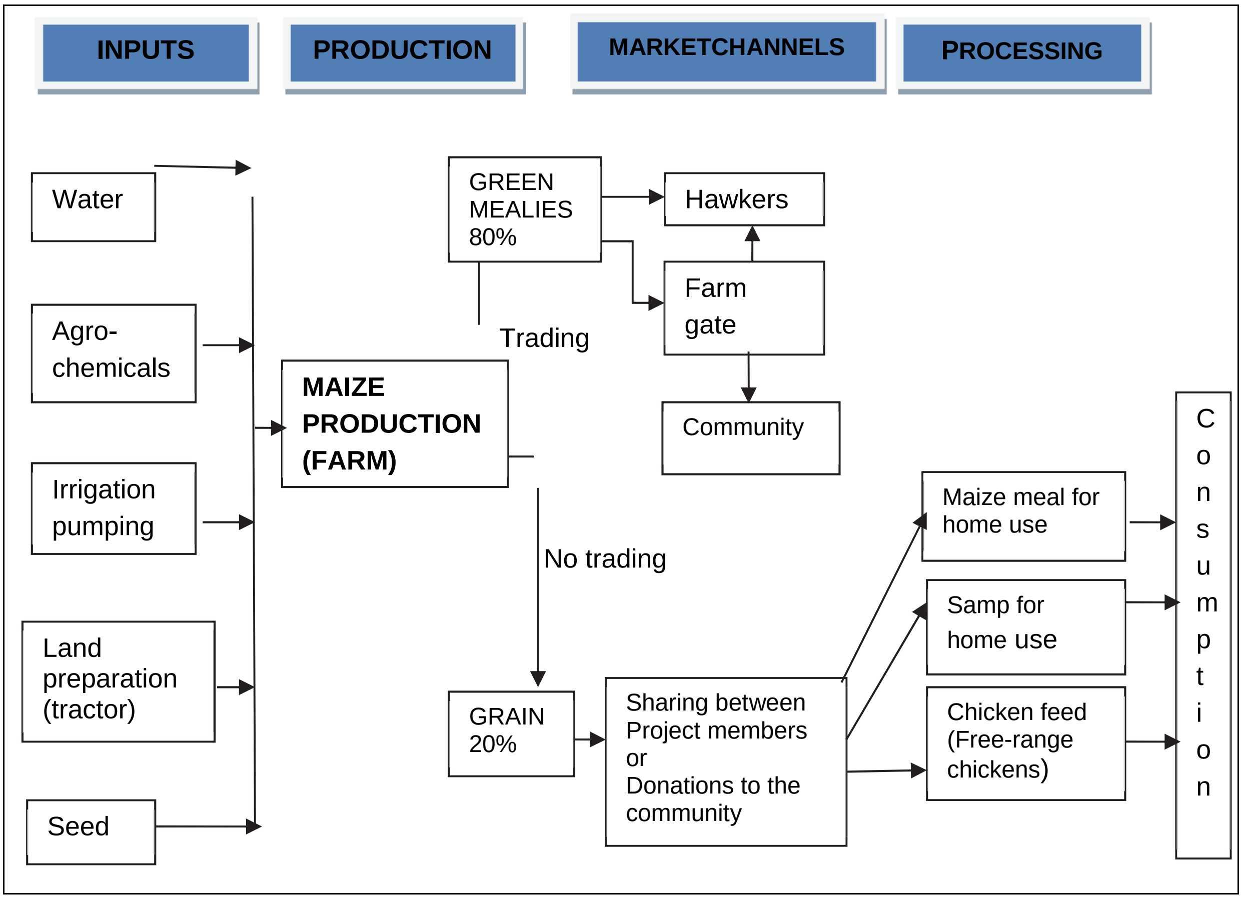

Figure 5.5 Product flow of maize produced at Foundation and Ciko Projects, 2010.

In addition to the maize production that took place at the irrigation projects, maize was also grown under rainfed conditions by individual households. The survey revealed that there was no marketing of this maize either as green cobs or grain. This could be due to limited areas of production which did not allow for a surplus beyond the household needs. Processing and transformation of maize was not very common in the Mbashe Local Municipality, except at a very small scale, and maize grain produced at the study site did not generally go beyond the boundaries of the municipality for further processing and more prolonged value chains. Secondary sources have however indicated that Mbashe Municipality was a green belt where considerable grain production took place under the government supported Massive Food Production Programme.

5.1.1.2.1 Production

Maize production was undertaken at both Ciko and FCP. At the latter, a maximum of 10 kg of maize seed was planted at a time for the production of green mealies. At a standard seeding rate of 30 kg/ha, this means that an area of only 0.3 ha was planted at a specific time. In both schemes, the maize variety SC 701, which is a white variety, was generally used. Key informant interviews with project leaders revealed that the low hectarage of maize was mainly because of unreliable markets. Since these farmers traded green maize, they had a limited time between maturity and drying off, to sell the commodity. Failure to market maize timeously would have meant a financial loss as farmers did not market grain,

Although farmers applied fertilizer both at planting, and as a top dressing for their maize, records on applied quantities and specific intervals of application could not be established. The major challenge was to differentiate fertilizers used for different crops but drawn from the same bag. For example, a

50 kg bag of LAN 28% was used to fertilize cabbages, maize and spinach on different dates and was applied by different project members. Under such circumstances, accurate record keeping is required to account for inputs for specific enterprises. This was a major challenge for both Ciko and FCP. The Eastern Cape DoA extension staff need to work with the projects to develop effective record keeping systems that will allow them to analyse the specific components of their enterprises better.

5.1.1.2.2 Storage of grain, processing and prices

The two irrigation projects did not have storage facilities for agricultural produce. Generally produce was harvested and then transported to the market. Green mealies must be transported as soon as possible to the market to reduce spoilage of the crop. Dried cobs were taken home by project members and were not stored at the project. Maize grain storage at household level did not make use of any sophisticated technology. Because of low output levels, farmers in Mbozi and Ciko communities often had very limited amounts of grain for storage and it was generally not kept for more than four months. No chemicals were used to protect the grain (on or off the cob) against pest damage. The cobs were stored as is, or were shelled and the maize stored in sacks in people's homes. Milling was done in small quantities to meet household needs.

Market deregulation[13], which involved the dismantling of the various marketing control boards, is believed to have led to an increasing proportion of the maize crop being milled by small-scale millers, both on- and off-farm. Industry estimates suggested that this could have been as high as 30% of the national crop. This meant that there were increased opportunities for small and medium scale businesses in processing and distributing maize and maize products. This was caused by regional price differentiation which in turn, reflected transport costs and regional variations in demand and supply (Vink & van Rooyen, 2008).

In the survey conducted in January 2010 as part of the current study, a dietary analysis of the 82 household respondents in Ciko and Mbozi communities was undertaken to assess the degree of reliance on household farm produce. During the interviews, both Mbozi and Ciko communities indicated that samp and maize meal were their major sources of starch (Table 5.3). When asked what they had eaten the 'previous day', 47.6% said that they had consumed samp. Some of this was purchased from retailers and wholesalers and some of the locally produced grain was processed for this purpose. Processing grain into samp also provides the by-product of bran to supplement the diet of chickens and other livestock.

Both Mbozi and Ciko communities processed their maize grain at Willowvale Supermarket which traded as Mega Save. An interview with the owner of Mega Save (a family-owned business), revealed that most community members brought grain for processing at the mill. Grain was either coarse-ground to make samp or fine-ground to make maize meal.

[13]Prior to 1996, the marketing of most agricultural products in South Africa was extensively regulated by statute, based on the original Marketing Act (1968). Most products were regulated under the 22 marketing schemes introduced from 1931, including the Marketing Act of 1937 which was consolidated in the Marketing Act of 1968. The Marketing of Agricultural Products Act (1996) gave birth to the National Agricultural Marketing Council (NAMC), whose immediate task was to dismantle the existing marketing control boards and subsequently to manage and monitor state intervention in the sector (Vink and van Rooyen, 2009).

Table 5.3 Daily consumption of maize meal and samp in Willowvale communities, 2010

Daily Consumption	Maize Meal		Samp	
	Frequency	Percent	Frequency	Percent
Yes	54	65.9	39	47.6
No	28	34.1	43	52.4
Total	**82**	**100.0**	**82**	**100.0**

Mega Save also sold yellow and white maize in 5 kg, 10 kg, 15 kg and 40 kg quantities. They provided a service of milling the maize on behalf of their customers. A 40 kg bag of white maize grain cost R80 and was processed into maize meal at an additional cost of R10/bag. Community members found the total cost of R90/40 kg bag cheaper than buying refined brands. For instance, 40 kg of White Star mealie-meal cost R224 (or R28 for 5 kg), which might have been too expensive for many local people.

The cost of transport was also a factor for farmers who wished to mill their own maize grain at the Mega Save Supermarket. As public transport did not charge for transporting quantities of grain less than 25 kg, farmers generally processed small quantities at a time in order to save on transport costs. Quantities in excess of 25 kg attracted luggage charges ranging from R10 to R30, over the 17 km distance from Mbozi village to Willowvale town.

The green mealie ‘industry’ can be seen as fairly distinct from the grain industry, and in turn has its own value adding opportunities. In January 2010, Foundation Project not only sold green mealies but also sold some cooked cobs. The price increased from R2/cob for uncooked green cobs to R4/cob for cooked cobs. Cooking green mealies was a simple process that generated additional income for project members. The mark-up on green mealies sold by hawkers in nearby towns is also of interest. In contrast to the project members at Foundation project, they sold uncooked green mealies for R6/cob and cooked mealies for R7/cob.

5.1.1.3 Marketing fresh produce

Denison and Manona (2007) noted that one of the central challenges facing high-value horticultural crop production is the existence of a sophisticated logistical chain between the producer and the end consumer. The complexities of the value chain greatly affect smallholder emerging farmers who are in most cases resource constrained. Cartwright (2002), cited by Denison and Manona (2007), emphasised the need for horticulturalists on small tracts of land to use sophisticated crop production processes as well as to enter into contracts with the agribusinesses that control high-value food value chains. Similarly Backeberg (2006), as cited by Denison and Manona (2007), found that one of the few options available to emerging farmers who have been historically excluded from profitable networks, is to engage in contracts with the agri-business sector and enter the higher value markets. Whilst these findings are valid and beneficial for smallholder irrigation farmers, it remains a challenge to build a strong and reliable relationship between smallholder farmers and agribusiness traders and processors. The major difficulties are a lack of trust between producers and markets (including processors) and the inconsistent production patterns of emerging farmers.

The marketing channels used by farmers at Ciko and Foundation Projects are illustrated in Figure 5.6. Marketing produce was difficult for farmers at both sites because the bulkiness of the commodity. Both projects lacked reliable transport for conveying their produce to the market.

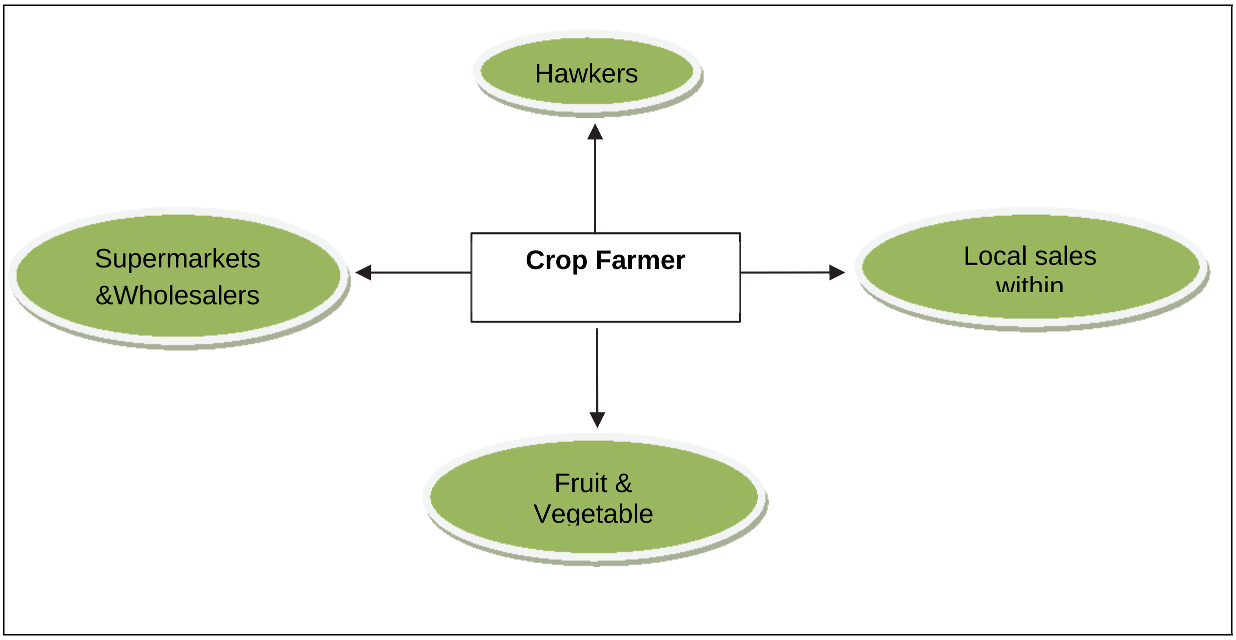

Figure 5.6 Marketing channels used by the projects at Willowvale, Eastern Cape, 2010.

Erratic supplies and lack of transport affected farmers' participation in competitive markets such as the fresh produce markets. All their produce was therefore destined for the smaller markets that included hawkers, neighbours (local sales), fruit and vegetable shops, and retail stores, to a limited extent. The hawkers and local community collected the produce at the farm gate, while supermarkets and fruit and vegetable shops required farmers to deliver their produce. Public transport was therefore hired by individual projects to transport produce to these buyers.

A market research study was undertaken to investigate the marketing opportunities available to farmers from FCP and Ciko. Several agricultural commodity traders (including hawkers, supermarkets, wholesalers, fruit and vegetable shops, fresh produce markets and market agents operating in specific markets) were interviewed to gather data on their trading relationships with both commercial and smallholder farmers. The main objective was to establish whether any of the traders had viable and profitable relationships with smallholder farmers. These results could be used to identify ways in which smallholder and emerging farmers can establish profitable ventures through trade with profit oriented traders instead of concentrating on the traditional farmer-to-farmer trading (local sales). This would allow farmers to benefit from participation in specific commercially-oriented food value chains.

Table 5.4 Traders interviewed that supply Mbashe Local Municipality, Eastern Cape, 2010

Trader category	Number Interviewed
Hawkers	25
Fruit and vegetable shops[14]	4
Retailers / supermarkets	8
Wholesalers	1
Fresh produce markets	2
Commodity brokers (Market agents)	4

[14] some shops have more than one outlet but were listed once

5.1.1.3.1 The role of hawkers

Hawkers include those who own their 'business', those who are employed by formal traders who extend their businesses into the streets, and those who are relatives of the owner. The numbers of hawkers in each category in Willowvale and Dutywa are given in Table 5.5.

Table 5.5 Ownership of hawking stands at Willowvale and Dutywa towns, 2010

Ownership of Hawking Business	Frequency	Percent
Seller owns the business	18	69.2
Owned by a local businessman	7	26.9
Relative of the owner	1	3.8
Total	**26**	**100.0**

Hawkers participate in crop value chains by buying from farmers or fresh produce outlets and reselling to final consumers at a profit. Hawkers operating within Mbashe Local Municipality continually raised the issue of inconsistent supply by smallholder farmers, and the inability of farmers to provide proper packaging for their produce. A hawker based at Willowvale had this to say:

> *"The best these farmers can do is to pack their produce in cheap plastics which are at times not good for some commodities like potatoes. Plastic packaging is very hot and hence potatoes go bad quickly."*

Hawkers procured their fresh produce directly from farmers (mainly commercial farmers) and from fruit and vegetable shops. They had arrangements with fruit and vegetable shop owners that could provide their own transport, to supply them at slightly lower prices than the usual selling price, which allowed them to make a small mark-up. For example, they purchased cabbages from fruit and vegetable shops at R7.50/head (less than the normal price in the shop) and then sold them at R10/head. Hawkers would buy produce from nearby farmers to reduce their transport costs, provided that the required products were available. Freshness of the produce was critical to prevent losses, as fresh produce, especially spinach, often has a short shelf life. Hawkers preferred trading products with a longer shelf life, such as cabbages, butternuts and fruit such as oranges and apples. Product pricing by hawkers depended on their buying price, though when products deteriorated, they were forced to sell at lower prices. Hawkers had no cold rooms so stocked limited amounts of produce at any given time.

5.1.1.3.2 The role of fruit and vegetable shops

Fruit and vegetable shop owners, or their representatives, were interviewed in Willowvale, iDutywa and Butterworth, as these are the towns that service Mbozi and Ciko villages (Details of traders are contained in Appendix 1). Procurement by most fruit and vegetable shops was directly from the municipal fresh produce markets. Some shops knew about the irrigation schemes near Willowvale, but only bought from them if produce could be delivered to the shop. Transporting produce was a real challenge for both Ciko and FCP, because of not owning a trailer or truck.. In addition, limited financial returns and poor roads made it difficult to hire transport for their produce.

Investigations revealed that some fruit and vegetable shops combined to hire trucks to collect fresh produce from the East London Municipal Market, yet the same shops were not prepared to hire transport to collect fresh produce from FCP – (17 km) and Ciko – (7 km). This suggests that these shops required a reliable supplier. An interview with Mr Marios, who owned Ndubs Fruits and

Vegetable shop at Willowvale, highlighted some aspects that need to be considered in building a strong base for smallholder agricultural projects (See textbox below).

Interview with a fruit and vegetable shop owner in 2010

This businessman owned two specialist fresh produce shops at Butterworth and Willowvale towns. He procured produce from East London Municipal Market. He combined his orders with three other shop owners who owned a seven (7) tonne truck and a trailer. They collected fresh produce twice a week from the East London Market and he paid R300 per trip (R600/week) for transport. The businessman believed that the transport cost was very cheap considering the distance and the volume of produce transported per trip. They preferred the East London Market because their order was arranged by their agent before the collection date to avoid paying for empty trips. This was not possible when procuring from local smallholder farmers who at times could not even fill a small one ton van with produce and who often demanded a higher price than the FPM for their products because they were selling to a shop owner and thought that he had a lot of money. Procuring from farmers caused the shopkeeper stress and extra costs because he had to buy packaging and employ workers to package the products. In addition there were high vehicle maintenance costs because of the poor roads. The businessman said that he would rather travel 200 km by tar and collect products in bulk than travel 10 km to get two bags of cabbages and lose his truck through breakdowns. He added that he believed that he had a good competitive advantage over other dealers because of his lower transport costs, and hence supplied the majority of the hawkers.

The interview above highlights the importance of good access roads for farmers. Fruit and vegetable shops can offer a good market for smallholder farmers in rural towns where there is likely to be less competition from large commercial farmers. However, these farmers were unable to take advantage of this opportunity because of resource constraints, and production and market-related factors.

Consistency of supply (including sufficient volume) and product quality have also emerged as critical factors affecting relationships between smallholder irrigation famers and buyers such as fruit and vegetable shops. In 2008, FCP supplied cabbages to George's Fruit and Vegetable Shops at iDutywa and Butterworth. However, by 2010, this relationship was slowly dying. The management of George's Fruit and Vegetable shop were asked about their experiences in dealing with smallholder farmers. They indicated their willingness to continue working with farmers but raised the following concerns:

- Quality was usually good, but this was not guaranteed. Sometimes smallholders gave the wrong impression over the phone because they wanted to sell their produce. This resulted in wasted trips, the cost of which was not sustainable for a business.
- Accessibility to FCP, especially during rainy periods, affected their planning and hence impacted negatively on their business. As a result, more reliable and accessible suppliers were used by the business.
- Quantity was generally not consistent. The first two trips might yield acceptable quantities and quality, but thereafter it was difficult to obtain consistently good quality and quantity from a specific smallholder farmer. The farmers might go for three months without any marketable produce and such erratic production and supply was not acceptable in the fresh produce business where consumers need the products on a daily basis.

5.1.1.3.3 The role of supermarkets and wholesalers

Supermarkets and wholesalers traded in diverse products. Most of the shops traded various agricultural products as minor products. Several shops (including Spar, Boxer Super Stores, Food Town, Kwamadyasi, Emsengeni Wholesalers, Shoprite and Spargs supermarket) were interviewed. Similarities on the requirements of retailers in iDutywa, Willowvale and Butterworth were evident. All retailers said that the transport problems experienced by smallholder farmers precluded them from participating effectively in markets. In addition, problems were experienced with the quality of the produce, and poor commodity grading by farmers.

- Willowvale's Frozen Foods supermarket indicated that they had previously procured produce from FCP and Ciko but that there was a problem with grading. Potatoes were always supplied ungraded and large and small potatoes were mixed in one pocket. The potatoes were not clean, and were difficult to sell because supermarkets were required to meet certain hygiene standards.
- Boxer Super-Store had a centralised procurement system for all products, including agricultural commodities, in Eastern Cape Province, and therefore did not procure directly from farmers. Boxer Super Stores had market agents at the East London Municipal Market who sourced products for all Boxer Super-Stores in Eastern Cape. This allowed consistent pricing and trading policies across all branches. Furthermore, market agents offered rebates of 1% to 2% of the total gross value spent per year, including any additional marketing and repackaging costs incurred by the shop. This was a great incentive as the rebates helped to offset losses incurred when produce was damaged or overripe. Smallholder farmers cannot pay such rebates, which amount to millions of Rands over the whole group annually. It was also impossible for smallholder farmers to supply the sort of volumes that Boxer required.

5.1.1.3.4 The role of fresh produce markets

The supply of fresh agricultural produce in Mbashe Local Municipality was dominated by the Butterworth FPM and the East London Municipal Market. The two markets were run differently and supplied the different demands of supermarkets, hawkers and fruit and vegetable shops.

The East London Municipal Market

The East London Municipal Market is owned and managed by the Buffalo City Municipality, with four registered agents operating on the trading floor. The Buffalo City Municipality owned the infrastructure and the administration and cleaning staff. The municipality's responsibilities included:

- Managing the day-to-day running of the market
- Registration of all farmers and buyers who participated in the market
- Ensuring efficient payment and accounting systems are followed by agents and traders
- Ensuring that levies were collected as per the municipality's policies and procedures
- Ensuring that all infrastructure, including cold rooms, forklifts, scales and all other facilities, were always fully functional

The municipality is not directly involved in the trading of commodities, as farmers trade their produce through market agents. The four agents operating at the East London Market were Martin & Scheepers, Border Farmers, Subtropico and AA Market Agency. Market agents are responsible for:

- Sourcing produce from farmers
- Negotiating trading prices for specific products with farmers and buyers
- Operating a trust account into which all their trading finances are paid by the municipality
- Ensuring that farmers are paid as per agreed schedules
- Ensuring that untraded produce was disposed of in accordance with the rules and regulations set by the market

Procurement process at the East London FPM: There were no standards or policy restrictions governing the participation of farmers at the East London Market. All farmers were free to bring their commodities to the market regardless of grade and quantities. On delivery, all suppliers had a consignment docket opened for them. Thereafter, the farmer selected an agent and negotiated a price for the produce, based on its quality and grade, and the prevailing market prices. The agent assumed the responsibility of marketing the produce on behalf of the farmers. Once the produce was sold, the money was deposited into the municipality's account before being transferred into the agents' trust account. The Municipality deducted 5% commission on the sales, and the agents took a further 7% commission, leaving the farmers with 88% of the total revenue. Further charges could accrue depending on the nature and quantities of the products supplied such as levies for inspection and storage (cold rooms). The farmer also bears the costs of transport to the market, packaging, grading and labour. Municipal staff managing the East London Market considered that market and transport costs hindered the participation of smallholder farmers on the market. In addition, their products had to compete with those from well-established farmers who generally had good quality, packaging and grading procedures and were bulk suppliers to the market. This resulted in sales of produce from smallholder farmers being slow and losing quality before being sold. At times, a point was reached where disposal of the product had to be arranged, which was also at the farmers' expense. The municipality certified disposal of rotten products together with the agent. Such uncertainties and losses resulted in smallholder farmers shunning the use of fresh produce markets as outlets for the commodities.

The East London Market does not have contracts with farmers. However informal relationships were normally forged between the agents and farmers, as agents wanted to retain as many productive farmers on their database as possible. There were very few government-supported agricultural cooperatives participating at the market. It was unfortunate that the farmers' database did not give detailed breakdown of farm size and did not track consistency of supply of individual farmers. Some farmers who last supplied the market more than 6 years earlier, were still on the database, but it was not possible to ascertain whether these farmers were still farming or had changed their marketing channel.

The East London Market accommodated hawkers, supermarkets and fruit and vegetable shops. Hawkers were the smallest buyers and normally paid cash for their purchases. All buyers were required to purchase a cash card for R10. This had a buyer number and made provision for the agents to record the quantity and price of the produce that the hawker had purchased. The card was used to pay the municipality's market cashier and the money was recorded against the respective agents for calculation of commission for the agents and payment to the farmers. Bulk buyers, such as chain stores and some fruit and vegetable shops, operated secured cash accounts with the market. These buyers deposited large sums of money into their market account from which payments were deducted for every purchase.

The Butterworth Fresh Produce Market

Procurement process at the Butterworth FPM: The Butterworth FPM operated in a similar way to the East London Market. However, the market is owned privately, and the owner, who was renting a private property, operated as the agent as well. Procurement was done across South Africa and a commission of between 8% and 12% was charged to farmers depending on their agreement. Thus the commission varied between farmers, unlike the fixed percentages at the East London Market.

Smallholder farmers did not supply the Butterworth Market, and most of the suppliers were established commercial farmers. Lack of transport, poor quality of produce and low output were considered to be the major factors hindering emerging farmers from participating at formal markets. Private ownership allowed flexibility in trading regulations to accommodate regular dealers. For instance, some hawkers were given produce on credit and paid weekly or fortnightly. This system catered for hawkers without ready cash and was mutually beneficial to both the hawkers and the market owner as it increased their sales volumes. However, the arrangement created the perception that these hawkers were working for the FPM. This raises concerns about the *de facto* ownership of the hawking business, as well as whether independent hawkers without credit arrangements could compete against those who were supported in terms of credit and product quality.

5.1.1.3.5 Consumer preferences

An analysis of consumer preferences was conducted in Willowvale. The town was a service centre for Ciko and Mbozi villages where the two project sites were based. Consumer choice of crop and livestock products for household consumption was investigated, as well as the reasons for using specific outlets. A sample of 41 consumers was randomly selected. . It was assumed that consumers using Willowvale Town were from the surrounding communities, including Ciko and Mbozi. As consumer perceptions and preferences influence the successful marketing of agricultural commodities, the results of the survey are useful determining the most suitable market channel for farmers in rural areas .

Table 5.6 below shows consumers' buying frequencies for fresh produce. More than 50% of the consumers bought crop produce either daily or weekly. This is a good indication of the demand for fresh crop produce in the area.

Table 5.6 Analysis of buying frequencies for crop produce, 2010

Purchase rate of fresh produce (crop and vegetable)	Frequency	Percent
Daily	10	24.4
Weekly	13	31.7
Fortnightly	6	14.6
Monthly	12	29.3
Total	**41**	**100.0**

The consumers were asked where they preferred to purchase fresh produce. The channels being used are presented in Figure 5.7, and the results show that consumers prefer to buy from supermarkets rather than from hawkers or farmers. The dominance of supermarkets as preferred outlets for crop produce is important as it suggests that smallholder farmers should have been targeting supermarkets as a market for their produce. However, this would only be possible if a strong relationship between smallholder farmers and supermarkets is forged, and the current problems of quality, delivery and consistency of supply have been resolved.

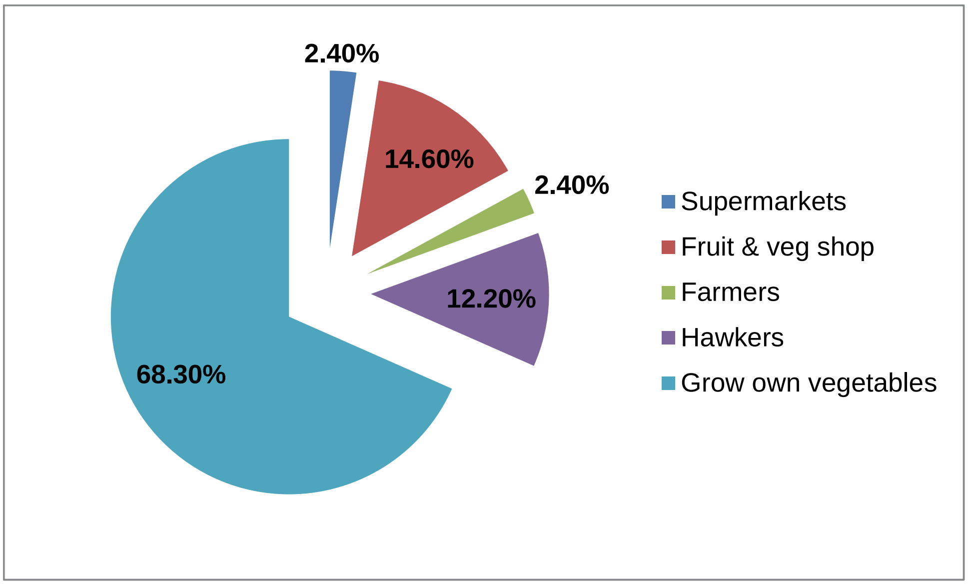

Figure 5.7 Preferred consumer outlets for fresh produce (vegetables) at Willowvale, Eastern Cape, 2010.

The expected role of fruit and vegetable shops and hawkers discussed in sections 5.1.1.3.1 and 5.1.1.3.2 was not consistent with consumers' preferences. An interview with a consumer revealed the following:

> "I don't buy from hawkers because they do not sell fresh products. Their products are always exposed to the sun and at times can go for days without buyers, making them stale. You can't get small units as well, especially of cabbages. You end up buying a full cabbage even if you would have preferred a fraction of it. That is why I use the supermarkets because you can find them packed into halves or quarter, which is enough for my family"

The sentiments of this consumer highlighted the importance of quality and product differentiation to meet a wider consumer base. The availability of cabbages in smaller portions was accompanied by an extra per unit cost, which consumers tended to overlook. During the data collection period (August 2010), a full cabbage had a retail price range between R6.99 and R9.99, while halves were selling for between R4.99 and R7.99. Consumers preferred to buy products that they could consume and finish whilst they were still fresh, and they were prepared to pay extra for the associated processing and repackaging costs.

Consumers were aware of irrigation schemes in the vicinity of Willowvale but were not prepared to walk or use a taxi to go and buy vegetables from the schemes, even if these were cheaper. Distance and time wastage were the major deterrents to buying directly from agricultural projects.

5.1.1.4 Factors impacting on value chains at the irrigation projects

A number of factors were identified that impacted on the value chains. Positive factors either strengthened the farmers' involvement in the value chain (enablers) or played a driving role (drivers). Negative factors hindered the participation of farmers in the value chain, and include barriers and regulators.

5.1.1.4.1 Enablers and drivers

The following positive factors were identified:

- **Communication networks:** Market participation by farmers was considered as an indicator of their aspiration to engage in commercial or semi-commercial production. The major enabler to the cabbage and maize value chain in both Ciko and FCP was the effective communication network provided by cellular telephones. Mobile phones were used both by farmers to advise potential buyers of the availability of produce, and by buyers in search of products for the market.

- **Demand:** Continuous demand for the commodities was a major driver of both the cabbage and the maize value chain. The potential market at Willowvale and iDutywa presented opportunities for farmers in the two projects provided that ways could be found to compete with produce purchased from the municipal fresh produce markets.

- **Water supply:** The reliable water supply for irrigation from the Shixini River ensured that the projects could produce good quality maize and cabbage. In addition, the cost of water was relatively low, as no water levies were paid, giving the farmers a competitive advantage.

- **Land availability:** Free access to land, as well as the opportunity to expand their areas of production, was a key enabling factor for both Ciko and FCP. In the latter, 66 ha was available for expansion purposes, although funds were required for fencing the area. Technical and financial support are necessary to facilitate growth of these farming enterprises.

5.1.1.4.2 Barriers and regulators

Some of the barriers and regulators that impact on the food value chains at Willowvale are summarised below:

- **Transportation:** Transport was a major factor limiting the effective participation of farmers in food value chains. Both Ciko and FCP lacked trucks and/or trailers to transport their produce to the market.

- **Accessibility:** The condition of the access road was a major barrier to marketing produce. When FCP started in 2007, a trading agreement was in place between the project and George's Fruit and Vegetable Shops whereby a truck collected fresh produce from the scheme. This agreement has been terminated partly because of the deteriorating condition of the road.

- **Facilities and skills:** The value chain mapping has shown that greater returns can be obtained from processed vegetables than from trading raw cabbage. However, farmers were not able to extend their involvement in the cabbage value chain because they had no electricity, and lacked cold storage and preparation facilities as well as the skills required to operate such facilities..

- **Competition:** Demand for fresh produce existed in Willowvale, but established businesses procured the bulk of their requirements from East London Municipal Market, because of better quality and a more reliable supply than was available from FCP and Ciko. This was threatening the viability of both irrigation schemes.

- **Government funding policies:** Ciko and FCP had DoSD grants of R240 000 and R345 000 respectively. This funding did not cover the costs of purchasing assets such as a tractor-drawn trailer or a delivery truck to market produce. Funds could only be used for input costs but did not cover extra labour. Although the need for tight controls on public finance is obvious, this should be balanced against realistic support for farmers at all stages of production (input procurement, primary production, harvesting, value addition, marketing and transportation of the produce. Currently, support limited to production and irrigation infrastructure only.

5.1.2 Cattle

The involvement of small-scale farmers in livestock value chains was investigated in terms of cattle production, because both project members and non-project members owned cattle. The value chain analysis was seen as an opportunity to examine the importance of access to water in livestock production.

Livestock play an important role in the lives of many rural poor, by providing a small but steady stream of food and income and helping to raise whole farm productivity. Livestock production is often the only way of increasing assets and diversifying risks. In addition, livestock give status to households and are of cultural importance. They also create employment opportunities beyond the immediate household (Otte, 2008).

5.1.2.1 Inputs and production

The survey of 82 households in Ciko and Mbozi villages n 2010 revealed that relatively few households owned cattle and very few of the owners marketed animals regularly. The results are shown in Table 5.7.

Table 5.7 Cattle ownership in Mbozi and Ciko Communities at Willowvale, Eastern Cape (n=82)

Variable	Quantity
Number of households that owned cattle	21 (25.6%)
Average herd size	4.8 (minimum herd size = 1, maximum = 15)
Farmers who had marketed cattle the previous season	2 (one animal per farmer)
Selling price per head	Prices obtained: R4000 (3 year old animal); R5000 (4 year old animal)
Labour	Most families used family labour for herding and handling livestock which had no perceived financial value
Dipping	Farmers used the Ciko communal dip tank. No dipping levies were paid. Dipping was co-ordinated by an animal health technician from Department of Agriculture, with assistance from the Dipping Committee. Dipping chemicals were provided free of charge by the government.

Cattle farmers relied less on western livestock remedies than was the case for commercial farmers. Animal health products were purchased mainly from Umtiza Farmers Co-op and Emsengeni Wholesale, trading as Build-It Hardware, at Willowvale town. Traditional medicine was also used where farmers were budget constrained and when it was available.

Production flows for cattle and cattle-derived products are shown in Figure 5.8. Inputs for livestock production were limited. Cattle owners in the two villages relied mainly on communal veld, which did not have a direct cost for the household. Grazing was largely restricted by the steep terrain that characterised the two villages, and this was apparently also limited sheep production in the area.

Cattle drank from small earth dams in the villages and from the network of natural streams and rivers (including the Shixini River, Mbozi River, Ciko River and Qwaninga River). The perennial rivers were an important source of water during winter and drought periods when the dams were dry. Cattle consume approximately 45 litres of water per day, so the availability of water in rivers and streams was advantageous for livestock owners who would otherwise have had to supply water. The volumes of water used in cattle production are considerable. On the basis of a daily water intake of approximately 45 litres, an adult animal could consume as much as 16 425 litres per annum.

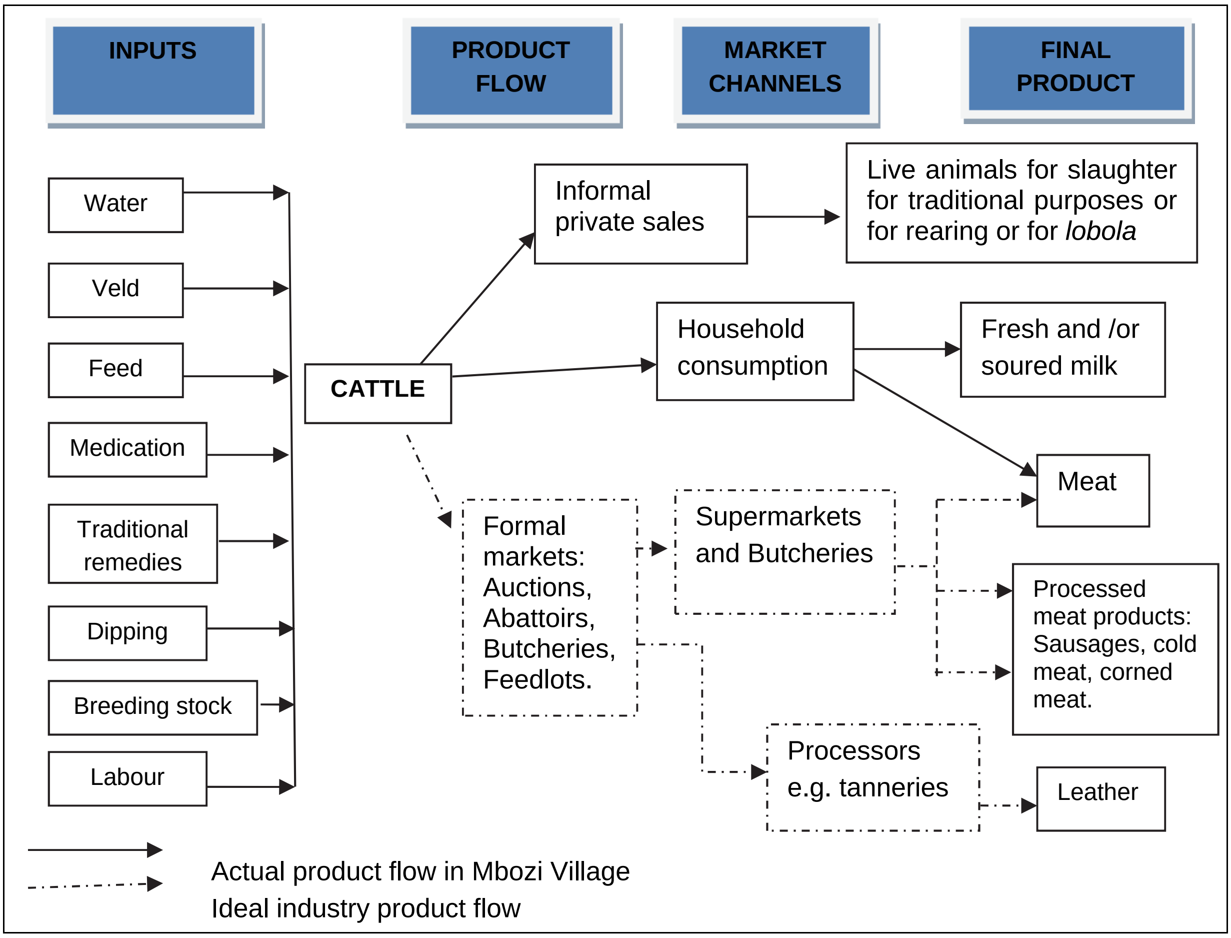

Figure 5.8 Production flows for cattle and cattle-derived products at Willowvale, Eastern Cape, 2010.

5.1.2.2 Actors involved in livestock marketing

The low participation of smallholder farmers at the study site in cattle value chains was thought to emanate from their low off-take rates and from high purchase prices. In terms of trying to understand how many cattle a household has before it is willing to sell of animals, the size of the herds from which animals had been marketed was investigated. The two farmers who had sold cattle the previous season, had 10 and 2 cattle respectively at the time of selling. This illustrates that households do not always feel the need to reach a certain threshold herd size before disposing of animals. Both farmers cited family problems, such as funerals, and associated financial needs as the major reason behind their selling cattle. This also shows that cattle rearing ventures among the smallholder subsistence farmers interviewed were not yet regarded as a farming business with great potential to generate income for the household. The low level of marketing may also be related to the high mortality of cattle due to parasites and diseases that was cited by farmers during the interview. This had resulted in herds either remaining constant or decreasing in size.

A livestock marketing study conducted by Musemwa (2008) in Chris Hani, Alfred Nzo and Amatole district municipalities indicated that auction was the most common channel used by farmers in Chris Hani and Alfred Nzo, while in Amatole private sales were the most commonly used channel. The current study found that a number of cattle market outlets were available to the cattle farmers; however access to formal markets for the Willowvale farmers was limited by a number of factors, of which the distance from the market and inadequate infrastructure were key. Dominant market channels included private sales, auctions, speculators, feedlots, butcheries and abattoirs. There was no formal processing of meat products encountered in the communities although animals were slaughtered locally for consumption within the community. Formal meat processing is highly specialised and well-established, certified abattoirs and butcheries are mostly involved.

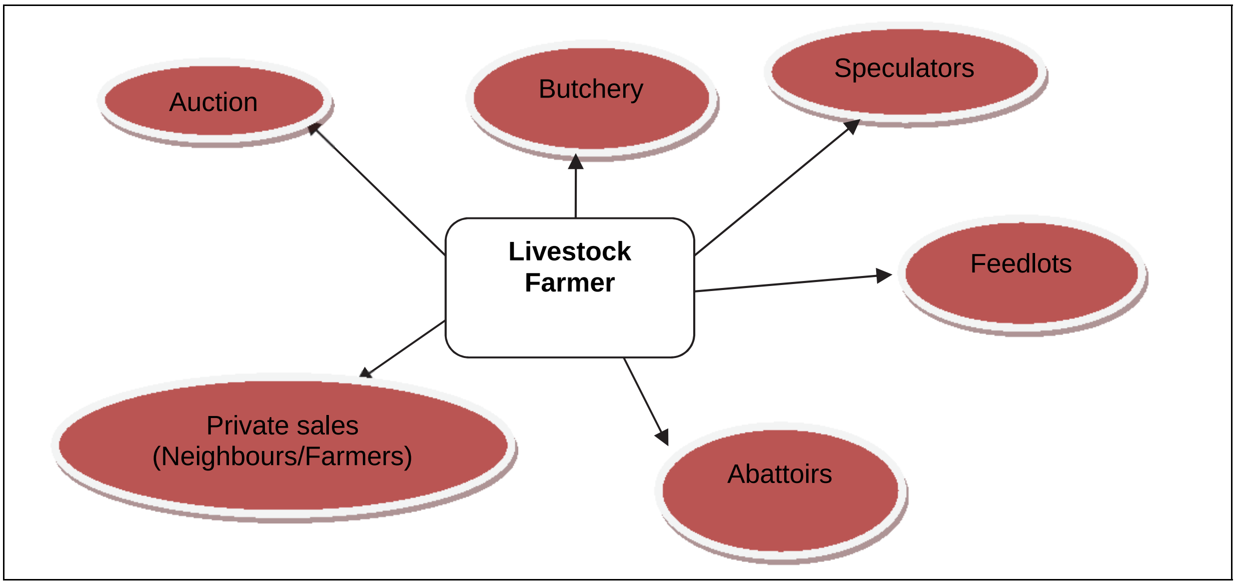

Figure 5.9 Generic marketing channels for livestock, 2010.

Livestock auction markets are established places of business where livestock are assembled at regular intervals and sold by public bidding to the buyer who offers the highest price per head (Nkosi and Kirsten, 1993). Auctions are public markets open to all buyers and sellers. As indicated by the NDA (2005), buyers include individuals buying for household use, butchers, commercial farmers and speculators. The number of cattle sold through auctions varies considerably between locations. This influences the number of prospective buyers which in turn may affect the prices paid for cattle at a particular market. The shortest, simplest and most popular option, especially amongst smallholder livestock owners, is private sales directly to the ultimate consumer (Nkosi and Kirsten, 1993). Private sales occupy an important position in the livestock marketing arena of the emerging sector. Private sales include individuals buying livestock for different reasons which include slaughter, investment or for socio-cultural functions such as funerals, weddings, customary and religious celebrations (USAID, 2003).

Private selling is a common practice for communal farmers as they are in a better position to determine prices for their animals. In addition, farmers incur lower marketing costs. Private sales are therefore the cheapest and possibly the simplest form of a market outlet. Nkhori (2004) also reported that on-farm or direct sales to the consumer offer the greatest profit margin on live animals for the producer because all middlemen and their fees are eliminated. It offers a year-round marketing outlet, however the demand is irregular with high demand during certain times of the year, such as Christmas and Easter holidays. Most of the cattle traded in these informal markets are primarily old oxen that have been in service as draught animals and destined ultimately for slaughter (Swallow and Brokken, 1987). The respondents in the Musemwa (2008) study indicated that most of the cattle sold through private sales were for functions such as family gatherings, funerals and weddings. The farmers that were interviewed indicated that they are dissatisfied with the use of this channel because of the delays in payment. Despite these drawbacks, the respondents indicated that private selling is the cheapest and simplest form of marketing cattle since the buyer just comes and buys from the seller's kraal thus saving the seller transport costs and allowing negotiation between the buyer and the seller over the price.

Another available option to communal farmers is to sell cattle directly to the butchers. Butcheries provide basic marketing services for farmers, particularly communal farmers, who are unable to market their cattle efficiently and profitably through other existing formal channels. Butchers enhance the marketability of livestock by providing a direct market and by buying at auctions. Nkhori (2004) found that the main reasons for some farmers' satisfaction with sales to butchers were the good prices obtained and the fact that farmers have strong bargaining power in determining the prices of their stock. Though butcheries provide market opportunities, typical rural communities like Mbozi and Ciko Communities in Eastern Cape Province have no standard butcheries that can meet the requirements for slaughter houses. The three butcheries at Willowvale town, when interviewed, all indicated that they get their meat from abattoirs in Mthatha and East London as well as Komga Distributors.

It is important to note that the Musemwa study revealed that less than 6% of the farmers in the three municipalities used abattoirs as a marketing channel. There might be a need to investigate the limiting factors to farmer participation in specialised markets such as abattoirs. According to the NDA (2005), the abattoir is the least used marketing channel for communal farmers because of factors which include distance from the producers, slow speed of payments, high risk factor of animals being condemned on the basis of health status, and many charges involved in using this channel. It is not economical to sell one or two animals, as transport costs will not be justified. Group marketing can assist farmers to enjoy economies of scale when using this channel, however group marketing is not always possible as farmers sell their animals at different times. Abattoirs pay farmers according to age, weight and grade of the animal. This system undervalues certain indigenous breeds and exotic breeds often fetch higher prices.

Though interviews with consumers indicated that there were also hawkers selling meat, none of these hawkers could be met or interviewed by the research team. This suggests illegal trading habits of hawkers against government regulation of selling only certified meat to consumers. Furthermore, it was suggested that hawkers of meat tended to be found at beer halls where they also sold meat to people who cooked it on site, especially at night. The lack of fridges and absence of formal operating space makes it difficult for communities to participate in meat trading, except when they slaughter their own livestock for the family and decide to sell part of it to raise cash.

Table 5.8 below gives a summary of the frequency at which consumers purchased meat products. The survey showed that about 61% of the consumers bought meat products daily or on a weekly basis.

Table 5.8 Summary of buying patterns of consumers for meat products

Purchase Rate of Meat products	Frequency	Percent
Daily	12	29.3
Weekly	13	31.7
Fortnightly	5	12.2
Monthly	11	26.8
Total	**41**	**100.0**

The survey also indicated that consumers mainly relied on supermarkets for their daily livestock product requirements (Figure 5.10), with 78% of the respondents indicating their preference for this channel. Consumers sited reliability and good quality of meat products in most supermarkets as the reason for their preference.

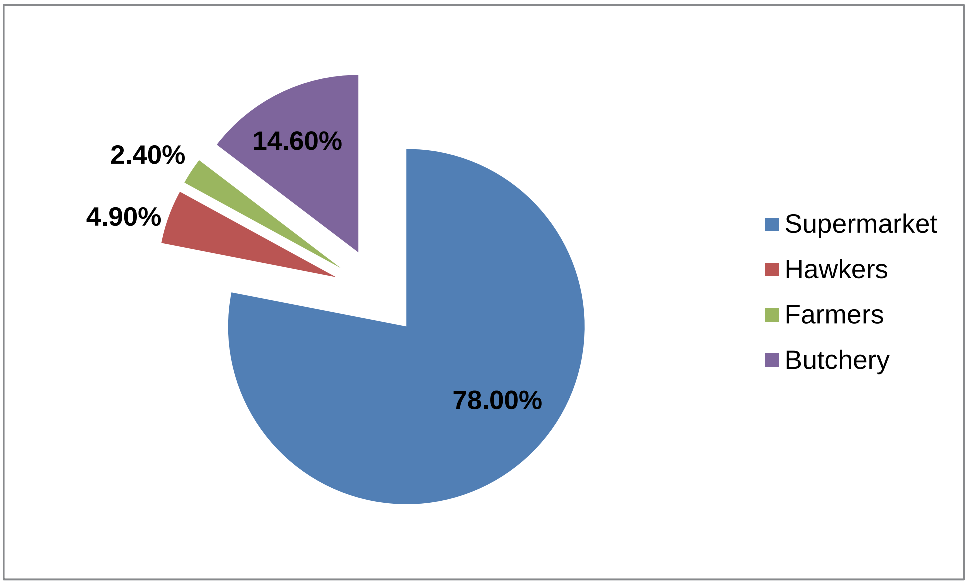

Figure 5.10 An illustration of preferred consumer outlets for meat products at Willowvale, Eastern Cape.

It is important to note the low participation of hawkers and farmers in meat trading, with only 4.9% and 2.4% of the consumers indicating that they used these sources respectively. This finding is consistent with expectations, due to the regulatory framework that controls the trading of uncertified meat products. Some consumers revealed that households sometimes sell meat after slaughtering an animal, as a mechanism to raise some income. This was however said to be an irregular and *ad hoc* phenomenon and consumers indicated that they could not rely upon this source of meat.

5.1.2.3 Factors impacting on cattle value chains

The next section provides a summary of some of the positive and negative factors that could be impacting on cattle enterprises in communal areas, and which could be preventing farmers from participating in more market-oriented value chains.

5.1.2.3.1 Enablers and drivers

Enablers and drivers identified are summarised as:

- **Free access to grazing areas:** There was no direct cost associated with accessing grazing in Ciko and Mbozi villages. Furthermore, there appeared to be no restriction on herd size per household as a way to control overgrazing and ensure equitable access to the resource. This gave room to farmers who aspire to be more market-oriented to increase their cattle numbers to allow for higher offtake rates. The study did not provide an opportunity to gauge the number of animals that the area could support and the extent to which this had already been reached. Herd sizes will be restricted by available resources and excessive pressure is likely to result in veld degradation and reduced carrying capacity.

- **Availability of dipping facilities:** Government supported communal dips were easily accessible in the area and were located along the perennial Shixini River. Their location facilitated refilling and replenishing of the dip by the community although the potential pollution of the water resource needed to be considered. Steps to minimise the negative impact on the river system and downstream users should be investigated. The existence and operation of the dip allowed for parasite control, which should in turn have had a positive impact on livestock productivity.

- **Perennial Water Supply:** The availability of drinking water for cattle was not a challenge in either Ciko or Mbozi communities. Cattle grazed along the rivers and hence did not need to travel long distances to look for water.

5.1.2.3.2 Barriers and regulators

Some of the barriers or challenges facing cattle owners within the study area and reducing their ability to participate in commercially-oriented production are discussed below.

- **Terrain of the grazing land:** Grazing was restricted by steep terrain within the two villages. There were some areas which were not reachable by cattle. The lack of control over the grazing meant that veld degradation could result from an increase in numbers. In addition, the opportunity for an individual cattle owner to make decisions about veld management and burning practices was very limited.

- **Parasites and diseases:** Cattle owners in the two villages complained of tick infestation despite the fact that they were dipping their cattle regularly. An investigation into the efficacy of the current dipping chemicals being supplied by the government (Triatix) and the mixing practices is worth considering.

- **Cost of purchasing livestock:** Most villagers (70% of the households that were interviewed) did not own cattle. The major reason was the high cost of buying a cow for breeding purposes. Many community members actually considered someone who can afford to buy a cow as being rich.

- **Distance to auctions and abattoirs:** There were no formal auctions accessible to cattle owners from the two villages. Such auctions might have motivated farmers to sell their cattle at competitive prices. It should, however, be noted that rural farmers might not be familiar with the operation of cattle auctions and could be disadvantaged by this. Similarly farmers did not have access to abattoirs.

- **Small herd size and low market off-take:** In the survey of Ciko and Mbozi Villages, the minimum herd size was found to be a single animal owned by a household, while the largest herd consisted of 15 cattle. Such small herd sizes are definitely going to have a negative impact on people’s willingness and ability to market cattle.

5.2 VALUE CHAINS AT MARINA, EASTERN CAPE / SOUTHERN KWAZULU-NATAL

While other sites have investigated a number of different value chains, the study at Marina focused on smallholder banana production. Bananas are grown commercially in KwaZulu-Natal and it was anticipated that opportunities might exist to draw smallholder producers into the formal value chain and to build a relationship between these two groups of farmers that could strengthen smallholder production in the area.

5.2.1 Commercial banana value chains in Southern KZN

KwaZulu-Natal accounts for approximately 15% of the national banana production in South Africa. The balance is produced in Mpumalanga, North West and Limpopo Provinces. Figure 5.11 provides a summary of the basic commercial value chain.

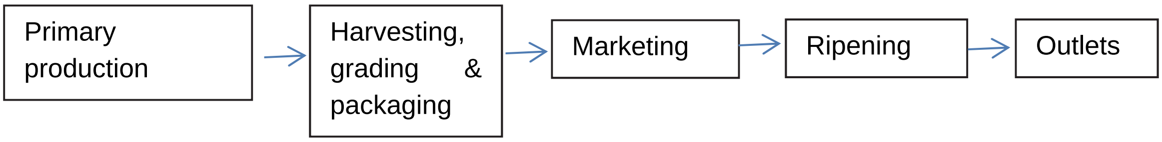

Figure 5.11 Summary of the large-scale commercial banana value chain, 2011.

The study found that commercial production occurred at a variety of scales, from small growers with less than 5 hectares to large growers with areas in excess of 100 ha. Banana orchards in Southern KZN were found to produce a crop every 15 to 24 months and bananas plants generally produced for 10 cycles or ‘ratoons’, after which the plant stock was replaced. New plants for replacement of ratoons were sourced from North West province when they were 5cm tall and were grown out in nurseries by farmers to 25-30cm in size, after which they were planted out. Key inputs for production were high quality, disease free plant stock, fertilizer and lime, insecticides and herbicides, water, electricity and fuel.

Mature banana bunches were harvested and graded on farm in specially designed pack houses. Bananas were marketed at the farm gate, direct supply and through KNBC, a specialised banana marketing company located in Port Edward. KNBC was originally the KwaZulu-Natal Banana Cooperative until the disbanding of the Banana Marketing Board in 1994. Before 1994 the Banana Board acted as a single channel marketing scheme with a pool of agents around the country to market bananas. At the time of the study, KNBC had become a limited company, although it still operated in the manner of a cooperative as producers were members or shareholders in the company. The study found that most of the bananas produced in southern KZN were sold on the Ugu and Mthatha fresh produce markets and to Freshmark (Shoprite / Checkers logistical company). When markets were favourable, bananas were also sold to the East London, Durban and Pietermaritzburg fresh produce markets.

According to commercial growers, key management factors were: good genetic plant stock; clean, disease-free plants and good soil hygiene practices; soil fertilisation to ensure optimal growth and production; irrigation; and propping of plants to prevent them falling over (lodging).

5.2.1.1 Primary production

While the production practices are given in more detail than a value chain mapping exercise would normally require, it is useful to compare the differences in investment between large-scale commercial and small-scale banana production.

5.2.1.1.1 Cultivation practices

Bananas in Southern KwaZulu-Natal were generally planted in November and December as these are the wetter months of the year. Plants can be established earlier and later (October to January), however it was said there was a risk of hot dry spells in September and October which could result in plant death, even with supplementary irrigation being applied. Planting beyond January was not recommended as the benefit of the summer warmth from February to April was lost and resulted in lower harvests in the first year and put the plants “out of cycle” (i.e. first harvest was lowered, which could negatively affect income). It was also said to be important that properly grown out plants (i.e. 20-30cm tall) were used in establishment as these were more robust and resistant to drought. Orchards were said to remain in production for a 10 year ratoon cycle, after which the blocks were replaced. This equated to a 10% replacement per annum. A fallow crop was planted between ratoons to control pests and diseases and improve soil organic matter and fertility. This usually consisted of a grass / legume crop and was sometimes followed by a cash crop. For example, a farmer visited during the research (Quentin Elliot) was using a forage sorghum crop followed by cabbage as the cash crop. The sorghum grew during summer and the cabbage was grown as the winter crop, under irrigation.

Banana farmers were also said to try to avoid planting on top of the hills as these areas were usually very windy and banana does not ‘like’ windy or dry conditions. Similarly, in very low lying wet areas, bananas do not do well (they don’t like having “wet feet”). However, lower lying areas were preferable as they were moister, had less wind and resulted in better production under dryland conditions.

5.2.1.1.2 Planting stock

Bananas were planted commercially with an inter-row spacing of 3 m and an intra-row spacing of 1.5 m, giving a population of 2222 plants per hectare. Plant stock was purchased from North West Province. The plants came in at 5cm tall at a cost of R3.30 per plant. Local farmers purchased collaboratively in bulk and a large delivery was made on an annual or biannual basis, depending on when they were required. These plants were kept in the nursery for about 4 months (when they are 20-25cm tall) after which they were planted out in the orchards. This practice was termed ‘growing out’. A specialist fertilizer was applied to these plants, called Horticult 7:1:2. This fertilizer was costly – approximately R1000 per 25 kg bag. This did however fertilize 5000 plants during the growing-out phase. A key element of growing out and banana production in general, is plant hygiene. It was recommended that homemade compost or potting mixes not be used as this was said to introduce the risk of diseases such as eelworm. Sterile potting medium such as Gromor potting medium was recommended for use.

Some farmers expanded their own stock through using suckers from existing banana plants that were maintained as a designated sucker nursery area where the disease risk was kept to a minimum. This meant that there was minimal movement between the orchard and the nursery to prevent cross contamination and shoes were sterilised when entering this area. Alternatively, it was said that only suckers from first year ratoons should be used as seed stock as they had the lowest disease load. Even with first ratoons, the disease load was already said to be increasing, which limited optimal production. By using disease-free seedlings, optimal production can be achieved. Plants grown out to 25-30cm were made available locally at R7.00 each for smaller banana growers.

5.2.1.1.3 Fertilizer application

Before planting, soil analyses are conducted to determine fertilizer requirements. These were sent to the Cedara Soil Science Laboratory for analysis. Generally fertilizer application was as follows, depending on soil analysis: Two tons of calcitic lime was applied on the lands prior to establishment, depending on the fertilizer recommendations. At planting, one spade of compost and a small amount of superphosphate was incorporated into the hole (each planting hole had dimensions of 500 mm X 500 mm X 500 mm). After one month, a side dressing of 30g of LAN per plant was provided – the purpose of this is to maximize vegetative growth early on. Standardised ratoon fertilizer application was as a monthly dressing of 100g of 4:1:12 per plant. In cases where there was sufficient phosphorus in the soil, it was suggested that 1:0:2 could be used. Fertilizers were applied monthly over a nine-month period (September-May). The cooler winter months did not produce sufficient growth in KZN to warrant fertilizer application during this period. Applications were also held off in August if the temperatures remained cool, as it was seen as a waste of inputs. Overall, the following amounts of macronutrients were generally applied annually to commercial banana ratoon crops in southern KZN: 320 kg N/ha; 20 kg P/ha and 650 kg K/ha.

5.2.1.1.4 Composting

Where materials are available, commercial farmers indicated that they made use of composting to control pests such as nematodes and to improve plant vigour. Composting and mulching was also used to improve soil condition, and optimise water use.

5.2.1.1.5 Propping

Commercial growers indicated that they had to prop their plants with wooden poles to prevent the weight of the bunches from pulling the banana plants down. Even with propping, losses of 3-4t/ha were experienced by growers due to plants falling over. Working on 650 bunches needing to be propped, with 2 props per bunch at a cost of R6.50 each, propping materials alone costs R8,50 per plant.

5.2.1.1.6 Pest and disease management

Control of some key pests affecting commercial banana production is discussed below. Nematodes can be problematic, particularly in sandy soils. These were controlled in a number of ways, but largely through the use of management practices rather than chemicals:

- Hygiene – making sure that only clean plant stock was introduced into fields.
- Incorporation of compost in infested soils – this increased the organic content of the soil, making it less conducive to nematode growth as well as encouraging nematode predators in the soil.
- One grower interviewed (Blaine Campbell) indicated that it was not economically viable to attempt to control nematode infestations in producing fields. He suggested that it would be better to remove the crop, put in a break crop and re-establish with clean plant material.
- There appeared to be limited use of Temik (Aldicarb) to control nematodes in southern KZN.

Insects and slugs were said to be problematic during banana formation and ripening. A combination of Benlate, Dicozol and Chlorpyrifos were sprayed onto the maturing banana bunches to control these pests. Weed control was also said to be important, particularly during the first few months of establishment. A pre-emergent herbicide mix of Roundup (glyphosate), Ametrin and Acetachlor was applied. This provided approximately 8 weeks of weed control, giving the bananas time to establish. Weeds were controlled during establishment by hand weeding adjacent to the plants and Gramoxone (Paraquat) applied to the areas in between (until the canopy had established), which controlled broadleaf weeds. Once the banana plants were well established (at least one metre), Round-up (glyphosate) was used as a broad spectrum herbicide. This was sprayed around the base of the plant, although care was required to prevent damage to the growing plant. During canopy establishment, when Gramoxone was used to control weeds, it was suggested that care had to be taken because if some spray touched the bananas it would burn them, while a full cover would kill them. It was recommended that spraying only be done on windless days. Often, the area directly adjacent to the bananas was weeded by hand and the weeds were controlled by chemicals in the remaining areas.

5.2.1.1.7 Water use and conservation

Bananas require a lot of water. The study found that it was not considered viable to establish bananas without irrigation as a commercial grower in KwaZulu-Natal. This was due to the increasing incidences of drought and erratic rainfall that were reported by the growers interviewed. Micro-sprinklers or drip irrigation were the main methods of water application. Monthly supplementary irrigation of 12-20 mm in winter and 25-35 mm in summer was provided on one commercial farm that was used as a case study, equating to approximately 5000 m^3 per hectare per annum (Elliott, 2012). Most farmers monitored soil water content remotely using soil moisture logging to assess soil water content. Under irrigated conditions, a loss of 10% of the bananas per annum could be expected, while under dryland conditions, significantly more losses could be expected, and it was highlighted that should a drought occur, the entire crop could be lost. Irrigation water was either pumped directly from rivers and streams or pumped into holding dams from which water was then pumped onto production lands.

Many of the soils in banana growing areas of southern KwaZulu-Natal are high in clay (>25%) and can be shallow in places (Cambell, 2012). This meant that high levels of irrigation were not supported as this could result in the leaching of fertilizer as well as ‘wet feet’ which was said to cause root stunting and root diseases and reduced yields.

Bananas were generally planted along contours and access roads were contour based. In-field drainage was used where poor drainage existed. Contours were designed to remove excess runoff from the lands to reduce erosion.

Mulch and compost was used on poorer soils (e.g. sandy, shallow or infertile soils). This had benefits in terms of limiting the risk of nematode infestation, improving soil structure, improving soil fertility through enhanced nutrient cycling and enhancing root penetration of banana plants. Garden services in the region were encouraged to dump their garden refuse on nearby farms, where it was chipped and composted. This was a benefit to both, as garden services would otherwise have to transport this waste to a facility in Port Shepstone, some distance away. The farmers benefitted by receiving free compost. There were, however, only limited sources of composting material available. Thus the main purpose of composting was not water conservation, but soil improvement.

5.2.1.2 Harvesting, grading and packing

Under commercial production, it was said that harvesting of banana bunches could occur between 15 and 24 months after the previous harvest, depending on location. In the warmer areas close to the coast, harvest intervals averaged 15-16 months. In the slightly elevated hinterland areas (equivalent to Marina altitude) an 18-month ratoon could be expected. In cooler high lying areas such as Paddock, a 24-month ratoon (50% per annum) could be expected.

Another commercial grower noted that a harvest percentage of 59% of the crop per annum was being achieved (Campbell, 2012). The amount harvested per annum is a key economic indicator and if this percentage can be increased through management, significantly improved profits can be realised. An example provided by the grower was that an increase from 59 to 65% harvested per annum would be an increase in yield from 27 t/ha p.a. to 40 t/ha p.a, an increase of 13 t/ha p.a. which would be mainly made up of profit.

Harvesting took place in two week cycles (i.e. the same block was harvested every two weeks as bananas became ready, with alternate blocks harvested each week to ensure consistent supply and cash flow). When the banana fruits were approaching maturity, they were sprayed with Chlorpyrifos to control insects and covered in plastic bags to protect them from the elements and increase the lifespan of the Chlorpyrifos. Slug and snail bait was also placed in the bags to control slugs.

It was highlighted that physical harvesting of the bananas must be done with great care, as any damage would appear only during the ripening process and could result in downgrading of the bananas. The stem from which the bunch was harvested was then cut down, as it would not produce another bunch. This then allowed one of the smaller plants growing from the base to grow (called a 'sucker'). Once removed from the tree, the bunches of bananas were loaded on trailers on a layer of banana leaves to minimise damage. The bananas were removed from the trailer at the pack shed and hung on chains which slid along railings towards the sorting and packing facility where they were gutted (individual bunches removed from the stem) and graded.

Harvesting was said to be at a minimum in winter. In July, around 30 boxes per hectare could be expected, while in the summer months, 200 boxes per hectare were the norm. While there were fewer boxes harvested in the cooler months, the bunches were said to be bigger as it took longer for the bunches to mature to a point where they were ready for harvesting.

The pack house represents a significant cost to production. Larger pack houses can employ 60 staff, increasing to 90 people in peak harvesting season. At the pack house, the individual 'hands', having been 'gutted' from the bunch, were dropped into a bath for cleaning and sanitising. These hands were then split further and were graded based on size and quality, as follows:

1. Premium Extra Large
2. Premium Large
3. Standard Extra Large
4. Standard Large
5. Standard Medium
6. Standard Small.

Graded bananas were then packed into branded cardboard boxes or generic plastic crates, depending on the destination. Most bananas were packed in plastic boxes where they would be sold at Municipal markets or be supplied to retail chain stores that would pack out or brand the bananas themselves. Bananas were sold by gross weight as either 18 kg cardboard boxes or 20 kg plastic boxes. In each case, there were 17.5 kg of bananas in the box[15]. Packaging costs were quite high, with the cost of a cardboard box being R4.50 alone and total packaging costs (labour, chemicals, etc.) potentially adding up to R20 per box (Elliott, 2012).

[15] Cardboard boxes weigh 0.5 kg, bringing the total weight to 18 kg, while plastic crates weigh 2.4 kg bringing the weight close enough to 20 kg.

Figure 5.12 Mature bunches hanging on rails before being graded and packaged (left) and Graded and packaged bananas ready for transport to a ripening facility (right).

Infrastructure required for packaging included the actual pack shed infrastructure (Chains and rails, baths, grading areas, conveyors, storage areas, loading bays) as well as specific equipment (e.g. scales, conveyors). Various chemicals, electricity and water were other necessities for a pack shed.

5.2.1.3 Labour requirements

Labour requirements were said to be dependent on the scale of production. On smaller farms the labour requirements were higher per unit area than on larger farms. It should also be borne in mind that most banana farms were mixed farming operations and therefore precise records on labour requirements for different operations were difficult to obtain. Estimates provided indicated that on a larger farm, one labour unit per hectare per annum was required for primary production and this could increase to one and a half labour units per hectare per annum on smaller farms.

Once they are packed, bananas are sent to a ripening facility as part of the marketing process. Most Municipal fresh produce markets have their own ripening facilities and most retail chain stores also have their own ripening facilities and centrally located logistics depots. Ripening infrastructure is made up of large sealed climate-controlled rooms. Ethylene, a naturally occurring plant auxin, is used in a gaseous form to control ripening, along with the careful management of temperature and humidity.

5.2.1.4 Marketing and prices

Marketing of bananas by producers in southern KZN was found to be either through direct marketing, farm gate sales or through KNBC, a specialised banana marketing company. For larger commercial producers KNBC was the avenue through which most bananas were sold, while for smaller growers, this represented only a small portion of their sales from surplus that could not be sold at the farm gate or through existing market channels. The marketing costs for bananas were found to be substantial and on average accounted for 38% of the gross prices paid by the market for the bananas in the 2009/2010 production year (Table 5.9). Transport also represented a significant marketing cost (13% of gross), particularly when bananas were transported to more distant markets.

Table 5.9 Average price received and marketing costs 2009/2010

Description	Rand	Percentage
Gross received per box	**72.7**	**100.00%**
Marketing costs per box		
Market Dues	3.17	4.36%
Agent Dues	3.5	4.81%
KNBC Dues	1.83	2.52%
Ripening	1.13	1.55%
Transport	9.09	12.50%
Pallets	0.4	0.55%
Loading	0.2	0.28%
Administration	0.01	0.01%
Rebates	-1.35	-1.86%
Containers	9.51	13.08%
Total marketing cost	**27.49**	**37.81%**
Net price to producers per box	**45.21**	**62.19%**

Source: KNBC (2011)

Producers and KNBC indicated that retailers negotiated strongly for lower prices, when compared with municipal markets however there were also costs savings when supplying retailers. Marketing costs such as Market Dues and Agent Dues, which are municipal market costs, were eliminated. Retailers also did their own ripening so this cost was not borne by the producer. These factors were used in the negotiation of prices. A comparison between a retailer and municipal market is provided in Table 5.10. This was part of an exercise to help the Marina small scale growers to understand the commercial value chain. Marina growers received feedback on five boxes of bananas they supplied to be included in a consignment that was sent by a commercial farmer to the Umtata Municipal Market.

In Table 5.10 it can be seen that the gross value per box was higher on the municipal market. These consignments were delivered in June, a period of low supply. Consequently a very good price was obtained on the Municipal market, when compared to gross value received by the commercial farmer from the retailer. However, marketing costs associated with supplying the retailer were only R8.01 (10.17%) compared with R23.55 (29.91%) when marketing through the municipal market. As a result, even though a higher gross price was obtained on the municipal market, the net price received by the grower was a lot lower for produce sold through the municipal market (R56.77 compared with R70.73). This again highlighted the importance for a commercial producer to be producing high quality bananas.

Banana prices were found to be based on supply and demand. Retail buyers used the national municipal market prices as a basis for setting the price of the premium grades. According to KNBC, fewer bananas were going to the municipal markets and, as discussed earlier, only standard grade bananas were usually sent to municipal markets. It was therefore difficult to get a real benchmark value for premium bananas as they were supplied to one of the few retail chains who had great power to negotiate prices. As a result, chain stores were drawing quality bananas from the farm at a *perceived* premium price because there was no other market against which the value of premium bananas could be compared. Retail buyers were taking the better part of the bunch and had stringent quality requirements (such as GlobalGap quality assurance) and also compelled producers to participate in promotions where the supplier supplied bananas at discounted prices. While there were no overt threats made, it was implicitly understood by the producer that they needed to participate in promotions to maintain their market share. These factors showed that the retail buyers yielded the most power in the value chain, which resulted in the margins of the producers being squeezed. As one grower stated "retailers want 'Mercedes' bananas produced from a 'Volkswagen' farm", which captured the sentiment of farmers regarding the price pressures they were faced with.

Table 5.10 Summary of consignments of bananas sent to retail and municipal markets, 2011

	Retailer (PXL)		**Municipal Market (L)**	
Description	**Rand**	**Percentage**	**Rand**	**Percentage**
Gross received per box	**78.75**	**100.00%**	**80.33**	**100.00%**
Marketing costs per box				
Market Dues	0	0.00%	4.02	5.10%
Agent Dues	0	0.00%	4.02	5.10%
KNBC Dues	1.82	2.31%	2.01	2.55%
Ripening	0	0.00%	0.78	0.99%
Transport	5	6.35%	9.62	12.22%
Pallets	0	0.00%	0	0.00%
Loading	0.2	0.25%	0.2	0.25%
Administration	0.01	0.01%	0.01	0.01%
Rebates	0	0.00%	0	0.00%
Containers	0	0.00%	0	0.00%
VAT on marketing costs	0.98	1.25%	2.89	3.67%
Total marketing cost	**8.01**	**10.17%**	**23.55**	**29.91%**
Net price to producers per box	**70.73**	**89.83%**	**56.77**	**72.10%**

Source: KNBC (2011)

5.2.1.5 Costs of production and marketing

According to Campbell (2012), a price of R50-R55 per box and a yield of 20t/ha p.a. was perceived as the break-even margin, depending on the farming operation and the overhead costs (i.e. farm size where economies of scale are a factor and also quality of bananas produced). While a much lower yield (16t/ha p.a.) was considered break-even for dryland bananas, most farmers considered dryland production to be too risky because of the variability of climate and those that were producing under dryland conditions were converting to irrigation or were considering alternative crops, such as macadamia nuts or sugar cane. Managing cash flow was also very important as most of the farmers' banana income was received between December and February and had to be managed carefully to maintain positive cash flow throughout the year.

5.2.1.6 Key actors in the formal banana value chain

Key players in the value chain were:

- Producers – most of the large commercial producers worked cooperatively through a buyer group for purchasing inputs, a study group to keep abreast of new technologies and production methods and were members or shareholders in KNBC.
- KNBC – provided a complete marketing service to many banana growers in southern KZN.
- Transport providers – truck owners provide transport services to get the produce to the market.
- Market Agents – Municipal market agents sold produce from the market floor of fresh produce markets. A 2.5% fee went to the agent and an additional 2.5% went to the market.
- Retail buyers – negotiated prices and volumes required with KNBC.

5.2.1.7 Factors impacting on the commercial banana value chain

Based on the approach of investigating critical forces that affect the alignment of agricultural value chains, this study has considered drivers, enablers, barriers and regulators that operate along the length of the value chain. Another aspect that has also been considered is that of critical success factors (CSFs) associated with each segment of the value chain (Kaplinsky and Morris, 2000).

5.2.1.7.1 Enablers and drivers

Enablers

The commercial value chain was characterised by a number of factors that can be termed as ‘enablers’. In terms of on-farm production and processing (grading and packaging), farmers had access to a range of key inputs, assets and services that supported high productivity levels, namely:

- Knowledge and skills
- Agricultural inputs (especially superior planting material)
- Services (such as laboratory services)
- Transport (for inputs as well as produce)
- Finance (credit)
- Vehicles and machinery.

They also had access to infrastructure and information technology such as:

- Irrigation
- Pack houses
- Ripening facilities
- Computers and internet.

Membership of KNBC was also a key enabler for commercial banana farmers in southern KZN. It facilitated bulk buying of inputs (and good prices) as well as negotiating with potential markets. The branding of bananas also enabled the commercial producers to obtain a consistent share of the local market. Cooperative purchasing of fertilizer and planting stock by the growers, independently of KNBC, reduced costs and was also an important enabling factor.

Drivers

The key driver that affects the commercial value chain was consumer demand for a high quality, blemish-free product. Since KNBC was negotiating with retail outlets and municipal markets on behalf of its members, this was creating a demand on producers to supply bananas.

5.2.1.7.2 Barriers and regulators

Barriers

The factors that were unfavourable for the development of the commercial banana value chain included:

- The demand for a high quality product by consumers
- Standards set by other bodies such as compliance with GlobalGap standards, which was required by retailers and highlights the need for adequate infrastructure
- Price-setting by retailers, which was identified by commercial growers as another factor that negatively impacted on the banana value chain.

Competition from other provinces (Limpopo and Mpumalanga) and countries (Mozambique) when supplying the local market was another factor that could reduce the profitability of the commercial value chain in Southern KZN. The warmer temperatures in these other areas made these producers more competitive, however a significant enabling factor to compensate for this was the proximity of Southern KZN producers to local markets, with reduced transport costs to local markets offsetting the lower levels of production experienced in southern KZN. Climate and disease factors were barriers to export of banana crops from Southern KZN. Another factor that was affecting commercial producers was that of the land restitution process. This affected the extent to which farmers were willing to invest in the land given the uncertainty of the future.

Regulators

Factors that regulated the activities of the players in the value chain, especially the farmers, and which can impact negatively on the value chain include:

- Processes for checking for compliance with international standards such as GlobalGap.
- Retailer requirements such as participation in promotions
- Market standards (GlobalGap)
- Interest rates that determined the extent to which farmers could afford to rely on credit facilities
- Competition from other banana producing regions regulated prices.

5.2.1.7.3 Critical success factors

At each key segment in the commercial banana value chain, the following critical success factors were identified:

Primary production

- Access to technical expertise to allow for good production
- Acceptable yields
- Access to irrigation infrastructure if rainfall is erratic
- Good disease-free genetic plant stock
- Access to inputs (and necessary credit)

- Coordination of producers to maximise purchasing efficiency.

Harvesting, grading and packaging

- Infrastructure and equipment for handling bananas
- Care to prevent bruising of fruit (i.e. well trained and motivated staff)
- Access to technical expertise
- Reliable labour.

Marketing

- Reliable markets
- Consistent quality of product that meets market demands and standards
- Collective selling to negotiate prices with markets
- Branding of product
- Acceptability of prices.

5.2.1.7.4 Barriers to participation of smallholder banana producers

If smallholder farmers from Bizana Municipality were to participate in the value chain that commercial farmers from southern KwaZulu-Natal had established, they would have had to overcome the following barriers:

- The market demand for a consistent supply of quality, blemish-free bananas would have to be met.
    - This might mean a greater investment in production inputs, which would require access to credit.
    - Infrastructure development for production. This would include contours, drainage and roads, and, importantly, irrigation.
    - Infrastructure development to allow for adequate grading and packing of bananas.
    - A greater investment in the crop in order to yield a better quality product (and greater yields to offset the higher production costs), which is likely to require access to superior planting material.
- Collection of boxes of bananas requires that sufficient volumes be available.
    - This would require coordination of the many smallholder growers.
- Effective marketing requires consistent supply and branding so as to be able to negotiate about prices.
    - This would require that smallholders become members of KNBC rather than operating independently.
    - This would also require greater collective behaviour of local producers.

In addition to the above points, it would be critical that smallholder producers had access to technical support in order to improve crop management practices, which would require greater linkages with commercial producers.

5.2.2 Smallholder banana value chains

Smallholder banana value chains were investigated in Ward 23 of the Bizana Local Municipality. The nature of the value chain was investigated through interviews and household visits to understand the activities associated with primary production and marketing of produce. The study revealed that they ranged in scale from <0.1 ha to 1 ha per farmer.

According to the farmers, the reasons for having started growing bananas ranged from meeting needs for home consumption to efforts to generate income. Some had seen bananas as an opportunity to

supplement their income, while others did not want their children to buy something that they could grow. One farmer who was considering growing a range of fruit, received advice from a friend that convinced him to plant bananas: there is year-round production (summer and winter), one can sell suckers for cash and the plants 'live' for a long time before their yield declines. According to the same farmer, most local households started with just a few banana plants that were initially established for home consumption.
The bananas were generally grown under dryland conditions with low levels of external inputs such as fertilizer and chemicals. Smaller farmers generally used their bananas for home use, while those at the other end of the scale mainly produced bananas for the purpose of generating income. Most of the bananas are consumed by the local community, while some also reach consumers further afield when purchased by traders / hawkers that sell their produce in Port Edward or Bizana, as is shown in Figure 5.13.

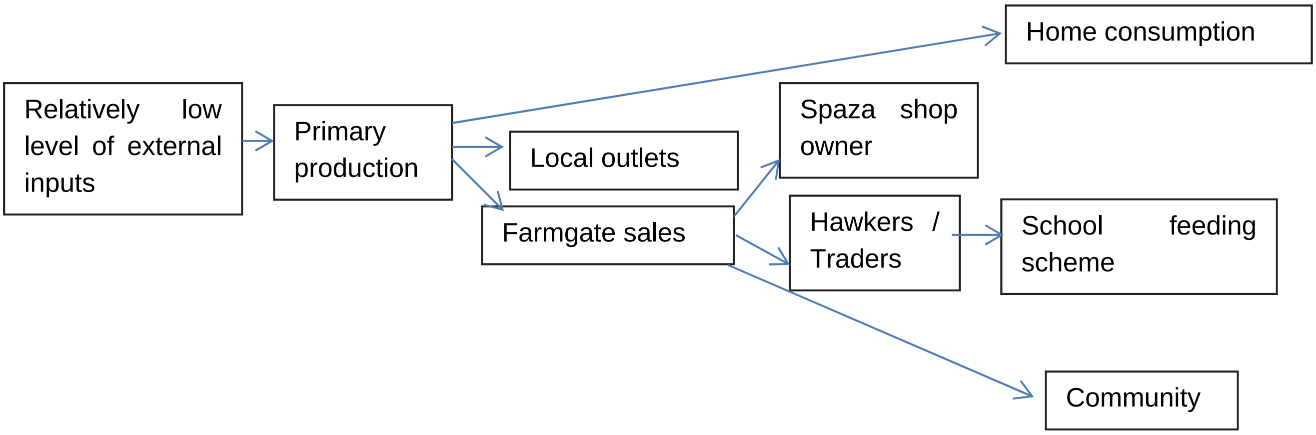

Figure 5.13 The smallholder banana value chain at Marina, Eastern Cape, 2011.

5.2.2.1 Primary production

This is the first phase of production and involves the on-farm production of the banana crop. This has been divided into:

- Land preparation
- Use of inputs (planting material, fertilizer and chemicals).
- Weeding practices
- Water use and conservation.

These have been investigated during establishment of new bananas as well as during maintenance of older stands of bananas.

5.2.2.1.1 Land preparation

Land preparation to allow for the establishment of new banana plantations was discussed. In three cases, the land where the bananas were planted had already been in production (planted to *amadumbe*, maize and sweet potatoes) and was thus not being cultivated for the first time. Six farmers had made use of tractors when establishing the previous crop or the current crop of bananas, while 4 indicated that no machinery had been used and that it had been done by hand. Tractors are generally hired for land preparation (the person with 82 plants, who established the bananas in 2010, paid R120 to prepare a 'small field' where he planted 82 bananas. Other farmers mentioned amounts of R150-R200 for preparation of a 'small field', with the point also being made that prices for land preparation have increased over time (For example a field costing R100 in 1996 would cost R180-R200 in 2011).

In terms of manual land preparation during establishment, this was said to relate mainly to hole digging (all 11 respondents indicated this). Three of the households made use of hired help to dig holes while the remainder dug the holes themselves or with the assistance of family members. Two farmers indicated that they expanded their area of bananas over time, which most likely applies to all the farmers though it was not specifically asked. Price paid for labour ranged from R30 (long ago) to R100/day (Current work). In terms of the efficiency with which holes are dug, figures ranged from 3-10 holes/person/day. Households where family labour was used did not provide a cost for labour.

5.2.2.1.2 Establishment of new plants

Growing out is the procedure of 'nurturing' very small plants before transplanting them into the field. This is generally practiced when very small plants are obtained from nurseries (or tissue culture facilities) as they are not yet strong enough to survive in the field. Since smallholders did not make use of such planting material, they did not need to grow out their plants in a nursery before planting them. One farmer did however indicate that when expanding his field using his own existing plants, he grew them out in nursery bags from 30cm height until 0.5 m, at which point he planted them out.

Normally farmers dug out and planted young suckers directly into the ground when establishing new areas. One of the farmers interviewed did it differently. He waited until the suckers were tall and then he dug them out and cut them as shown in the picture and the shoot that came from the middle of the stem then grew out into a new plant. He said this was faster than planting a young sucker as they had a well-established root system at the time of planting. He said this method was previously used by commercial farmers (Figure 5.14).

Figure 5.14 A smallholder farmer with an area of new bananas (left) and one new plant, 2011 (right).

5.2.2.1.3 Management of mature stand

Many of the farmers allowed a number of stems to develop from each plant. One farmer indicated that while there were always 2-3 young plants that grow next to the one being harvested, he always removed the 'third' one. Farmers indicated that they cut down the stem after harvesting the bunch, and two indicated that they used the old plant material for mulching. ‘Seed’ plants were said to be selected in such a way that they ‘maintained the line’. This meant that the banana plants migrated in a specific direction (generally northwards) as suckers from the same side of all the plants were selected.

Generally smallholder farmers did not use poles to support their bananas as commercial farmers did, though Figure 5.15 shows that this is sometimes practiced. This may be because of the limited use of inputs which did not allow for the production of very big bunches. The practice of leaving a number of productive stems per plant also resulted in plants producing smaller bunches, which meant that the use of supports was not essential. There was, however, evidence that some farmers had encountered storm damage that had resulted in plants being blown over if the fields were established in very exposed locations. With one of the farmers who encountered such problems, the situation may have been exacerbated by the waterlogged soil conditions in his field.

Figure 5.15 A banana plant being propped at the home of a smallholder farmer at Marina, Eastern Cape, 2011.

5.2.2.1.4 Replacement of old plants

Most of the smallholder banana farmers had not been in production for more than 10 years and had not replaced their original plants. Generally they had just been expanding their area of production. One of the larger farmers who had original plants that have been in the ground for 10 years, acknowledged that he was no longer obtaining good yields from the original plants and planned to replace them. He intended to wait until he was able to obtain suckers from the new planting material that was to be donated by the KNBC as part of the research initiative facilitated by INR. At establishment, a key input is the planting material. Most farmers indicated that they bought or were given their initial plants from which they then expanded their area by transplanting young shoots. Seven indicated that they sourced new plants locally from family members of community members, while four indicated that they sourced them from outside (Port Edward and Munster). Where people purchased plants locally, prices ranged from R5-R10 per plant.

5.2.2.1.5 Fertilizer application

In terms of establishment, inorganic fertilizer use was very limited. Only one farmer indicated that she used no form of fertilizer at all at planting while the remainder indicated some form of organic fertilizer. Kraal manure is generally obtained free of charge (often from neighbours). One person indicated that they pay someone to collect the manure (R30/day). Chicken litter was sourced by one farmer from a commercial poultry farm near Port Edward at R12 for a 50 kg feed bag. The farmer had paid R100 for delivery of the load of 30 bags to his house at Seaview.

Table 5.11 Types of fertilizer used by banana farmers at Marina, Eastern Cape at planting (n=11), 2011

Type of fertilizer	Amount applied per hole at planting	Number and category of farmer
Nothing	-	Small (1)
Kraal manure	2 litres 2 litres 10 litres Half wheelbarrow 1 wheelbarrow	Micro (5)
Mixture of grass and kraal manure	1 litre 10 litres – half a wheelbarrow	Micro (2)
Mixture of grass and kraal manure Urea	20 litres 750 mm/plant applied 3 months after planting	Medium (1)
Mixture of grass and chicken litter	Half a wheelbarrow	Medium (1)
Mixture of grass and chicken litter/goat manure Lime	1 litre Spread over whole field at and then 500 ml/plant	Small (1)

Enquiries were also made regarding the use of fertilizer post-establishment. This is where there was some usage of inorganic fertilizer. Of the 11 farmers interviewed, 6 had made use of some form of inorganic fertilizer or soil amelioration agent (See Table 5.12 below for detail).

Table 5.12 Summary of post-establishment fertilizer usage at Marina, Eastern Cape, (n=11), 2011

Fertilizer type	Producer category	Time of application	Amount applied
LAN	Micro	Every 3 months	1 cup / plant
LAN	Micro	September/October	1-2 handfuls/plant
4:1:12	Small	Used previously October-February	1 cup/plant
2:3:2 (22)	Micro	During the growth period	1 handful/plant
Chicken litter	Medium	Annually	5 litres/plant

Note: The last row is non-chemical fertilizer use.

There appeared to be more use of chemical fertilizers by the micro-scale producers, which is probably an indication that it was seen as too costly to apply to larger fields. One of the larger farmers did, however, purchase chicken litter. The limited use of fertilizer was probably responsible for the farmers not needing to use props to support bunches.

5.2.2.1.6 Pest and disease management

The use of agro-chemicals was also investigated. This included both herbicides and insecticides. Chemicals used by smallholder farmers were mainly herbicides, with very little use of insecticides. Only one farmer indicated that he was using chemicals to control insects and referred to the use of livestock dip and DDT (*Note: this was not confirmed as the products were not on hand*). Six farmers indicated that they made use of herbicides (See Table 5.13 below). Herbicides used included Round-up, Springbok and Mamba. One farmer (categorised as a 'micro' producer) provided some detail regarding usage of Springbok, saying that the herbicide is applied in September when weed growth is strong and is then repeated in March. Chemicals are generally purchased from Coastal Farmers at Port Edward.

Table 5.13 Summary of herbicide use at Marina, Eastern Cape (n=11), 2011

Herbicide type	Producer category	Application
Unknown product	Small	Two weeks before planting and then later on the existing field.
Springbok	Micro	300 ml/20 l This was said to be enough to spray the whole garden at establishment. She also used chemicals on existing field.
Springbok	Small	100 ml/10 l Two weeks before planting. For existing fields, he also applied Springbok, using a 5 litre mix to spray approximately 100 mx100 m. He emphasised that it had to be sunny and dry to apply the chemical.
Roundup	Medium	200 ml/25 l during establishment No chemical use on existing fields – weeding was done manually.
Roundup	Medium	200 ml/20 l during establishment and for existing field
Mamba & Springbok	Micro	Spraying the existing field

When asked what pests affect bananas, farmers mentioned slugs, 'brown fly' and '*inyoka*', which is an organism that leaves snake-like tunnels in the soil and also affects sweet potatoes and cabbages, targeting plant roots.

5.2.2.1.7 Manual weeding practices

Besides the use of herbicides discussed above, there was also a large amount of manual weed control taking place. According to the interviews, 4 farmers only used herbicides, 2 indicated that they used a combination of herbicides and hand weeding (and both make use of hired help) and 4 said that they only used hand weeding practices (*Note that one farmer provided no information and appeared not to practice weed control*). One farmer indicated that he used herbicide to control weeds because hand hoes caused damage to the roots. Weeding practices are summarised in Table 5.14 below.

Table 5.14 Summary of weeding practices at Marina, Eastern Cape, (n=11), 2011

Weeding practices	Number and category of farmers
Hand weeding only	4 Micro
Chemical use only	2 Micro 2 Small
Combination of hand weeding and chemical use	2 Medium
No mention of weeding	1 Micro

According to the interviewees, and illustrated in Figure 5.16 many farmers leave the weeds in the field to act as mulch that breaks down to supply soil nutrients.

Figure 5.16 Weeding is practiced and the weeds are used for mulching at Marina, Eastern Cape, 2011.

5.2.2.1.8 Water use and conservation

Irrigation of bananas was only undertaken by 3 of the farmers interviewed (these were all categorised as micro scale producers with very few plants). Of these, one irrigated at planting and only when it was very dry, while the other two only irrigated in winter. They drew water from a stream or river and applied it using a bucket (10 litres/plant). One of these two farmers had wells dug in the garden that were used for irrigating. The small and medium scale farmers depended on rainfall and did not even apply water at planting. One farmer indicated that he waited for rain before planting and the other indicated that his field actually had a waterlogging problem and thus there was no need to irrigate.

Figure 5.17 A water well to hold water – water just seeped into the well (left) and drainage furrows in a waterlogged field, 2011 (right).

All eleven households made use of mulching practice. For example, one of the more advanced smallholder farmers added grass in the planting holes at planting and piled the soil in half-moons to serve as a small catchment for rainwater. Mulching practices allowed for water conservation measures although it might have been practiced for different reasons such as preventing soil erosion, improving soil fertility, etc. Mulching was done with grass and/or banana leaves. Some farmers indicated that this was also to provide a source of compost.

The retention of piles of leaves and weeds, while providing mulching, was mainly done to provide material for fertilizing new planting holes and was new in terms of a water conservation practice, which was seen as a secondary benefit. Mulching was itself a fairly new practice in the area but Figure 5.18 illustrates a number of practices that were encountered during the study. Previously people threw away weeds but they had started to retain them in their gardens after removing or spraying them. They also added grass and freshly harvested stems. When the material had broken down they used it to fertilize the soil. The use of mulch for water conservation was a practice that has been transferred between farmers.

Two farmers indicated that not only banana leaves but also plants from which bunches had been harvested, had been chopped down and left in the field. Mulching was generally undertaken by the farmer, but two mentioned that they used hired help for this task. One of the medium sized farmers with an area of approximately 1 hectare, indicated that it took about two weeks to mulch and undertake maintenance on his whole field. He generally did the mulching himself to ensure that it was done as he wished, though he did sometimes use the people that he employed to weed his field.

Figure 5.18 A variety of mulching practices encountered during the study, 2011.

Other forms of water harvesting that were mentioned included: creating furrows to slow down and capture water that flows across the field (this was mentioned by 2 farmers). One farmer, Mrs Madikizela, felt that the furrows were not effective as the furrows did not appear to hold the water and she blamed it on moles opening holes. It is suggested by the authors that the water was simply infiltrating the soil. There was some evidence of water harvesting off roofs at some homesteads. The household pictured below used such water mainly for domestic purposes as this house had plenty of water in the soil (due to subsurface rocks) and did not need to irrigate its bananas.

Figure 5.19 Furrow for water collection and storage (left) and tanks for roof harvesting (right), 2011.

5.2.2.2 Harvesting, grading and processing

For the smallholders, no grading or processing took place, so this section only covers the harvesting procedures undertaken. Bananas were harvested at 12 month intervals from a particular plant. According to two farmers, if a bunch was harvested in a certain month one year, then it was expected that the next bunch would be harvested in the same month the following year. One of the more successful smallholders suggested that it was a bad idea to plant in winter otherwise the bananas produced bunches in winter and this meant that they produced smaller bunches. He was not aware that commercial farmers harvested after 14-16 months.

The smallholder farmers interviewed had no infrastructure specifically used for harvesting and grading bananas. They did have plastic or wooden boxes that were used for harvesting and storing bananas. The farmers did not make use of any chemicals for prolonging the lifespan of the harvested bananas. They also did not make use of cardboard boxes and only used plastic / wooden boxes (costs mentioned were R80 for plastic and R50 for wooden boxes – obtained from Southbroom or Port

Edward) to facilitate transactions – with bulk buyers having their own boxes. One of the larger farmers (with 2000 plants) indicated that he owned 100 boxes. Another farmer indicated that the boxes were only used for storing bananas and tracking the volume of bananas harvested. Farmers making use of boxes included one small (100 plants), as well as the three large growers. The volumes harvested are summarised in Table 5.15 below for the eleven farmers interviewed.

Table 5.15 Summary of volumes harvested in 2009, 2010 and 2011 at Marina, Eastern Cape

Scale of production	2009	2010	2011 (Jan-August)
Micro	No info available	>30 plants	None yet
Micro	No info available	>38 plants (>19 boxes)	>8 plants
Small	No info available	60	100 bunches
Micro	No info available	40-50 plants (20 boxes)	No info available
Micro	No info available	7 (drought blamed for reduced yield)	14
Micro	>50 plants	About 50 plants	No info available
Micro	5 or 6 plants	6 plants	No info available
Micro	Has not harvested yet		
Medium	120 boxes @ R30/box	480 boxes @ R40/box	No info available
Small	260-280 plants	240 plants	No info available
Medium	100 boxes @ R30/box	250 boxes @ R40/box	30 bunches

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Note: The number of bunches per box varied depending on the size of the individual bananas as well as the overall bunch, but generally varied between 2 and 4 bunches per box.

5.2.2.3 Labour requirements

Labour requirements along the value chain were explored.

5.2.2.3.1 Crop establishment and maintenance

At planting, when digging holes, only 3 farmers (1 micro, 1 small and 1 medium) had made use of hired help, with most farmers doing it themselves, with assistance from other family members. For those hiring assistance, daily rates varied from R30-R100/day/person. Farmers did not quantify the cost of labour where it was provided by a family member. There was reference to a single person digging 6-10 holes/day, while a family was said to be able to dig 50 holes/day. Labour requirements post establishment were associated with application of chemicals (herbicides), manual weed control and manual irrigation.

In terms of on-going maintenance and weed control of the banana fields, herbicide application was generally done by the farmers themselves, together with their families, with time spent spraying being highly variable. Three (3) households indicated that they controlled weeds manually using family labour, while 3 (1 Small, 2 Medium) said that they made use of hired help. They indicated that they hired two to four people at a time. The amount of time spent in managing the fields was not recorded and farmers found it difficult to quantify.

5.2.2.3.2 Packaging and grading

For the smallholder farmers, there was very limited grading and packaging taking place. Most (7) indicated that there was none taking place. Three indicated that the family undertook these tasks and generally this was limited to packing the bananas into storage boxes. One person indicated that the family also graded when packing into boxes. One of the large producers indicated that he hired someone to assist with packing boxes.

5.2.2.4 Marketing and prices

The eleven farmers interviewed were asked whether they sold any bananas and if so, what proportion of their crop (or volume) they sold and how much they consumed. Table 5.16 below shows that besides the one household that had not yet started harvesting bananas, 9 out of 10 farmers marketed a portion of their crop. Seven (7) of them sold more than 75% of their crop while 1 indicated that they sold half. Excluding three farmers that were not marketing bananas, the markets that smallholder producers supply could be summarised as follows: farm gate sales to the local community (6), local outlets (2), hawkers and spaza shop owners (3), and school feeding schemes (2). Most farmers had a range of different market outlets that they supplied except one that only sold directly from the homestead.

All households consumed a portion of their crop, although for the larger producers this was limited to rejects (i.e. bruised bananas). In addition, it was fairly common to give away a portion of the crop. Excluding the one household that had not yet harvested, 8 indicated that they had given away a portion of their crop, though this was generally less than 25% of the crop. Wastage was discussed. Five (5) farmers indicated that they had no wastage of bananas, while 5 said that they had minimal amounts of wastage. One of those indicating minimal wastage, added that such bananas were fed to pigs.

Table 5.16 Summary of markets and proportion of crop marketed, consumed, given away and wasted at Marina, Eastern Cape, n=11, 2011

Scale	Sell how much?	Market outlets	Consume how much?	Give away how much?	Waste how much?
Micro	>three-quarters	• Sold at local football matches • People came to buy at home	Minimal	Minimal	Minimal
Micro	0	N/A	Half	half	None
Small	Half	• Sold to community (farm gate style)	¼	<1/4	Minimal – feed pigs
Micro	18 out of 20 cases	• Sold to community (farm gate style) • Wife sold on road-side	1 case	1 case	None
Micro	0	N/A	More than half	About 4 cases	None
Micro	45 bunches	• Sold to community (either they come to house or he goes to sell) • Sold to school children	3-4 bunches	1-2 bunches	Very small amounts
Micro	>half	• Sold to neighbours • Sold to school children	1 bunch	1 bunch	Very small amounts
Micro	Have not yet harvested a crop				
Medium	40 boxes/month	• Two local schools bought for their feeding scheme (5 boxes/week) • Sold to women that sell on the roadside • Sold to a spaza shop owner (not regular)	Only rejects (small and bruised bananas)	None	None
Small	220 bunches	• Sold to community (farm gate style) • Sold to hawkers from Bizana and Port Edward	20 bunches (rejects)	None	None
Medium	225 cases	• Sold to community • Sold to Marina school • Sold to a hawker	10 cases	10 cases	5 cases

Some farmers sold individual bananas and price depended on size (30-40 cents each for smaller bananas and 50c each for bigger ones). Hawkers were said to buy bananas individually for 25 cents (small) – 35 cents (big) and then sell them for R1 each, allowing for a profit. Some farmers sold 3 bananas for R1, while another said that a good, blemish free banana sold for immediate local consumption could fetch R2. Some said that they set prices according to the 'norm', or by what other people were charging for their bananas ("just like you compare the different prices when you go shopping". Prices from Port Edward hawkers were used by one farmer to set prices. One farmer said that he was selling for R40/box while others were selling at R50/box and that the other growers did not like this. Four farmers mentioned prices per box, rather than for individual bananas. Prices/box ranged from R35-R50. One farmer said that some buyers asked for discounts when buying in bulk and this was said to 'kill you as a farmer'.

There were differing opinions about the incidence of price fluctuations. Five said that prices did not fluctuate (some mentioning seasons, months and some even saying that prices had not changed from year to year). One person said that prices were better in summer than in winter because the bananas were fuller (R40 versus R30 per box), while another said that hawkers paid more in winter than in summer because there was a shortage of bananas in Port Edward.

Customers were said to consider the ripeness, size and presence of blemishes of the bananas. In terms of ripeness, people buying to eat immediately were said to want ripe bananas, while other customers preferred green bananas, especially if they were hawkers that planned to store them. Some customers avoided blemishes and would complain about the price if the bananas did not look good. Customers avoided rotten bananas. One farmer said that customers were more worried about price than quality and this was why they often asked for discounts when buying a number of boxes.

5.2.2.4.1 Marketing to hawkers and traders

For the purpose of this study, telephonic interviews were conducted with three hawkers that sourced bananas from smallholder farmers that participated in the interviews. The outcomes of the interviews are summarised below. Two of the interviewees can be termed hawkers as they were selling bananas directly to consumers, while the third supplied the Vulindlela Primary School feeding scheme. None of the hawkers / traders relied solely on smallholder farmers for the supply of bananas. The trader only bought from one smallholder farmer, whom he saw as reliable, and when this farmer was not able to supply, then the trader purchased from a fruit and vegetable shop in Trafalgar, Margate, saying that Port Edward and Bizana were too expensive.

The trader supplying the school feeding scheme required 5-6 boxes every Monday. There are 700 children at the school and they each received 2 bananas per day. The two hawkers said that the boxes that they bought lasted 3 days and 7 days respectively. They sold at pension pay points and directly to children at schools and people passing by. One of the hawkers also sold some bananas at his spaza shop. The two hawkers sold bananas on Monday-Friday and Monday-Saturday respectively.

Both hawkers indicated that sales had declined since the year before, and some hawkers were said to have actually stopped selling bananas because of this (the woman interviewed gave the following reason for continuing, “I do not have a husband and if I stop my children will starve”). Hawkers had some wastage due to slow sales, with one indicating that they had to eat over-ripe bananas themselves when they were no longer suitable for selling. Sales were said to be better at the end of the month and during pension days (up to 3 boxes/week at these times).

When buying bananas locally, hawkers and traders indicated that they paid R40-R45 per box. This was an increase from the R30 per box paid in 2006-2008. On occasions where bananas had to be sourced elsewhere (normally in winter), prices ranged from R40-R50 for cases from Port Edward, while Indian traders sold cases transported to Bizana at R60 each. Hawkers sometimes placed orders for bananas from a commercial farm in Port Edward (Royce’s). Boxes cost R40-R50 each and were delivered on Mondays, Wednesdays and Fridays, on their way to Bizana. Royce also sold boxes of loose bananas for R60 each. When selling, bananas were sold individually for 50 cents each, R1 for three small ones or R5 for five or six bananas. Profits of R20-R35 per box were made, but hawkers often did not keep proper records so these were estimates. Profit margins were lower for the bananas from Royce’s, possibly due to the transport cost.

Quality requirements for bananas were said to depend on the consumer and the mode of sale. The bananas supplied to schools had to be ripe and ready to eat immediately. In winter, the trader bought them earlier (the previous Thursday) to ensure that they had time to ripen before he delivered them to school. One of the hawkers indicated that he bought a mixed box of green and ripe bananas to ensure that he could start selling immediately.

Two of the people interviewed had access to their own transport. One hawker indicated that he combined collection of bananas with collection of other items from Port Edward. The second hawker bought locally (or ordered from Royce's, which were delivered locally) and was able to transport her bananas on her head, travelling on foot. Traders/hawkers had access to their own cases for carrying and storing bananas. The hawkers both sold for themselves and did not employ people to sell on their behalf.

5.2.2.4.2 Marketing challenges

Challenges were mentioned by six farmers during the interviews and are summarised below:

- The low prices paid for bananas, which did not allow you to buy even your household essentials (1)
- Insufficient customers, which leads to wastage (1)
- Lack of boxes prevents her selling in this way (1)
- The market is not guaranteed and it depends on whether people want to buy or not – unlike selling at a market where your income is guaranteed (1 large producer)
- Prices are influenced by prices in Port Edward (1)
- Theft is a big challenge since her husband passed away (1).

5.2.2.5 Key players in the smallholder banana value chain

In the smallholder value chain, the only stakeholders that play any sort of role were:

- The local farmers / banana producers – who shared planting material, knowledge, etc.
- The local community – who provided a convenient market for bananas
- Commercial banana farmers – they were competitors currently, but were also a source of information and technical support
- Lima Rural Development Foundation – provided agricultural support to farmers
- Eastern Cape Department of Agriculture extension officers – provided some technical support.
- Bizana Local Municipality and OR Tambo District Municipality – potential support
- Hawkers and traders – important market outlet for larger producers.

Until the current WRC project, there had been no involvement of the KNBC or any private sector players (no markets and no market agents involved). With the project, there had already been a level of sharing of information about production and marketing information.

5.2.2.6 Factors impacting on the smallholder banana value chain

As with the commercial value chain, this section considers factors that impact on the smallholder banana value chain as well as critical success factors.

5.2.2.6.1 Drivers and enablers

Factors that have impacted positively on the smallholder value chain and which have led to other farmers deciding to engage in banana production include the following:

- Cell phone communication, which facilitated market access

- Access to adequate amounts of chicken litter that could be used instead of inorganic fertilizers to reduce input costs
- Access to ‘free’ land allocated to households by the local traditional authority
- The establishment of the Vela Langa Farmers” Association and the Banana Commodity Group allowed for targeted support and sharing of information
- Less stringent quality requirements of local consumers
- Markets provided by the local community as well as hawkers and traders that provided access to consumers outside of the immediate area
- Support provided by Lima and Eastern Cape Department of Agriculture
- Government programmes such as the school feeding schemes created demand.

5.2.2.6.2 Barriers and regulators

Factors that impacted negatively on the smallholder value chain and reduced the potential profitability of smallholder enterprises include:

- Lack of access to planting material that was disease resistant
- Heavy transport costs for inputs due to individual buying behaviour and reliance on public transport
- Lack of technical knowledge about commercial farming techniques
- Lack of access to credit
- Lack of access to infrastructure for irrigation as well as grading and packing
- Direct competition from commercial farmers that were also supplying hawkers and traders
- Prices are set by hawkers based on prices they could negotiate elsewhere.

5.2.2.6.3 Critical success factors

In terms of the current smallholder value chain, factors associated with the two key segments that were critical for its success include:

Primary production

- Adequate rainfall and mulching is critical to ensure that satisfactory production in terms of yield and quality is obtained
- Access to adequate amounts of organic fertilizer and other material is essential to support the low external input system
- Availability of family labour and ‘cheap’ local labour is essential otherwise less labour intensive crop management practices must be used

Marketing

- The production levels cannot increase through growth of current growers or introduction of new growers as the local market appears to be saturated
- Hawkers and traders, who also have access to commercial farmers, will only continue to purchase from the smallholders if they remain competitive in terms of price and quality
- Success relies on strong relationships with hawkers, traders and local community
- Effective communication channels between producers and customers are essential and are currently provided by cell phones
- The demand by local communities for bananas remains a CSF and increased local production by households for home consumption would reduce demand to purchase.

5.2.3 Comparison of commercial and smallholder value chains

5.2.3.1 Structure and complexity of the value chain

The first step in comparing the commercial with smallholder banana value chains is to consider the complexity of the two value chains in terms of the number of segments. In the case of the commercial value chain, on-farm activities included grading and packing, which required substantial infrastructural development at the farm level.

If one moves back along the value chain to inputs, it is clear that these two groups of farmers had divergent ranges of inputs. The most obvious difference is the access to irrigation that characterised most commercial farmers in southern KZN. In addition, commercial farmers made use of inputs such as props and bunch bags that allowed them to produce a better quality product. They were also characterised by a much higher reliance on agro-chemicals and fertilizer. Smallholder farmers were far more reliant on organic sources of manure for soil improvement and while they made use of herbicides, there was very little use of insecticides. The commercial farmers made use of superior genetic plant stock that was also more disease-resistant than the ‘old’ recycled planting material that was generally used by smallholders.

The commercial farmers had a wider range of marketing options. They could either market via KNBC, which negotiated with retailers and/or municipal markets on their behalf, or they could supply directly to these markets since they generally had access to transport and had sufficient volumes to justify this cost. In addition, commercial farmers could also supply to traders and hawkers or sell a portion of their crop at the roadside to passers-by (farm-gate sales). The farm-gate sales competed directly with the larger smallholder producers. The smallholder farmers’ bananas were mainly consumed locally except for that portion of the crop that was sold to consumers in Bizana and Port Edward by hawkers / traders.

5.2.3.2 Profitability of the different production systems

An attempt was made to compare the potential profitability of the commercial system with the low input system. The low input system was based largely on the enterprise of one of the largest of the smallholder producers. Two commercial systems were also compared, namely dryland and irrigated production. These are based on gross margins provided by KZN DoA’s COMBUD publication.

The establishment costs for banana production were found to be high because of a combination of land preparation, plant material, agro-chemicals and labour. These costs were offset in subsequent harvests as they could not be recouped in year 1. In the case of smallholder farmers, establishment was a gradual, progressive process, while commercial farmers would establish their new areas in a very short period of time. Smallholders avoided the substantial costs associated with establishment by expanding their fields as time and budget permitted. Table 5.17 below provides an indication of the relative costs of the three systems (smallholder dryland, commercial dryland and commercial irrigated). Smallholder systems were substantially less costly to establish than either of the commercial systems (R30 971 versus R51 202 for dryland and R55 282 for irrigated).

If one considers the post-establishment phase presented in Table 5.18, then it is clear that while the yields were substantially lower (approximately 9,7 tons versus 20 tons), the costs were also substantially lower than commercial dryland production (R10 225 versus R49 177). A comparison of commercial dryland versus commercial irrigated production also yielded interesting information. Irrigation increases yields substantially (30 tons versus 20 tons), but the costs increased from R49 177 to R66 954 and the gross margin increased from R14 823/ha to R29,045/ha.

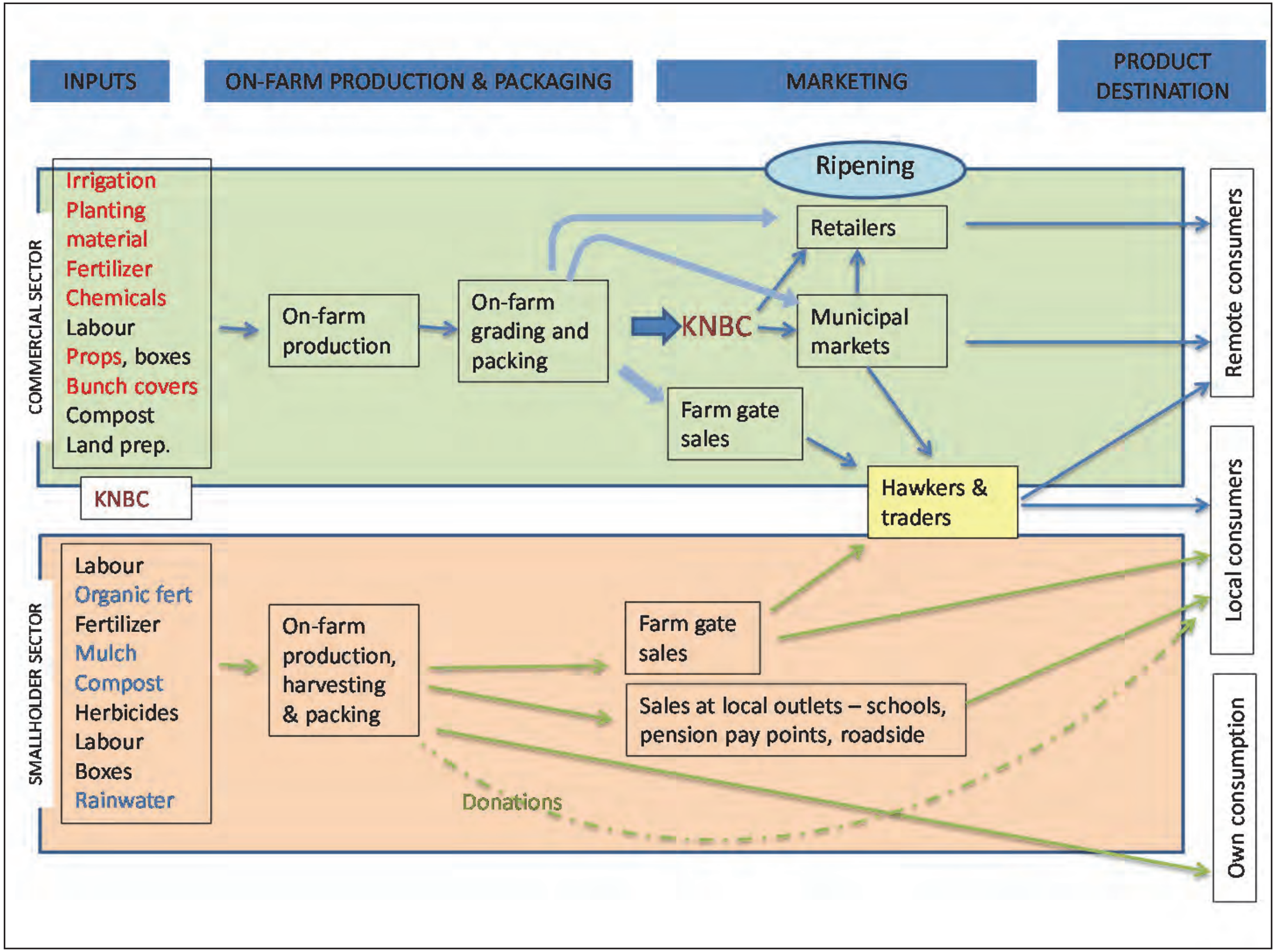

Figure 5.20 Comparison of the commercial and smallholder banana value chains. The inputs depicted in red and blue indicate differences between them.

Table 5.17 Summary of establishment costs for smallholders, commercial dryland and commercial irrigated production

SMALLHOLDER ESTABLISHMENT COSTS - MEDIUM SCALE			
Pre-harvest costs	**Price/unit**	**Unit**	**Rands**
		sucker	
Planting material	5	2500	12 500.00
		plants	
		hole	
Organic fertilizer	2.5	2200	5 500.00
		litre	
Herbicides	44.42	2.5	111.05
		holes	
Labour - holes	3.00	2500	7 500.00
		days	
Labour - weeding	30	112	3 360.00
		hectare	
Land preparation (tractor hire)	2000	1	2 000.00
TOTAL ALLOCATABLE COST PER HECTARE			**30 971.05**

DRYLANDS - ESTABLISHMENT COSTS			
Pre-harvest costs	**Price/unit**	**Unit**	**Rands**
		sucker	
Planting material	7.3	2222	16 220.60
		ton	
Fertilizer	7200	1	7 200.00
		ton	
Lime and manure	700	2	1 400.00
		metre	
Waterways	4	232	928.00
		plants	
Poles & bags	1.74	2222	3 872.00
		litre	
Herbicides	44.42	2.5	111.05
		hectare	
Pesticides	3600	1	3 600.00
		days	
Labour	70	237	16 590.00
		litres	
Fuel	8	100	800.00
Repairs			480.00
TOTAL ALLOCATABLE COST PER HECTARE			**51 201.65**

IRRIGATED - ESTABLISHMENT COSTS			
Pre-harvest costs	**Price/unit**	**Unit**	**Rands**
		sucker	
Planting material	7.3	2222	16 220.60
		ton	
Fertilizer	7200	1	7 200.00
		ton	
Lime and manure	700	2	1 400.00
		metre	
Waterways	4	232	928.00
		plants	
Poles & bags	1.74	2222	3 872.00
		litre	
Herbicides	44.42	2.5	111.05
		hectare	
Pesticides	3600	1	3 600.00
		days	
Labour	70	237	16 590.00
		litres	
Fuel	8	100	800.00
Repairs			480.00
		mm	
Irrigation	4.25	960	4 080.00
TOTAL ALLOCATABLE COST PER HECTARE			**55 281.65**

Note: This does not include the cost of establishing infrastructure which can be estimated at approximately R40,000 per hectare.

The cost of banana establishment is lower for the smallholder farmer mainly because he is paying labour rates that are lower than the minimum wage. If one increases the rate to that which the commercial farmers are paying, then the cost of establishment does not vary substantially.

The smallholder option shows a price of R5/plant as the cost of planting material. While some farmers have purchased suckers from their neighbours at this cost, many just take suckers off their own plants and thus would not incur this cost, which would reduce the establishment cost to R18,471.

It was assumed that a smallholder farmer would establish an entire hectare at one time. In reality this is not the case, but this assumption has been made to allow for a direct comparison between commercial and smallholder farmers.

Table 5.18 Summary of post-establishment costs for smallholder production versus commercial dryland and commercial irrigated production

SMALLHOLDER POST ESTABLISHMENT COSTS - MEDIUM SCALE			
	Price/unit	Unit	Rands
		box	
Income	40	488	19 512.20
Pre-harvest costs			
			-
		plants	
Manure	2.5	2500	6 250.00
		hectare	
Herbicides	232	1	232.00
			-
			-
		days	
Casual labour (2 pplx7 daysx4)	30	56	1 680.00
Post-harvest costs		days	
Family labour	30	48.78	1 463.41
		boxes	
Banana boxes	12	50	600.00
Marketing commission			
Transport contract			-
INDIRECTLY ALLOCATABLE COSTS			
			-
			-
			-
TOTAL COSTS			**10 225.41**
GROSS MARGIN ABOVE TOTAL ALLOCATABLE COSTS			**9 286.78**

BANANAS DRYLAND - POST ESTABLISHMENT			
	Price/unit	Unit	Rands
		box	
Income	56	1 143	64 000.00
Pre-harvest costs		plant	
Fertilizer	3.20	2222	7 100.00
		hectare	
Lime & manure	700	1	700.00
		hectare	
Herbicides	232	1	232.00
Pesticides	138	1	138.00
		hectare	
Maintenance (poles & bags)	3783	1	3 783.00
		days	
Casual labour	70	89	6 230.00
			18 183.00
Post-harvest costs		days	
Casual labour	70	48	3 360.00
		boxes	
Banana boxes	12	1 143	13 714.29
Marketing commission	12.50%		8 000.00
		ton	
Transport contract	200	20	4 000.00
			29 074.29
INDIRECTLY ALLOCATABLE COSTS			
Fuel	8	150	1 200.00
Repairs	720	1	720.00
Total			**1 920.00**
TOTAL COSTS			**49 177.29**
GROSS MARGIN ABOVE TOTAL ALLOCATABLE COSTS			**14 822.71**

BANANAS IRRIGATED - POST ESTABLISHMENT			
	Price/unit	Unit	Rands
		box	
Income	56	1 714	96 000.00
Pre-harvest costs		plant	
Fertilizer	3.20	2222	7 100.00
		hectare	
Lime & manure	700	1	700.00
		hectare	
Herbicides	232	1	232.00
Pesticides	138	1	138.00
		hectare	
Maintenance (poles & bags)	3783	1	3 783.00
		days	
Casual labour	70	97	6 790.00
		mm	
Irrigation	4.25	960	4 080.00
			22 823.00
Post-harvest costs		days	
Casual labour	70	52	3 640.00
		boxes	
Banana boxes	12	1 714	20 571.43
Marketing commission	12.50%		12 000.00
		ton	
Transport contract	200	30	6 000.00
			42 211.43
INDIRECTLY ALLOCATABLE COSTS			
Fuel	8	150	1 200.00
Repairs	720	1	720.00
Total			**1 920.00**
TOTAL COSTS			**66 954.43**
GROSS MARGIN ABOVE TOTAL ALLOCATABLE COSTS			**29 045.57**

In addition to considering the overall profitability of the different enterprises, Table 5.19 also compares the net prices received by smallholders versus commercial farmers selling via KNBC. It is clear that while the gross price paid to commercial farmers exceeded the smallholder price substantially, the net price was fairly similar. Smallholder farmers anticipated receiving much greater prices if they supplied to the Municipal Markets and it becomes clear that this may not, in fact, be the case.

Table 5.19 Comparison of prices received for bananas by commercial producers and smallholder farmers

Commercial producers		**Smallholder producers**	
Description	**Rand**	**Description**	**Rand**
Gross received per box	**72.7**	**Gross received per box**	**40.00**
Marketing costs per box			
Market Dues	3.17		
Agent Dues	3.5		
KNBC Dues	1.83		
Ripening	1.13		
Transport	9.09		
Pallets	0.4		
Loading	0.2		
Administration	0.01		
Rebates	-1.35		
Containers	9.51		
Total marketing cost	**27.49**		
Net price per box	**45.21**	**Net price per box**	**40.00**

5.3 VALUE CHAINS AT MOOI RIVER IRRIGATION SCHEME, KWAZULU-NATAL

A more in-depth study was undertaken at MRIS because it formed part of a PhD study. The initial preliminary survey was followed up by a large household survey of 307 respondents and a more detailed study of the potato value chain was undertaken in 2013.

5.3.1 Irrigated production at MRIS

Farmers at MRIS were found to produce a variety of crops at the scheme to meet their household needs. They produced crops under irrigation for marketing and household purposes, growing a combination of grain and vegetable crops. Maize was the most dominant grain crop while cabbage, tomatoes, potatoes, beans, spinach and garlic were the commonly grown vegetable crops in the scheme (Table 5.20).

Table 5.20 Relative importance of crops grown by farmers in MRIS, KwaZulu-Natal, 2013

Crop	Percentage of people who grow the crop
Maize	95.8
Cabbage	32.4
Tomatoes	25.4
Potatoes	16.0
Beans	11.0
Other vegetables (spinach, garlic, onions etc.)	12.0

The preliminary value chain analysis focused on three commodities, namely maize, cabbage and tomatoes, which were the dominant crops grown in MRIS. Maize was selected as the major staple crop grown in the scheme. Maize was mainly produced as a commercial crop since farmers sold the crop as *green mealies*. The bulk of the vegetables produced in MRIS were marketed for income generation purposes, with a small fraction consumed at household level. Subsequently, the potato value chain was also investigated, and is documented separately.

5.3.1.1 Maize

5.3.1.1.1 Crop inputs

Irrigation farmers in MRIS utilised commercial inputs such as fertilizers, hybrid seeds, pesticides and herbicides. The input market had several players that included RTS Trading, LandMark (Trading as TWK Agriculture Ltd), Mike's Agri Trading.cc., Farmers Agri-Care (Pty) Ltd and Sunshine Seedlings. The inputs were almost entirely sourced from Greytown because of the proximity of the town to the local producers, and the opportunity for price comparisons. In comparison, Tugela Ferry, which is about 30 km from the scheme, had only one main input trader. Farmers claimed that the shop was expensive compared to suppliers in Greytown, hence they used it less frequently.

Public transport cost to Greytown and Tugela Ferry were almost the same, at R24 and R20 for a one way trip respectively. Farmers sometimes, but very infrequently, hired *bakkies* (light delivery vehicles) for transportation of inputs. The research has established that input requirements for a 0.1 ha plot, which farmers refer to as a "bed", could be transported in public taxies. For instance, a "bed" required 2 kg of maize seed, 25 kg of basal fertilizer and 25 kg top-dressing fertilisers. A 25 kg bag was charged R24 on public transport, hence farmers used this option instead of hiring private bakkies for input transportation. Some farmers also utilised hired pick-up trucks to transport their produce into Greytown, and inputs on their return trip. By so doing, farmers paid the R300-R400/trip to reach the market but did not pay for transporting inputs back to the scheme because the fee included a return trip with unsold produce.

5.3.1.1.2 Financial implications

Figure 5.21 presents a summary of irrigated maize production costs at MRIS. The respective proportions were calculated based on the gross margin budget for the farmers (Appendix 2).The gross margin made certain assumptions so that approximate costs could be calculated. Firstly, family labour was calculated using a rate of R30/day, which was equivalent to the higher rates paid in the scheme. Secondly, transport cost was based on hire rates instead of fuel costs, even for those with their own transport. These same assumptions have been applied to both the cabbage and tomato gross margin calculations.

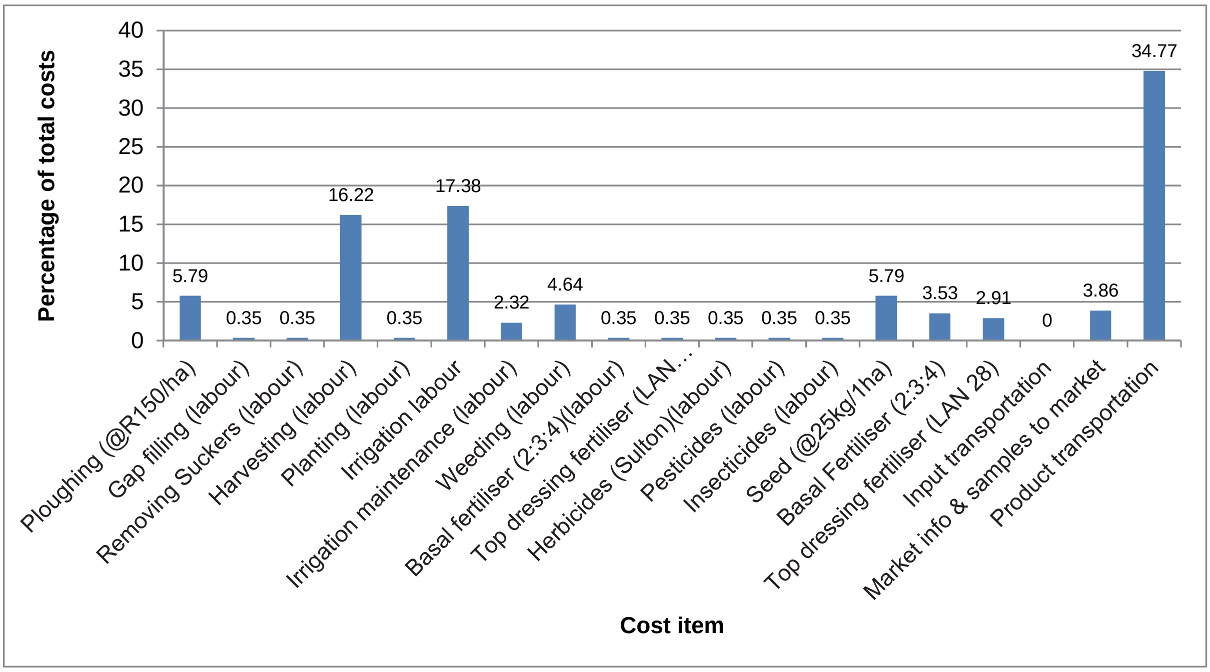

Figure 5.21 Maize production cost structure at MRIS, KwaZulu-Natal, 2011.

By expressing costs for specific activities as a percentage of total variable costs, it was possible to estimate the percentage contribution of each activity to the overall cost structure of maize production. The results indicated that transport cost, irrigation labour and harvesting labour were the major drivers of maize production costs. Their individual contributions were 34.77%, 17.38% and 16.22% respectively.

5.3.1.1.3 Market channels and pricing

The 2011/12 cropping season had challenges for the farmers in MRIS. Most farmers lost their crops to floods and hail storms in December 2012 and January 2012. However, farmers still managed to participate in their respective market channels for maize and other crops. Figure 5.22 shows two main market segments for the maize produced at MRIS. The maize either went through the *green mealie* market or the grain market. Farmers indicated the maize was grown for trading as *green mealies*, but because of market constraints, approximately 50% of maize grown on a 0.1 ha plot was harvested dry. This maize was used to meet various household needs.

Maize was traded as green cobs by the majority of farmers in MRIS. The dominant market channel was through informal traders who bought for re-sale in neighbouring towns including Greytown, Tugela Ferry and Weenen. Traders used pick-up trucks (bakkies) with a capacity to carry 600 cobs per load. Traders bought green cobs at an average of R10 per 5 cobs, which were then sold to consumers at R10 for 3 cobs in Greytown. The traders generally sold to hawkers who then sold the cobs singly at R5/cob.

Maize grain has multiple uses at household level. Farmers indicated that maize grain was regarded as a surplus product since most farmers produced the crop for marketing as green cobs. The dry maize was harvested and stored in 80 kg or 50 kg bags. Some farmers did not shell their maize for storing, hence they just put the cobs on the floor in *rondavels* (traditional Zulu houses) for future use. The maize was fed to goats and chicken as feed supplements. Whole maize grain was normally used to feed the animals. Farmers cited the cost of processing as the deterrent to crush the maize for animals. Hence they fed them whole grain. However, farmers also processed the maize to make maize meal for home consumption. The area has one hammer mill owned by a local resident (Figure 5.23).

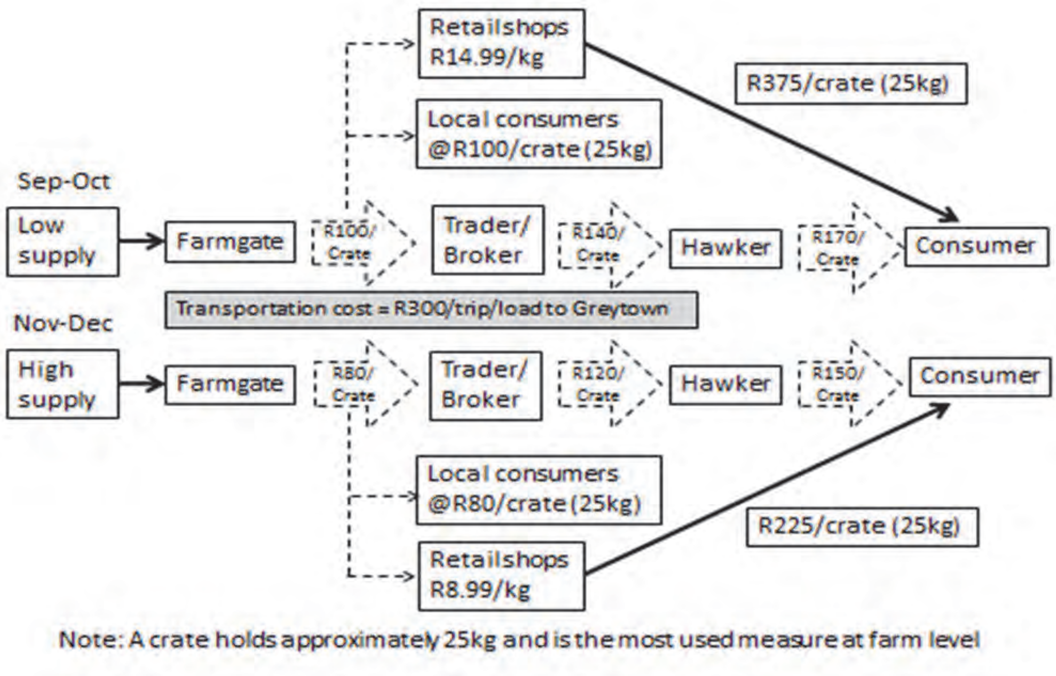

Figure 5.22 Schematic flow of maize in MRIS, KwaZulu-Natal, 2011.

Figure 5.23 The maize mill in a village adjacent to Block 3 at MRIS, KwaZulu-Natal.

An interview with the owner of the grinding mill showed that villagers actually did utilise the facility to process their maize. The cost of crushing a bucket of maize (20 litre container) was R20. The owner however pointed out that most people crushed maize to make traditional beer and *mahewu* (a non-alcoholic traditional beverage) for their cultural functions since people did not like using the super refined maize meal brands for these purposes. The processed maize meal was also used to prepare *uputhu* (traditional maize meal dish) and thick porridge (*pap*) for home consumption. FGDs revealed that most people did not like the taste of homemade maize meal. Nevertheless, maize grain was contributing towards food security of the farmers in MRIS.

5.3.1.2 Cabbage

Farmers in MRIS engaged in cabbage production mainly for income generation / marketing purposes. The value chain was short, with no product differentiation. A few actors that included input suppliers, transporters and traders, were involved in the cabbage chain.

5.3.1.2.1 Crop inputs

An attempt was made to quantify input usage for cabbage farmers at MRIS. Cabbage and tomato seedlings were purchased at RTS Trading in Greytown and transporting the seedlings would cost farmers R24 per tray of 1000 seedlings. Farmers also accessed seedlings from Sunshine Seedlings Nursery near Pietermaritzburg (approximately 300 km return trip), which was not a preferred channel due to high transport cost (Table 5.21).

Table 5.21 Distances of towns from MRIS, KwaZulu-Natal, 2011

Town	Distance from MRIS (one way trip)
Tugela Ferry	30 km
Greytown	40 km
Pietermaritzburg	150 km

5.3.1.2.2 Financial implications

A gross margin budget was calculated based on actual expenditures and yields that farmers received on a per hectare basis (Appendix 3). The major drivers of cabbage cost were transport to the market, cost of seedlings, irrigation labour and harvesting labour, which contribute 21.74%, 10.02%, 10.87% and 10.14% respectively (Figure 5.24).

The bulkiness of cabbage could be one the reasons why transportation of the commodity was so expensive. There was a need for farmers to consider options to reduce transport cost so as to maximise their profits. One way could have been through collective marketing, where farmers put their produce together and hired a much bigger truck to reduce the number of trips to the market. There is, however, a need to secure markets before such initiatives can be successful.

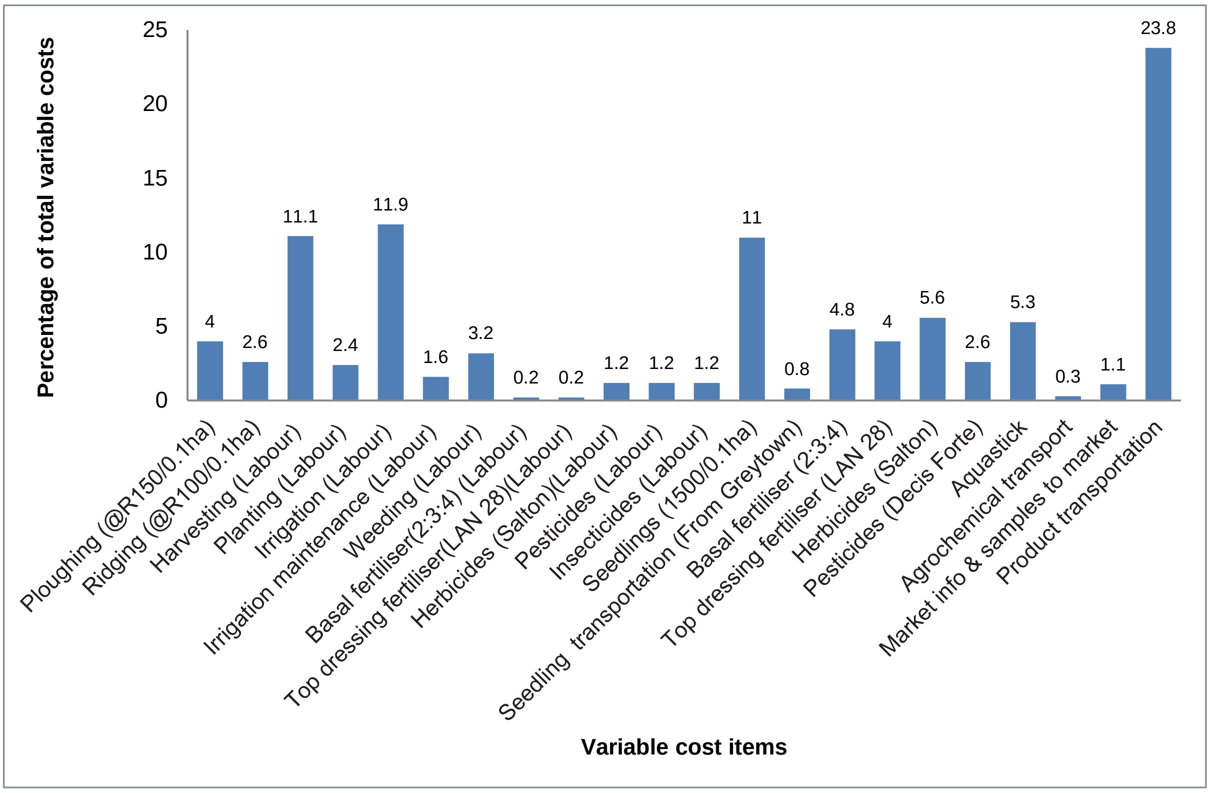

Figure 5.24 Cabbage cost structure, 2011.

5.3.1.2.3 Market channels and pricing

The challenge of accessing reliable markets was real, and smallholder farmers need to come up with ways to improve the way they do business. As shown in Table 5.22, cabbage producers mainly sold to the local community or to hawker. A focus on more formalised markets with a potential to enter into contractual agreements with customers might be possible way to cut down on transport costs in the long run, given that farmers were relying on informal bakkie traders (Table 5.22), who had no guaranteed markets of their own. Their purchases were not certain and farmers remained in a dilemma of whether or not to increase production.

Table 5.22 Cabbage market channels at MRIS, KwaZulu-Natal, 2011

Market channel	**Frequency**	**Percent**
Did not produce cabbages	*48*	*67.6*
Community members	7	9.9
Hawkers / Traders	7	9.9
Retail shops	1	1.4
Home consumption	7	9.9
Total	**70**	**98.6**
No response	1	1.4
Total	**71**	**100.0**

Cabbage prices at MRIS fluctuated between R3/head and R5/head depending on season, supply and demand of the produce (Figure 5.25).

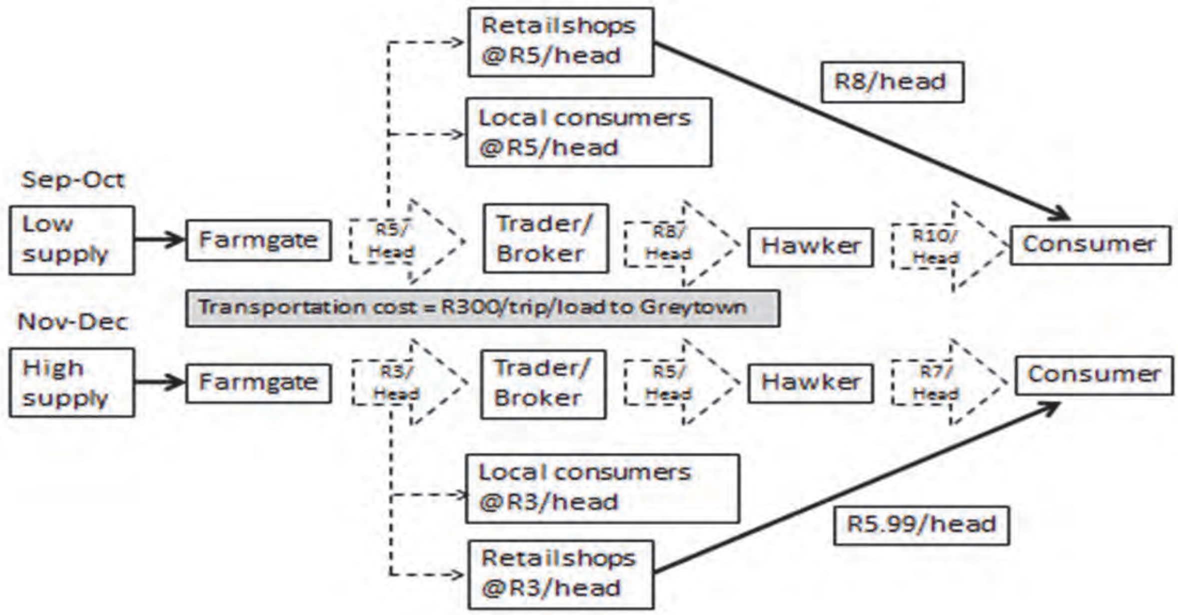

Figure 5.25 Cabbage market channels and price transmission at MRIS, KwaZulu-Natal, 2011.

As with other fresh commodities, farmers in MRIS relied on bakkie traders to market their produce. Those with own vehicles transported their produce and sold directly to consumers in nearby towns. However, farmers did not like this approach, as they felt they were wasting time that could have been better used in the field. Those without their own transport generally hired bakkies to transport their produce to the market at a cost of R300-R400 / return trip. Farmers either sold their produce along the streets in nearby towns (Tugela Ferry and Greytown) or supplied hawkers who then sold the produce at R10/head.

5.3.1.2.4 Value addition and processing

Transportation of the produce from the field to the market was the main value adding activity that occurred at farm level. Farmers at MRIS sold fresh, unprocessed cabbages. The bulk of the cabbage was sold to traders who sold directly to consumers. At the time of the study, this specific channel did not involve any processing. However, some of the cabbages that were sold through the supermarkets were processed into halves, quarters or shredded to make salads or stir-fry, with each process increasing the revenue generated from the cabbage. Specific processing activities were not followed up with supermarkets because there was no supermarket that indicated that it was a bulk buyer of cabbages from MRIS. Most supermarkets bought cabbages from the municipal fresh produce market in Pietermaritzburg.

5.3.1.3 Tomato

The tomatoes produced in the MRIS went through four basic operations: 1) bed / land preparation, 2) transplanting, 3) weeding / fertilization / pesticide application / irrigation and 4) harvesting. Direct production of tomatoes from seed was rare in this region. Only bed preparation was mechanised. Small farmers used manual operation for the entire process.

5.3.1.3.1 Crop inputs

All the tomato producers in MRIS used a range of inputs (seed, fertilizer, pesticide, etc.) and their own tools and equipment. A flow diagram of the production process was developed after a detailed interview with the producers. The bold line in Figure 5.27 represents the process that the majority of the producers followed. During the field investigation, it was observed that the farming practices used by the majority of the local producers followed a combination of scientific and indigenous knowledge. Although the improved farm practices for soil testing, soil moisture determination, temperature measurement and water management were lacking, general crop management practices were followed. Such practices included trellising, pest and disease control and land preparation.

5.3.1.3.2 Financial implications

Based on the gross margin calculation (Appendix 4) for MRIS farmers, Figure 5.26 shows the respective contribution of each activity to the cost of production. Product transportation to the market and harvesting labour were the most important drivers of tomatoes costs with each constituting 16.78% of the production process.

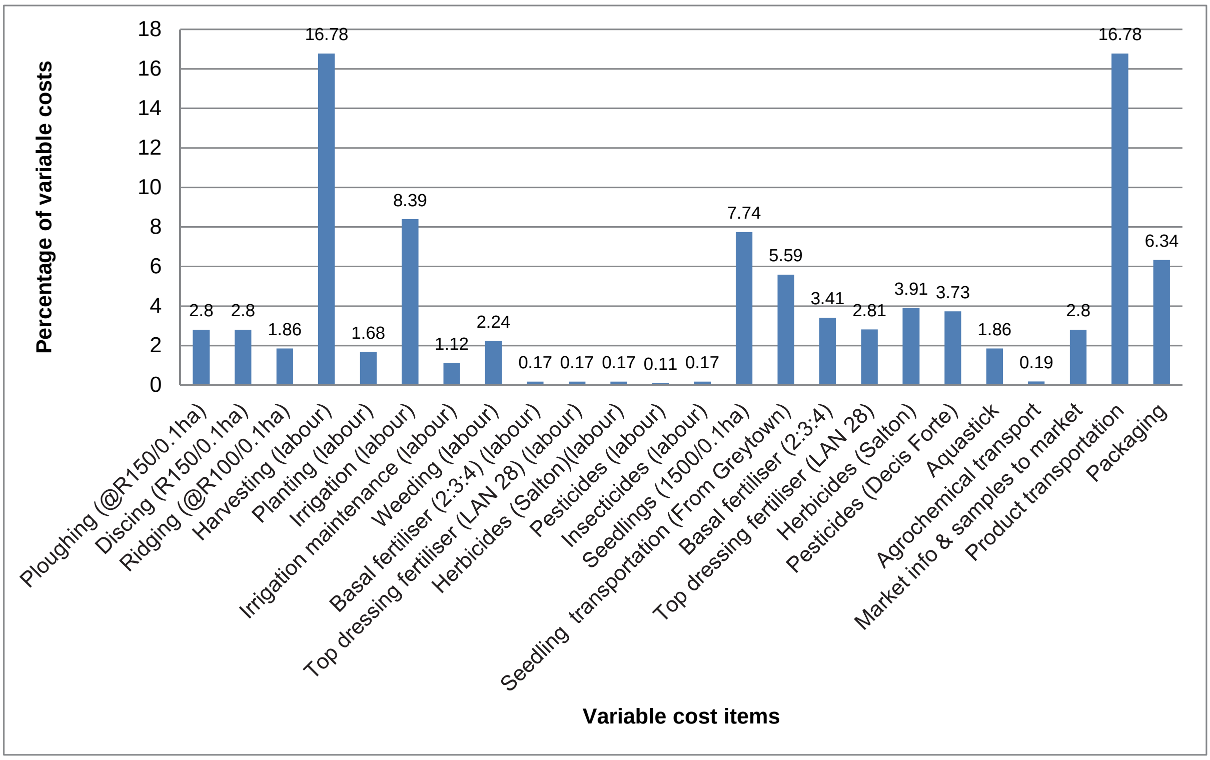

Figure 5.26 Cost of production for tomatoes, 2011.

Tomatoes come in a number of varieties with highly standardised cultivation practices. Each variety has its own shape, colour, size, and timing of cultivation, duration of harvesting, yield and disease resistance. Farmers in MRIS scheme mainly used hybrid varieties instead of open pollinated varieties. Therefore cost structure estimations were based on the assumption that farmers used hybrid varieties. Purchased inputs, such as fertilizers and pesticides, were minor drivers of the cost of producing tomatoes at smallholder level. The cost structures were based on an assumption that family labour was remunerated at R30/day, which is the rate at which hired labour was paid in MRIS in October 2012. Harvesting labour and transport costs were high for tomatoes because of multiple harvesting that had to take place before the crop could be removed at the end of the season. Farmers harvested tomatoes over an average of two months and hence they had to make use of harvesting labour for an extended period.

5.3.1.3.3 Market channels and pricing

Besides home consumption, farmers market their produce on roadsides and through fresh produce brokers (Table 5.23).

Table 5.23 Market channel for tomatoes from MRIS, KwaZulu-Natal, 2011

Market channel	**Frequency**	**Percent**
Did not produce	*53*	*74.6*
Roadside trading & traders	9	13
Community members	4	5.6
Home Consumption	4	5.6
Sub-total	**69**	**97.2**
No response	2	2.8
Total	**71**	**100.0**

Of the 24.5% farmers who produced tomatoes, 13% indicated that they utilised bakkie traders to sell their produce. These were preferred to other forms of markets because they bought in bulk and on a cash basis. Farmers indicated that trading locally to communities made it difficult to keep track of their agricultural revenue on a daily basis. Farmers did not bank amounts of less than R100, but used this cash to purchase daily household consumables such as bread. These small amounts were therefore rarely accounted for. The flow of tomatoes is depicted in Figure 5.27.

The price received by farmers depended on the time of the season. Farmers received higher prices during the early part of the season (R100/25 kg crate of tomatoes), whereafter the prices decreased as supply increased from the middle of the season, reaching R80/25 kg crate by November to December. Despite price variation, farmers still sold their produce through traders and hawkers instead of retail shops. There were more hawkers than retail shops, and hence more produce was sold through this channel. There was also room for negotiating prices with hawkers unlike most retail shops whose prices were bench marked with the Mkondeni Fresh Produce Market in Pietermaritzburg. Retail shops were also not prepared to collect their produce from the farm, making traders and hawkers more favourable trading partners.

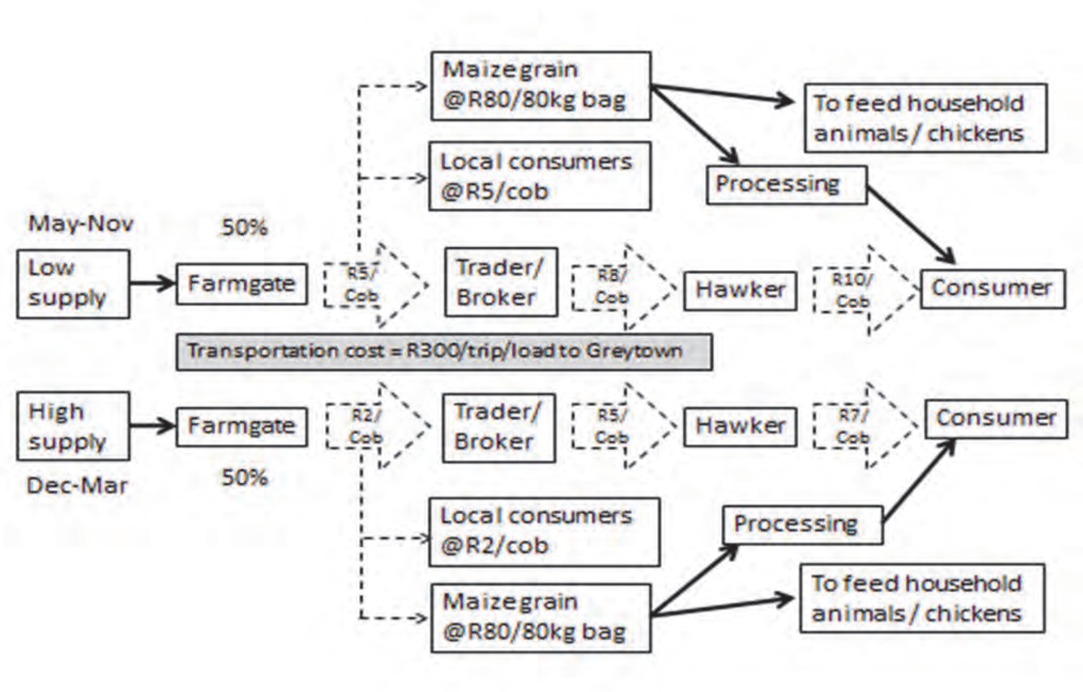

Figure 5.27 Market channels and tomato price transmission, 2011.

5.3.1.3.4 Value addition and processing

The first stage of value addition occurred during the transportation of tomatoes from the field to the nearest pick-up point by traders. This could either be on the roadside or owners' homestead. Farmers relied on family labour, friends or hired labour to move the produce out of the field. Payment was usually made using a portion of the produce. For instance, a 20 litre bucket full of tomatoes was given to voluntary assistants after a day's work. The same also happened with movement of cabbages and maize. By assisting farmers to carry their cabbage out of the field, the assistants were given one bag of cabbages, which contained 10 heads, and 10 cobs or 2 cobs per member of the household of the person that was helping with carrying maize out of the field. A financial value equivalent to a day's task of R30 was paid to those assistants who were not prepared to be remunerated using part of the produce. Focus group discussions with scheme members revealed that labour was not a problem in the community due to special social relations among households. Groups based informally on their family relations, past working relations, religion (e.g. same church) carried out farm operations such as harvesting and movement of the produce to accessible selling points.

The lack of value addition of tomato critically affected the growth, profitability and income opportunities of a large number of farm households who engaged in the tomato cultivation and marketing process. There were opportunities to minimise post-harvest losses of tomatoes by adopting technologies such as sun-drying tomatoes or making tomato soup with a longer shelf life.

At farm level, farmers wiped tomatoes to remove mud from the fruits before selling. There was no packaging at the farm gate and traders normally brought their own empty containers, bags or just put the tomatoes in the back of the truck without packaging. If tomatoes were not clean, traders further cleaned the tomatoes before packing them in small netlon mesh bags for selling. This process involved the use of clean water.

At Tugela Ferry, a trader indicated that a local retail owner charged R2 / 25 litre container of clean water. Traders/hawkers also had to pay for the packaging material at a cost of R3 per roll, which provided for 15 pockets of tomatoes. Packaging material therefore cost traders/hawkers about 20 cents per pocket of tomato. The average price for the small pockets of tomatoes was R10 at the hawkers' trading counter. Traders indicated that the cost of packaging material was not a major constraint, but grading of the tomatoes based on quality and size was time consuming.

5.3.1.4 Marketing of fresh produce from MRIS

There was an attempt to engage farmers and understand the extent to which some market related factors were impacting on their access to agricultural commodity markets. A five point Lickert scale was used and farmers ranked the extent to which various factors (search for market information, market finance, marketing levies and marketing sheds) affected their access to markets. The results are shown in Table 5.24.

Table 5.24 Farmers' perceptions of factors affecting market access at MRIS, KwaZulu-Natal, 2011

Ranking	**Market information search**	**Market finance**	**Marketing levies**	**Marketing Sheds/structures**
	Percent	Percent	Percent	Percent
Not a challenge	21.1	4.2	31.0	2.8
Neutral/Can't say	**32.4**	18.3	**32.4**	29.6
Minor challenge	11.3	1.4	9.9	9.9
Challenge	12.7	31.0	9.9	**53.5**
Major challenge	18.3	**40.8**	12.7	4.2
No response	4.2	4.2	4.2	4.2
Total	100.0	100.0	100.0	100.0

Farmers indicated that market finance was the major inhibitor to market access. Market finance was defined as the funds required to finance marketing activities along the value chain. Farmers failed to hire transport or improve their packaging because of limited funds. Some farmers in MRIS put their harvested produce under trees next to the road while waiting for their clients to pick them up to prevent deterioration post-harvest. This was a clear sign of a deficit in marketing infrastructure at the scheme. Farmers were therefore asked to rank their opinion on the absence of marketing infrastructure, with particular reference to marketing sheds. More than half of the respondents (53.5%) regarded this as a challenge and their establishment could improve marketing as the marketing sheds could also act as collection points by traders. Farmers also made reference to delicate vegetables like spinach, which deteriorate fast, especially if exposed to direct sun after harvesting. Such crops definitely need to be stored under cool conditions, hence the need for the sheds, preferably with cooling facilities. Famers in MRIS utilised informal traders and therefore did not pay any market levies, so this was not regarded as a barrier to market entry. However, a few farmers had previously used the Mkondeni Fresh Produce Market and stopped doing so because of levies, transport cost and losses associated with poor quality products.

5.3.1.4.1 Role of informal traders in the crop value chains

Fresh produce from MRIS was transported to various destinations by different agents along the marketing chain. The major traders bought the produce from the farmers for selling in Tugela Ferry, Greytown and Pietermaritzburg. Most of the traders were not registered as formal businesses with the government. They operated as informal family owned businesses and were dominated by people who owned pick-up trucks (Figure 5.28).

Figure 5.28 Bakkie trader loading fresh produce in MRIS.

The traders bought fresh produce from MRIS and sold this through different outlets including road side stalls and fruit and vegetable shops. Fresh produce traders in Greytown procured their produce from all over the KwaZulu-Natal Province, depending on availability and prices at the time of purchase. Interviews with the traders revealed that there were no set rules or by-laws governing the trading of fresh produce by informal traders, who operated on streets of most towns including Greytown. Because of this, it was difficult to ascertain the exact number of traders in each area. Although traders operated independently of each other, there was always informal communications between them about market prices and possible suppliers of fresh produce at any given time.

Traders highlighted challenges such as the lack of commodity grading by smallholder farmers. Unlike their commercial counterparts, smallholder farmers were not consistent with the way they did business. The traders indicated that only two in every ten smallholder farmers actually graded their tomatoes according to size, colour and variety Most of them mixed different varieties and sizes of tomatoes in one selling container, making it difficult for traders to convince their clients to buy their produce. The traders therefore had to sort the produce before selling. Smallholder farmers tended to grade the first two deliveries, and thereafter concentrated on ensuring that all their produce went to the market. A study by Jordaan and Grové (2012) also highlighted that, by including poor quality vegetables in loads instead of grading correctly, farmers received lower prices for the load than if they had separated them.

5.3.1.4.2 Attributes of the vegetable markets around the MRIS

The market servicing the MRIS was characterised by a lack of trading regulation, no strict adherence to product grading and was dominated by informal unregistered traders. The markets in surrounding towns were characterised by lack of sufficient physical trading place for the traders or farmers. Provision of physical market infrastructure would help to decongest the roads and improve the hygiene conditions of the markets (Figure 5.29).

Figure 5.29 Fresh produce traders in Tugela Ferry and Greytown, KwaZulu-Natal

Traders were not able to return rotten produce to the farmers/suppliers and hence were forced to sell it, even if the price was lower than the buying price. This was done to minimise losses. Unless the consumers showed absolutely no interest in the bad quality produce, traders attempted to push it through the market. This was a clear indication that there were no set standards on these types of markets. Traders were not liable to any authorities for trading bad quality produce and at the same time, consumers had no protection against any malpractice by informal traders.

The produce was not weighed during packaging and hence traders used different sizes of pockets at any given time. Lack of weighing facilities may have resulted in consumers not receiving the correct quantity of produce. Consumers relied on visual assessment to compare the packaging and condition of the tomatoes across different sellers on the market before making a decision to buy or not to buy.

The vegetable market, especially for tomatoes, was characterised by a lack of storage and processing facilities. Some traders indicated that they lost between 2 and 4 crates of tomatoes (50-100 kg) per trip due to rapid loss of quality and damage. This represented about 8% losses. Cold storage could have allowed traders to take advantage of the low tomato prices during the peak season and could have provided an opportunity for the farmers to get relatively higher prices, which would have helped develop community agriculture.

The fresh produce pack house at Tugela Ferry

A pack house, financed by AFRICARE, was built at Tugela Ferrying 1999. AFRICARE initiated the concept, in consultation with the Msinga office of the Department of Agriculture and smallholder irrigation farmers in the Tugela Ferry Irrigation Scheme and MRIS. A governing board was elected, comprising about fifteen farmers from the two schemes, representatives from the Department of Agriculture and chaired by the AFRICARE representative. The main objective of the pack house concept was to assist farmers in agricultural commodity value addition and securing markets for the produce. As such, farmers from Tugela Ferry Irrigation Scheme (TFIS) and MRIS were supposed to be the main suppliers of the produce to the pack house.

The initial phase of the pack house concept involved the development of human capital by training farmers on general management, financial management, vegetable production and the management of cooperatives. The training sessions were coordinated and funded by AFRICARE. This went hand in hand with the construction of the pack house which was equipped with cold rooms, cleaning machines, packing machines, juice extraction machines and milk processing machines. The operators of the machines in the pack house were on the AFRICARE payroll and the costs were supposed to be handed over to the farmers after the project has started generating profits. However, the pack house stopped operating around 2008. According to former board members, the main reason for the collapse was farmers' low response to the project. When AFRICARE initiated the project, there was hope that after investing in farmer training, farmers would also increase high production within a period of about 3 to five years. When this failed, AFRICARE had limited funds to continue with the project and farmers also had no means to fund personnel employed by AFRICARE for the project. This eventually led to the collapse of the project, which could otherwise have provided an improved market for smallholder farmers.

5.3.1.5 Summary of factors impacting on the value chains

Factors affecting the various value chains at the MRIS are discussed below.

5.3.1.5.1 Enablers and drivers

Enablers and drivers of fresh produce value chains at MRIS can be summarised as follows:

- **Labour:** Labour supply was abundant in the local communities. This included both family labour and hired labour. Labour was paid a daily wage of R30 or a monthly salary of R700.
- **Water:** Water was available to sustain crop production. The scheme was serviced by a 20 km gravity fed irrigation canal and members in blocks 1 to 12 did not pay any fee for water although Block 14 and 15 members paid R20/month for pumping irrigation water.
- **Accessibility:** The scheme was serviced by a highly accessible gravel road that facilitated transport of produce to the market.
- **Machinery and equipment:** Farmers had access to hired tractors from individual owners, the municipality and the Msinga office of the Department of Agriculture.
- **Subsidised inputs:** The government occasionally supported the farmers with inputs such as fertilizers and seeds. For instance, in 2012, plot holders received seed potatoes and 3 bags of fertilizer from the Department of Agriculture.
- **Mobile phones:** More than 90% of the farmers in MRIS had access to a mobile phone. This greatly improved their communication with potential buyers of the produce.

5.3.1.5.2 Barriers and regulators

Some of the barriers/ regulators of the fresh produce value chain are summarised here:

- **Transport cost:** Transport cost and availability inhibited farmers' effective participation in commodity value chains. Focus group discussions and key informants revealed that farmers without their own transport did not engage fully in tomato production and marketing. Tomatoes are highly perishable and any delays in marketing them increase infield and post-harvest losses. Farmers were risk averse, and those without vehicles limited their production to a single 0.1 ha bed or less to minimise losses emanating from a lack of transport to the market.
- **Bad condition of infield roads:** Whilst the district road leading to the MRIS was very accessible and well maintained, farmers and bakkie traders highlighted the bad state of infield roads. The infield roads were not maintained and some of them were heavily eroded and inaccessible. This had a greater impact on farmers whose plots/beds were located some distance from the main

road. These farmers incurred the extra cost of hiring labour to transport produce to the main road, while traders with pick-up trucks complained of delays of up to 5 hours in filling up their trucks with produce from distant and inaccessible plots. The challenge was even worse for produce such as cabbages, which are heavy and difficult to carry.

- **Market conditions at the Mkondeni Fresh Produce Market:** Farmers did not make use of the nearest fresh produce market, which was in Pietermaritzburg. This was allegedly because of the high transport cost and unfavourable market conditions. The buying conditions at the Mkondeni Fresh Produce Market were such that farmers had no influence over the price and were only paid 2-3 weeks after the date of sale. Farmers preferred cash sales and were also not prepared to suffer losses if their produce went bad because of delays in trading or absence of buyers at the market. For instance, a farmer might be paid for only 40 out of 50 delivered pockets of cabbages, because of bad quality or the produce rotting before being sold. In addition, the farmer would incur the transport cost of taking the produce to the fresh produce market and the cost of disposing of the rotten produce.
- **Market competition:** Market competition also affected MRIS farmers. All neighbouring towns had small-scale and large-scale commercial farmers located within their proximity. Tugela Ferry was well serviced with produce from the nearby TFIS. The same scheme also supplied the Greytown market together with other commercial vegetable producers in the Mvoti Local Municipality. Whilst the demand for the produce existed, established businesses procured the bulk of their fresh produce from the Mkondeni Fresh Produce Market in Pietermaritzburg, where they claimed to get better quality than from the nearby community projects. The manager of Spar at Tugela Ferry said that selling fresh produce was not very viable because consumers bought vegetables at cheaper prices directly from the scheme and from bakkie traders. As a result, the shops procured very limited quantities of fresh produce to cater for a small population that did not buy from hawkers or directly from farmers.
- **Fence condition:** The fence around the MRIS was in a state of disrepair, and exposed the crops to livestock damage. This had a major effect on crop yields at MRIS and also discouraged the farmers who were averse to risk.

5.3.2 Detailed analysis of the potato value chain at MRIS

Data was collected weekly from 60 potato producing farmers during the period of June-December 2013 on all aspects of potato production (land preparation, planting, crop maintenance and harvesting). This followed the survey of 307 farmers which did not allow the researchers to quantify input usage at smallholder level due to poor record keeping. A full-time field assistant from the local community was engaged to record weekly potato production activities, include the application of irrigation. The intention was to capture irrigation activities by recording actual labour demand and irrigation water applied to the crop in order to enhance the quantification and valuation of water use in smallholder crop production.

Potato production in MRIS started in 2011 through a government initiative to encourage smallholder farmers to grow high value crops. During the 2011 cropping season, the KwaZulu-Natal Department of Agriculture and Environmental Affairs supported MRIS farmers with subsidised potato seed and fertilizers. The input support programme benefited more than 200 farmers in the scheme. In 2012 and 2013, government support was limited to coordination and assisting in the procurement of potato seed from certified growers. There have been challenges in terms of availability of potato seed from the growers. This was partly because smallholder farmers delayed paying for their seed, and by the time the funds had been raised, the seed stock from the growers was exhausted. Where farmers organised themselves in groups, the Msinga Office of KZN DoA assisted in transporting the seed from the commercial growers to the scheme. Technical and agronomic support was also given to the farmers by DoA extension officers. These were positive efforts to ensure sustainable production of potatoes at smallholder level.

5.3.2.1 Production activities in MRIS

The current study focused on potatoes as one of the major crops grown between June and December in the scheme. The 60 farmers who participated in the survey had access to 262 x 0.1 ha plots. The average land allocation was 0.4 ha per farmer. A total of 102 (38.9%) of the plots were rented from friends and relatives. The average land under potato crop was 0.2 ha per farmer. During the time of the survey (June-December 2013), land utilisation was low (below 50%) and was peaking up towards year end as farmers started planting summer crops like maize. The survey focused on the major crops grown between June and December, which was considered the most critical period in terms of water shortage in the scheme. Data collected showed that farmers were diversified and grew an average of two crops at a time, with a minimum of 1 and a maximum of 4 as is shown in Table 5.25.

Table 5.25 Crop diversification in MRIS, KwaZulu-Natal, 2013

Position in scheme	Number of crops grown at a given time				Total
	1	2	3	4	
Upper	3	3	6	0	12
Middle	13	9	2	1	25
Tail-end	10	6	6	1	23
Total	26 (43.3%)	18 (30%)	14 (23.3%)	2 (3.3%)	60

The majority of plots were ploughed using hired-in tractors at a mean cost of R150 per 0.1 ha plot. Although some farmers relied on privately owned tractors, most hired tractors belonging to a government body, either the local office of the KZN DoA or the Msinga Local Municipality. About 13% of the farmers used livestock power, mainly donkeys, for land preparation. There was no difference in the cost of hiring animal power or tractors, so farmers used animals when it was difficult to use tractors.

Conventional chemical fertilizers were used by most farmers, both as a basal dressing and as a top-dressing. A limited number of farmers (2) used cattle manure instead of the conventional fertilisers. Although livestock manure is accessible, it is more labour intensive than conventional fertilizers, requiring labour to dig, transport and apply the manure.

There was limited use of conventional crop protection chemicals by the sampled farmers. A large number of farmers in MRIS had started potato production in 2011, but by 2013, there were few cases of potato pest and disease outbreaks in the scheme. This led to the low use of conventional pesticides, fungicides and insecticides by farmers in the scheme. However, because of the poor condition of the fence around the scheme, crops were exposed to livestock (goats and cattle) damage. Farmers resorted to the traditional method of applying a cow dung mixture to potato foliage to protect the crop. The smell from the cow dung kept away livestock, and the application was repeated after rains or when the farmer perceived that the effectiveness of the previous spray was weakening.

Labour is one of the major inputs in irrigated agriculture. A combination of family and hired labour is commonly used by farmers in MRIS. Labour was hired by farmers for almost all activities on a casual-work basis, and paid after completion of the task. Payment for labour for operations such as land clearing, weeding, planting, spraying and irrigation was in cash, while payment for harvesting was in some instances in the form of crop produce. Labour for harvesting included packaging and grading to prepare the produce for the market. Farm labour price in South Africa is regulated by the government through a bargaining process with farmers' organisations. Despite the presents of a regulatory framework, farm wages vary across the agricultural sector. This is influenced by economic and production related factors. For instance, high unemployment levels in South Africa might mean excess labour supply, leading to low wages on the principle of demand and supply. Furthermore, profitability of smallholder agriculture is low, hence the reduced capacity of such farmers to pay the minimum wages. This poses a challenge in valuing labour in MRIS. The average daily wage for hired labour in MRIS was R30 per day, which was below the minimum wage (R70/day) set by the government for farm workers. However, there were instances where the charges were negotiable based on completing specific tasks, for example, clearing and weeding commonly attracted a rate of between R150 and R200 per plot (0.1 ha) respectively. Such activities would normally take two to three days to complete. Irrigation was charged at about R30 a plot, and would take about 3 hours or more depending on flow rate and field conditions. Higher flow rates reduced the time spend on irrigation while excessively dry soils and collapsed infield ridges increased the duration of irrigation.

While farmers in MRIS tended to hire labour for some operations, the majority of them preferred to irrigate using family labour, because of uncertainties in irrigation water supply. At times water was not available on scheduled days, and farmers had to check for any problems like blockages or severe leakages along the canal. Some farmers in the middle and tail-end section of the scheme at times resorted to night irrigation to improve irrigation water access. The challenges associated with water access made it difficult to rely on hired labour for irrigation purposes. A summary of the production costs for potato production in MRIS are presented in Table 5.26.

Table 5.26 Labour and inputs used in irrigated potatoes, MRIS, KwaZulu-Natal (n = 60), 2013

Cost breakdown	Average cost (R/ha)
Labour:	
Clearing	551
Weeding	1 092
Irrigation labour	778
Chemicals/Crop protection*	286
Harvesting	935
Total labour costs	**3 642**
Tradable inputs:	
Land preparation/Tractor hire	1 500
Seed cost	6 650
Pumping Cost	520
Fertiliser Cost	2 185
Packaging Cost	1 235
Transport Cost	2 000
Marketing	259
Total tradable inputs	**14 349**
Average variable cost/ha	**17 991**

Source: Muchara *et al*., (2014)

From the cost breakdown shown in Table 5.26, it is evident that seed cost, fertiliser and transport are the major variable costs affecting potato production at smallholder level. However, caution is required when interpreting these results because low use of some variable inputs could have been due to unavailability or poor accessibility of the input to the farmers, or because farmers were not familiar with them.

Potato seed certification

Certified potato seed is one of the most costly inputs in potato production. According to the South African Plant Improvement Act (No. 53 of 1976), growers can only plant potato seed that has been verified and certified as disease free and healthy by accredited persons through the South African Potato Certification Scheme. Because of the strict requirements for producing seed potato, there were no smallholder potato farmers certified to grow potato seed around MRIS at the time of the study. Some of the requirements include the complete isolation of the area under potato seed from crops such as cabbages, tomatoes, groundnuts and peppers, as these are the common host plants of bacterial wilt disease. The nature of smallholder production in MRIS was characterised by multiple cropping, hence conditions were not conducive for potato seed production. Farmers used the smaller sized potatoes as seed, even though such seed was not certified. This could have exposed farmers to diseases associated with the use of uncertified seed potatoes. There was a need to improve seed access by farmers at affordable prices. Certified seed potato producers were limited to approximately 40, according to the DoA database, and all were large scale commercial producers. Only four farms located about 45 km from MRIS were easily accessible to the MRIS farmers for seed supply. However, competition for seed with commercial farmers was also prevalent, and MRIS farmers needed to organise themselves into groups to book seed prior to their intended production season to ensure adequate supply from the seed producers. This had not been possible to date because of lack of long term planning, and weak coordination mechanisms among farmers. Interviews with seed producers in the area revealed that smallholder farmers worked on an *ad hoc* basis, and therefore it was difficult to do business with them. Smallholder farmers did not make bookings for their seed, hence they got seed by chance from what remained after all orders had been collected. This potential threat to potato production at smallholder level can easily be resolved if farmers co-ordinate their efforts by forming commodity groups and place collective orders timeously.

5.3.2.2 Water availability relative to demands of potatoes

The annual long-term mean rainfall for areas around MRIS is 639 mm. The rainfall measured by Weather South Africa (Weather SA) in 2013 indicated a total of 466 mm at the Tugela Ferry weather station, which is located approximately 25 km from the MRIS. However, the data supplied by Weather SA was considered by the team to be unreliable because of incomplete records and missing daily rainfall readings. According to the long-term mean rainfall figures for the area, the rainfall received between June and November, which was regarded as the effective growing period from the potatoes, is 208 mm (2080 m^3) and was assumed to be evenly distributed across the scheme (Table 5.27). The study measured actual water applied to potato crop between June and December 2013. In reality, the yields obtained did not reflect this apparent ‘abundance’ of water and it is likely that the nature of the rainfall (heavy downpours) does not provide a useful source of water and the irrigation water, which varies from 92% of SAPWAT estimate for potatoes at the head of the scheme to 45% of SAPWAT estimate at the tail-end is definitely insufficient for the mid-lower blocks.

Table 5.27 Irrigation and rainfall distribution in MRIS, 2013

Block position	SAPWAT Estimate (m^3)	Actual Irrigation applied					
		Irrigation water	Irrigation water as percentage of SAPWAT estimate	Irrigation performance range	Long-term mean rainfall (m^3) from June-November	Total water (Irrigation + Rainfall) (m^3)	Total volume applied as a percentage of SAPWAT estimate
Head	4480	4119	92%	32-174%	2080	6199	150%
Mid	4480	2780	62%	20-135%	2080	4860	108%
Tail-End	4480	2001	45%	14-118%	2080	4061	91%
Average	**4480**	**2749**	**61%**	**14-174%**	**2080**	**4829**	**108%**

Source: Muchara *et al*., (2014)

5.3.2.3 Potato yields

Farmers in MRIS were not competitive in potato production, as potato yields were low averaging 4800 kg/ha against a potential estimate[16] of 30 000 kg/ha under irrigation (Table 5.28).

[16] Potential yield is based on Combud enterprise budgets for KwaZulu-Natal province (2012/13)

Table 5.28 Potato yield comparison (Actual versus potential) at MRIS, KwaZulu-Natal (n=60), 2013

Scheme section	**Area (ha)**	**Total yield (kg)**	**Actual yield (kg/ha)**	**Potential yield (Kg/ha)**	**Yield performance** **Actual yield (kg/ha) as a proportion of potential yield (kg/ha)**
Upper (n=12)	2.1	20 490	9 757	30 000	32.5%
Middle (n=25)	4.4	23 200	5 272	30 000	17.6%
Tail-end (n=23)	4.6	10 480	2 278	30 000	7.6%
Total/Ave	**11.1**	**54 170**	**4 800**	**30 000**	**16%**

Potato yields varied across the scheme. Farmers in the upper section of the scheme had yields of 32.5% of potential yield compared with the 7.6% obtained by farmers in the tail-end section. Low yields are a major setback in the development of potato value chains at smallholder level.

5.3.2.4 Home consumption versus commercial trading

A summary of potato utilization, in terms of household consumption or commercial trading, is given in Table 5.29.

Table 5.29 Potato utilisation at smallholder farm level at MRIS, KwaZulu-Natal (n=60), 2013

Scheme section	**Area sampled (ha)**	**Yield (kg)**	**Total home consumption as a proportion of total yield**	**Commercial trading as a proportion of total yield**
Upper	2.1	20 490	4.8%	95.2%
Middle	4.4	23 200	8.8%	91.1%
Tail end	4.6	10 480	28%	71.9%
Total / average		**54 170**	**11.1%**	**88.9%**

The results reveal the link between the two main objectives of agriculture at smallholder level, that home consumption and selling. An average potato producing rural household consumed about 100 kg of potatoes per production cycle. The average consumption was higher among farmers with less total produce compared to those who produced more. This might have been the result of farmers who produced greater quantities becoming more market oriented and hence trading bulk quantities of produce instead of utilising them within the household. Higher levels of consumption were common among farmers located in the tail-end section of the scheme, where yields were low due to water constraints. Potatoes produced in water constrained sections of the scheme were of lower quality, smaller in size and did not attract a premium price on the market. Some farmers in this section harvested and kept the potatoes as seed for the next planting cycle, as a way of saving on the cost of buying seed.

5.3.2.5 Market channels and pricing

Farmers in MRIS utilised two main market channels for the potatoes. These were informal bakkie traders and the local communities. The largest market was the bakkie traders, which absorbed about 54% of total yield, while 35% and 11% was sold to the local communities and consumed at household level respectively. The bakkie traders provided a link between the farmers and the nearby towns of Greytown, Tugela Ferry and Weenen, where they sold directly to consumers as well as supplying hawkers and other informal food outlets (See Figure 5.30). The farm gate price for potatoes ranged between R35 and R40 per 10 kg bag. The farmers benchmarked their prices with the informal trading prices in neighbouring towns of Greytown and Tugela Ferry. The strategy of differential pricing is important given the varying grades and quality of potatoes produced by the farmers. Price differentiation is influenced by the size of potatoes and the quantity of potatoes being supplied to the buyer at the time of purchase.

Bakkie traders were either contacted telephonically by the farmers when the potatoes ware ready to harvest, or they would telephone their regular farmers to enquire about the availability of potatoes. In most cases prices were negotiated over the phone to allow farmers to start the harvesting and packaging process before the buyer came to collect the produce. On the other hand, community buyers who bought one or two bags of potatoes for home consumption paid a higher price of R40 per bag of potatoes compared to bakkie traders. This was mainly because of the low volumes purchased. The selling price by the middle men was about R60/10 kg bag. This translated to an average marketing margin of R20/10 kg bag.

Figure 5.30 depicts two potato value chains: Row A shows the generic potato value chain which is most common among commercial farmers and some emerging farmers: Row B shows the potato value chain operating in MRIS, which differs mainly because of the non-existence of wholesalers and retailers. The role of wholesalers was played by bakkie traders, who collected potatoes from the farmers for selling to hawkers, informal food outlets and directly to consumers by trading on the roadsides of surrounding towns. Bakkie traders had their own transport, a service that most wholesalers and retail outlets did not offer to the farmers.

Neither smallholder nor commercial potato farmers engage in any processing, though MRIS produce could be traced into the informal food outlets where French-fries were mostly produced.

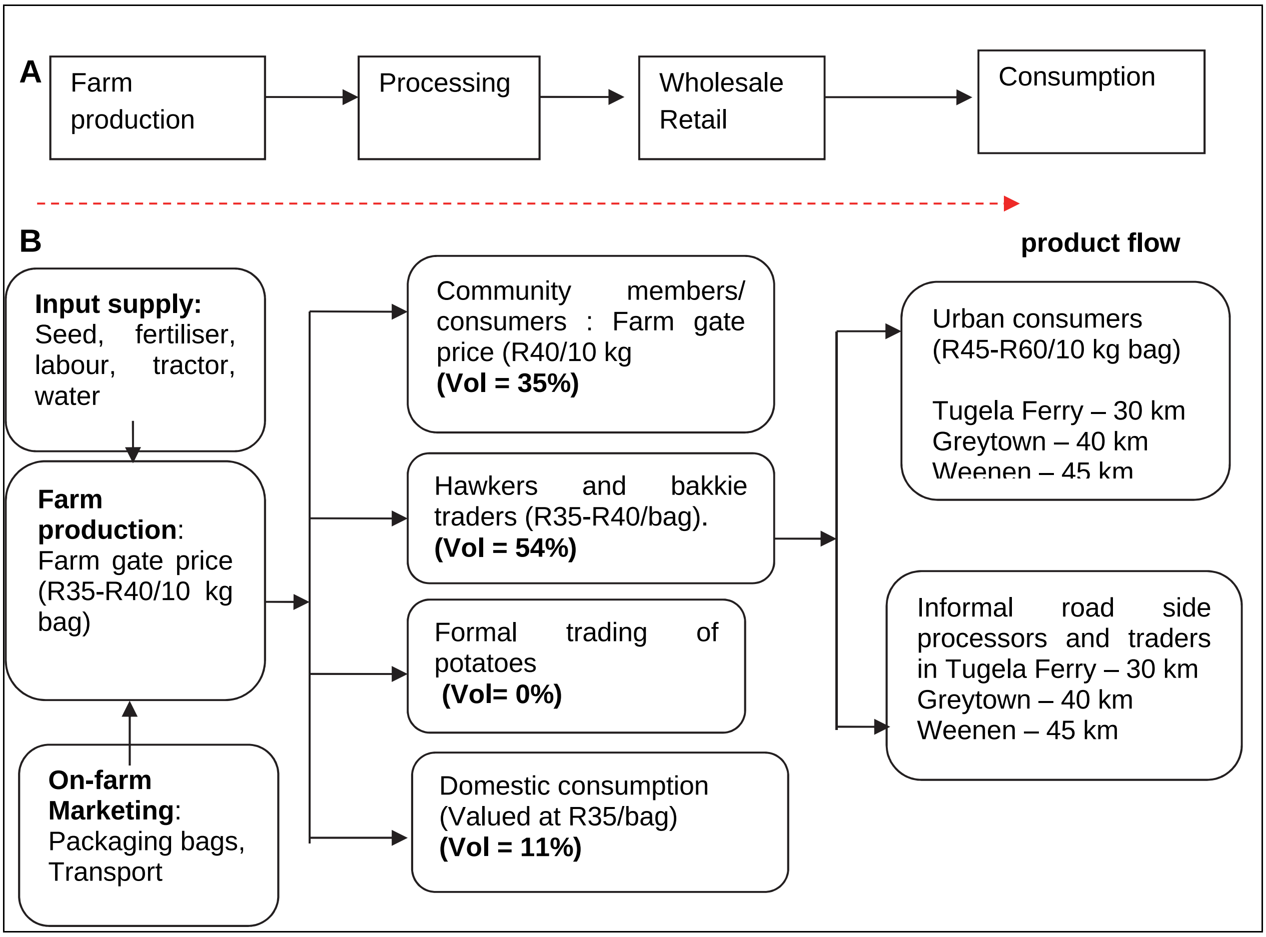

Figure 5.30 Potato marketing channels at MRIS, KwaZulu-Natal, 2013.

Farmers in MRIS also had options to supply potatoes to the formal markets such as the Mkondeni Fresh Produce Market in Pietermaritzburg, or directly to the retail shops, which they were not doing. Interviews with key informants, selected from the farmers who had once participated in the Municipal Fresh Produce Market (MFPM) and the retail market, revealed the following challenges:

- High transport cost to the nearest MFPM in Pietermaritzburg (300 km return trip) hindered farmers' ability to participate on the market. Farmers therefore preferred trading with the community members, bakkie traders and hawkers who used their own transport to take the potatoes from the farm to the market.
- The commission and handling costs amounting to 12% were not sustainable for the smallholder farmers to sell their produce through the MFPM.
- Competition from commercial farmers at the municipal fresh produce markets, whose produce was of with better quantity and quality, excluded farmers from the market. For instance, no smallholder in MRIS supplied washed potatoes because of the lack of chemicals, technical knowledge and infrastructure. This meant their potatoes would fetch lower prices if sold through the fresh produce market.

The major challenges hindering smallholder farmers from participating in the formal retail market were:

- Competition from commercial farmers and the municipal fresh produce markets, which supplied retailers with larger quantities and better quality produce.
- The cost of transport, which encouraged trade with community members, bakkie traders and hawkers who had their own transport.

5.3.2.6 Profitability of smallholder potato production in MRIS

The average size of land under potatoes was 0.2 ha per farmer, with a minimum of 0.1 ha and a maximum of 0.4 ha. All of the 60 sampled farmers planted the Mondial potato variety. Labour and inputs for potato production in the MRIS varied across the sampled farmers and have already been discussed above in Table 5.26. Based on the individual cost structure, gross margins were calculated by subtracting costs from gross returns. These did not include a share of fixed or overhead costs, such as canal maintenance, repair or replacement of tools and equipment. Gross margins, both positive and negative, for the 60 farmers in the sample are shown in Table 5.30.

Table 5.30 Profitability of potato production at MRIS, KwaZulu-Natal (n = 60), 2013

Plot Location	No. of sampled farmers per section	No. of growers making negative gross margins (%)	No. of growers making positive gross margins (%)	Gross margin range (Rands/ha)	Average positive gross margins (Rand/ha)	Average negative gross margins (Rand/ha)
Upper	12	3 (25%)	9 (75%)	-R12 770 to R22 992	R13 260	R7 442
Middle	25	10 (40%)	15 (60%)	-R28 221 to R28 481	R9 754	R7 962
Tail-end	23	15 (65%)	8 (35%)	-R29 520 to R16 090	R6 321	R9 220
Total	60	28 (47%)	32 (53%)	-R29 520 to R28 481	R10 089	R8 580

Source: Muchara *et al.,* (2014)

Profitability of production decreased from the head section of the scheme towards the tail-end section of the scheme. The majority of farmers, 75% in the upper section and 60%in the middle section, managed to achieve positive gross margins, compared to 35% in the tail-end section of the scheme. The gross margins ranged between R29 520/ha and R28 481/ha (Table 5.30). Among those with positive returns, the average gross margin was R10 089/ha per farmer. Farmers in the MRIS grew two crop cycles per year, and an average farmer had a potential to earn R20 000/ha per year. However, such income could not be met by the majority of the farmers, whose land access was restricted to 0.2 ha per farmer, unless extra land was rented from friends and relatives whose plots were not fully utilised.

5.3.2.7 Opportunities for strengthening the value chain

A description of the activities taking place along the chain identifies a number of possible opportunities to develop the potato value chain in MRIS (Table 5.31).

Table 5.31 Market standards for the potato value chain in MRIS, KwaZulu-Natal, 2013

Standard	**Description of current scenario**	**Development or improvement opportunities**
Grading	• Grading took place at farm level. • Small potatoes were selected either for home consumption or for seed for the next crop. • Medium and bigger sized potatoes were traded for cash. • Challenge of bad quality characterised by physical damage of the potatoes during harvesting, sprouting, greening, malformed potatoes and soiled potatoes. • No chemical washing of potatoes took place on-farm • Target market (hawkers and community members) did not demand washed potatoes	• Farmers were not separating medium and large potatoes for the market. There is still room to improve by separating the two sizes especially if farmers are to enter the formal market. • Potato washing could also be explored but would require appropriate technology for smallholder farmers.
Quality attributes	• Both poor grade and good grade potatoes were produced • Visual quality defects included sprouted potatoes, malformed potatoes, physically damaged potatoes and cracked potatoes.	• Improve ridging to ensure potatoes are completely covered in soil to minimise sun exposure and cracking of the potatoes • Consistent irrigation scheduling ensures minimal potato malformation. • Proper harvesting schedules (not too early or too late) minimises sprouting of potatoes and improves storage life of the crop.
Packaging	• Packaging was done in 10 kg packets.	• Farmers faced a high packaging cost. Bags cost R2.70 per bag in Greytown, compared to R1.60/pocket in Pietermaritzburg. Collective purchase of material from distant towns, which are cheaper, can reduce costs.
Certification	• No smallholder potato farmers were certified seed producers.. • Farmers used smaller sized potatoes as seed, however, such seed was not certified, and might have exposed farmers to pests and diseases associated with monoculture.	• There is need to improve seed access by farmers at affordable prices. • There is also a need for timeous collective ordering from certified seed producers
Processing	• There was no on-farm processing of potatoes in MRIS	• The establishment of locally based processing facilities could provide an alternative market for farmers.

Both agronomic and economic principles need to be applied to improve the potato value chain among smallholders. Some yield-enhancing agronomic practices include proper land preparation, sufficient ridging and proper irrigation scheduling to ensure maximum tuber development. To maintain good quality potatoes, harvesting should be well timed to avoid fruit damage (Table 5.31) and washing might be necessary, depending on the target market. Strategies to reduce production and marketing costs are also required. For instance bulk procurement of standard packaging material can greatly improve profitability of the enterprise and at the same time enhance farmer participation in formal markets.

5.3.2.8 Summary and policy implications

The study aimed to profile the smallholder potato value chain and identify the challenges and opportunities in its development. The smallholder potato value chain was found to be short and mainly dominated by two informal markets; namely the local community and the informal bakkie traders. On the production front, the biggest threat to potato production was found to be water availability. Potatoes require a consistent supply of water to ensure maximum yields and good quality tubers. Intermittent water supply led to some farmers ploughing back their failed potato crop for other rain-fed options, and others harvesting as little as 80 kg of potatoes per 0.1 ha plot. An improvement in water management systems to ensure efficient distribution and improved efficiency of water use is necessary to improve smallholder potato production.

Distances to both the input and output markets were found to be a barrier to entry into the formal market, hence the reliance on informal markets. This was worsened by a shortage of certified potato seed and high input costs, which impacted negatively on the profitability of MRIS farmers. On the output side, the local community market and informal traders seem sufficient to absorb the potatoes currently being produced in the scheme. However, as more than 50% of land was fallow during the time of study, there is potential to increase both the number of farmers, and the area under potatoes, with a concomitant increase in supply. This would trigger a need to penetrate more distant markets, prompting more robust approaches to production and marketing. Collective production and marketing of produce could provide solutions. Through collective production, farmers could procure bulk supplies of potato seed, packaging material and fertilisers, which would lower per unit transport costs. The same approach also has the potential to reduce marketing costs, especially if distant markets were to be supplied.

5.3.3 Evaluating the effectiveness with which farmers use irrigation water

Lack of water measurement devices, different management capabilities and unequal water distribution across the scheme at farm level, meant that variation in water use by irrigators might affect overall scheme performance. The efficient and effective use of water across the blocks at MRIS was therefore investigated using the residual valuation method. This method attributes the values of all the resources (except water) to the respective inputs, whereafter the balance of the cost can be attributed to water. This provides an indication of how effectively farmers are using water. The study also aimed to analyse how different factors (age as a proxy for farming experience, area planted, location of the farmers' plot within the scheme, frequency of irrigation and number of crops grown) influence variability of water values at smallholder level. Analysis of variance using the General Linear Model (GLM) procedure in IBM SPSS statistics 21 was used to identify factors that influence variation in water values. The magnitude of the effects was determined by computing Partial Eta squares. The value of the measure of association (partial eta squared) is interpreted as the proportion of variance in the dependent variable that is attributable to each effect (Pierce *et al.*, 2004). The use of Type III sums of squares option tests the unique contribution of each independent variable by removing effects of all other independent variables (McCullagh and Nelder, 1989; Pierce *et al.*, 2004).

In addition to drawing on COMBUD gross margin analyses, the SAPWAT3 estimated water requirements were used to impute residual water values for potatoes. The irrigation water values for potatoes were estimated by dividing the net gross margins of the crop by the actual water applied. The crop margins were calculated by multiplying the total yield by the market prices and subtracting total costs (at market prices). Water values were calculated for the three sections of the scheme. The data is tabulated in Table 5.32.

Table 5.32 Returns to water for smallholder irrigated potato production, Mooi River Irrigation Scheme (n=60), 2013

Description	Variability for farmers with positive gross margins				Variability for all sampled farmers			
	Upper n=9	Middle n=15	Tail-end n=8	Mean n=32	Upper n=12	Middle n=25	Tail-end n=23	Mean n=60
TR (R/ha)	34 803	24 504	22 802	26 975	29 110	20 118	11 563	18 637
TVC (R/ha)	20 807	14 749	16 481	16 886	20 474	17 449	15 377	17 260
GM (R/ha)	13 995	9 754	6 321	10 089	8 636	2 668	-3 815	1 377
Water (m^3/ha)	4 324	3 163	2 759	3 388	4 119	2 780	2 001	2 749
Water Value (R/m3)	**3.24**	**3.08**	**2.29**	**2.98**	**2.10**	**0.96**	**-1.91**	**0.50**
Range: Min	0.29	0.31	0.07	0.07	-4.07	-10.89	-17.6	-17.6
(R/m^3) Max	5.91	12.64	8.98	12.64	5.91	12.64	6.98	12.64

TR=Total revenue; TVC=Total variable costs; GM=Gross margin

Source: Muchara *et al.* (2014)

Although the variation in water values within the scheme seems to have a narrow spread, the water values declined after including negative gross margins in the imputation method (see Table 5.32). Since average water value is a good indicator of performance (Hussain *et al.*, 2007), it is apparent from the high proportion of farmers (47%) with negative gross margins and consequently negative water values, that smallholder farmers in the MRIS are underperforming. Furthermore, water values may show intrinsic challenges of water allocation and management at a local level, evidenced by negative values by tail-end water users in the scheme. In the case of MRIS, there may be significant opportunities to increase the net values generated with limited water resources by improving the distribution of water among farmers thereby reducing the negative water values.

The water value estimates from the RVM are accurate to a certain degree, and omission of some variables (e.g. land) might increase the estimates. Although this might be the case in this study, such omissions exert an equal influence on the final water value figure for all sampled farmers and therefore do not affect the variability of water values across the different users. Economically, farmers who have water values close to zero or negative should not use the resource, since it can be regarded as wastage. However, since most smallholder farmers do not pay for water in South Africa, negative water values might also be an indicator of the extent of government subsidisation to smallholder agriculture. Of concern are farmers who applied above scheme average irrigation (≥ 3380 m^3/ha), but still managed negative gross margins. These farmers represented 7% of the sample and qualitative reasons for the negative gross margins were sought. Some of the reasons include crop damage by livestock at flowering stages while potato blight was reported by one farmer as the main reason she lost her crop. After the blight attack, the farmer continued to irrigate with the hope of harvesting a meaningful yield. However, this decision could have been different if the farmer was paying for irrigation water, as additional cost could have deterred her from continuing to apply water to a failing crop. To ensure maximum returns on water, irrigation management must always be supported by other management and agronomic practices such as fencing and control of pests and diseases.. Extension support might help to improve production decisions.

5.3.4 Factors affecting irrigation water values at smallholder level

The imputed water values for the potato producers were regressed against age, education of the farmer (EDUC_LEV), frequency of irrigation (IRRIG_CYCLS), number of crops grown (NUM_CROPS), land size (HA_PLANT) and location of the plot (FARM_LOCAT) along the main conveyance canal. An F-test was used to determine the fitness of the model, and it was accepted at the 5% significance level (p=0.016). Variance Inflation factors (VIF) were computed for the variables included in the model and the results indicated that multicollinearity was not a problem (VIF<10). The GLM results are presented in Table 5.33.

Table 5.33 Factors affecting variation in water values, Mooi River Irrigation Scheme, 2013

	Type III Sum of Squares	DF	F	Sig.	Partial Eta Squared
Corrected Model	551.810	7	2.772**	0.016	0.272
Intercept	119.423	1	4.201**	0.045	0.075
AGE	11.553	1	0.406	0.527	0.008
EDUC_LEV	92.694	1	3.261*	0.077	0.059
HA_PLANT	10.333	1	0.363	0.549	0.007
NUM_CROPS	0.081	1	0.003	0.958	0.000
IRRIG_CYCLS	90.967	1	3.199*	0.08	0.058
FARM_LOCAT	211.484	2	3.718**	0.031	0.125
Error	1478.73	52			
Total	2074.968	60			
Corrected Total	2030.54	59			

Note: **, * mean statistically significant at the 5% and 10% levels, respectively.
Source: Muchara *et al.* (2014)

Variation in water values across the scheme was mainly influenced by farmers' education level, frequency of irrigation and farm location with respect to the main water source. The F-Value for education (EDUC_LEV) is statistically significant at the 10% level and explains 5.9% of the variation in water values. This is consistent with *a priori* expectations that level of education would influence water utilisation. Education has an influence on farmer decision making processes. Most farmers in the MRIS grew multiple crops at each given time; hence, they always had to make critical decisions pertaining to water allocation across the different crops. The more crops a farmer grew at a time, the more the constraints s/he faced in supplying adequate water to the crops. This might be attributed to the restricted access to water in the MRIS, where a farmer was allocated water one day per week. Assuming that farmers are rational, it can be argued that they allocated the water to what the farmer would regard as strategic crops for the household. This could either be based on potential revenue or household food security demands. Expectedly, such allocation had an impact on the variability of water values per crop and decision making processes have been shown to be positively influenced by farmers' education level.

Application of water one day per week could also affect the water value for a number of reasons. Firstly, because farmers only received water once a week and were uncertain of future supplies, they tended to apply as much as possible and over-irrigate. Secondly, farmers might not get water the following week, meaning that crops would be without water for two weeks, resulting in poor crop performance and even failure in some cases. Finally, in situations where there are quick draining soils and where crops are at a critical stage (e.g. seedling or flowering), weekly irrigation might not be sufficient for optimal crop performance. These factors would also contribute to low water values.

Water allocation in the MRIS varied across the different sections of the scheme and among the farmers within the blocks. The major challenge affecting farmers was water access. Farmers in the upper section of the scheme received more water than those on the middle and the tail-end sections. Analysis of variance shows that 12.5% of the variation in water value is explained by farm/plot location (FARM_LOCAT). Plot location was used as a proxy to explain institutional challenges around water allocation and how farmers whose plots were located at different positions along the main canal had unequal water access. The statistically significant F-value confirmed that location further from the water source negatively affected water values. This is also supported by significant F-values for irrigation frequency (IRRIG_CYCLS), which varied from the upper section to tail end section of the scheme. Consequently, irrigation cycles explain 5.8% of the variation in water values. This calls for improvement in local water management systems and the equitable allocation of irrigation water resources.

5.3.5 Cattle and goat value chains

From the 90 households, 76 households owned goats and 62 households owned cattle, as presented in Table 5.34. The total number of goats owned by the respondents was 1797, with a mean flock size of 23.65 goats. The total number of cattle owned was 665, with a mean herd size of 10.73 cattle.

Table 5.34 Summary of household ownership of goats and cattle sampled at Msinga, 2013.

Community	Goats ownership	Cattle ownership
Nxamalala	25	18
Madulaneni	26	16
Ntanyana	25	28
Total	**76**	**62**

As shown in Table 5.35, 54% of households interviewed owned a combination of goats and cattle, while 14% only had cattle and 31% only had goats. It should be noted that this is not representative of the total community as the focus was on livestock-owning households when identifying respondents.

Table 5.35 Number and percentage of households owning goats and/or cattle in each community, 2013

Communities	No of households with cattle only (%)	No of households with goats only (%)	No of households with goats and cattle (%)	Total
Nxamalala	5 (16.67)	12 (40)	13 (43.33)	30
Madulaneni	3 (10)	14 (46.67)	13 (13.33)	30
Ntanyana	5 (16.67)	2 (6.67)	23 (76.67)	30
Total	**13 (14.44)**	**28 (31.11)**	**49 (54.44)**	**90**

The contribution of livestock to the socio-economic status of the households interviewed was explored. As shown in Figure 5.31, livestock as a highly important source of income was mentioned by approximately 10% of households interviewed, while nearly 50% of households interviewed said that government grants were highly important. The lack of both permanent and temporary work affecting approximately 70 and 90% of households respectively is also apparent from the graph. More detail regarding the role of livestock as well as their management is provided below.

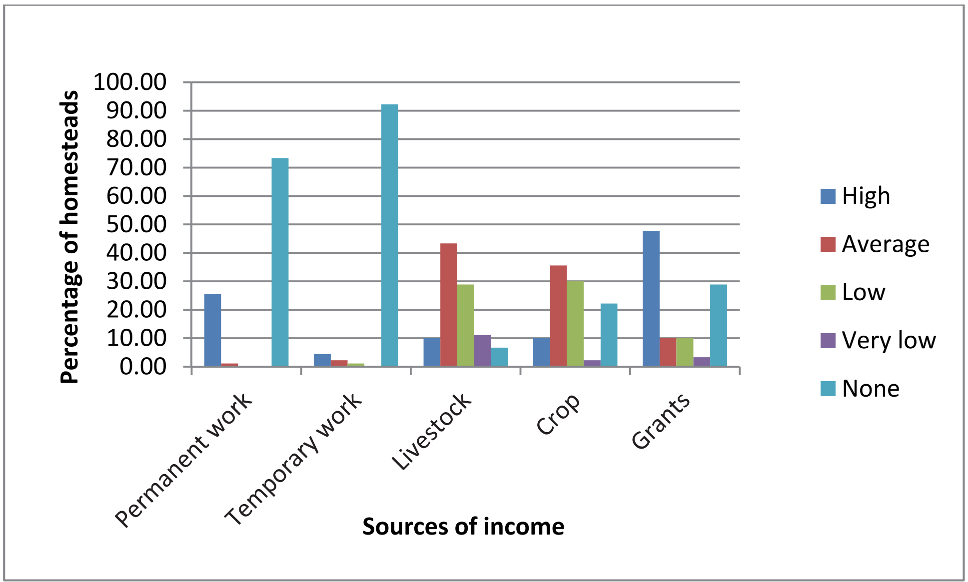

Figure 5.31 Percentage sources of income across the communities; ranked from high to none.

5.3.5.1 Goat production

Goat production at Msinga was explored in terms of reasons for keeping them and changes in flock size over time.

5.3.5.1.1 Reasons for keeping goats

Respondents were asked to indicate from a list, the reasons for keeping goats. They were said to be kept by households for a number of different reasons, which are provided in Table 5.36.

Table 5.36 Number of households keeping goats for various purposes, n=76, 2013

Purpose	Number of households	Percentage of households
Income	53	69.74
Meat	46	60.53
Milk	4	5.26
Cultural purposes	49	64.47
Prestige	33	43.42

From Table 5.36 it is apparent that households in Msinga perceived income to be an important reason for keeping them (mentioned by 69.74% of goat owners), but cultural purposes (mainly slaughter for communication with ancestors), was also seen as an important purpose, being mentioned by 64.47% of respondents.

At the FGD, it was highlighted that goats play an important role and that they may not be slaughtered until the head of the house has given permission. Also, goats were said to be used to pay fines enforced by the Traditional Authority. The importance of goats for ancestral worship also emerged from the FGDs and the survey.

Alongside with this cultural practice, famers kept or sold the skin of the goats and cattle slaughtered, as shown in Table 5.37. The skins that were kept were used as mats on which to sit or were used in the manufacture of various traditional items. When sold, they were a source of income to the household. While the sale of goat skins was not discussed in detail, it is recognised that there is a local demand for skins for the manufacture of traditional skirts known as *izidwaba*.

Table 5.37 The main use of goat and cattle skins, 2013

Main use	**No of households (Cattle hides)**	**No of households (Goat skins)**
Discard the skin	8	11
Sell the skin	29	27
Keep the skin for my use	24	40
No answer	2	-
Total	**62**	**76**

Through the survey, farmers were asked to reflect back on the use of goats during the period January to June 2013 to provide some indication of usage or loss of animals. The results are presented in Table 5.38 It is important to note that one of the goat farmers who sold goats in this period sold 33 goats, while the rest sold between 1 and 6 (and most only sold 1 goat). The use of goats for ceremonies had the highest frequency of uses (47.37% of respondents), and since the meat from these goats is largely eaten by the household, the same goats may have been mentioned in two categories in the table below.

Table 5.38 Summary of goats numbers used or lost in the period January to July 2013, n=76.

Number of goats utilised for various purposes	**No. of households**	**Percentage of households owning goats**	**No. of goats**
Given out as gifts	4	5.26	5
Consumed at home as food	28	36.84	91
Used for ceremonies this year	36	47.37	117
Used to pay charges / fines / damages	10	13.16	69
Sold	17	22.37	75
Other purposes	2	2.63	7

It is also important to note that a total of 19 households had goats stolen during the same time period and the number of goats stolen was 111, which is almost the same number of goats used for cultural ceremonies. This highlights the magnitude of the problem of stock theft in the area.

5.3.5.1.2 Changes in flock size over a 12 month period

A measure was obtained of the percentage of flocks showing an increase from June 2012 to June 2013. It was found that 57.89% increased while 42.11% either stayed the same or decreased. Reproduction was said to be the major mechanism for flock increases across the three communities.

Other mechanisms included purchases and gifts, but farmers from Nxamala only attributed flock size increases to reproduction, as shown in Figure 5.32.

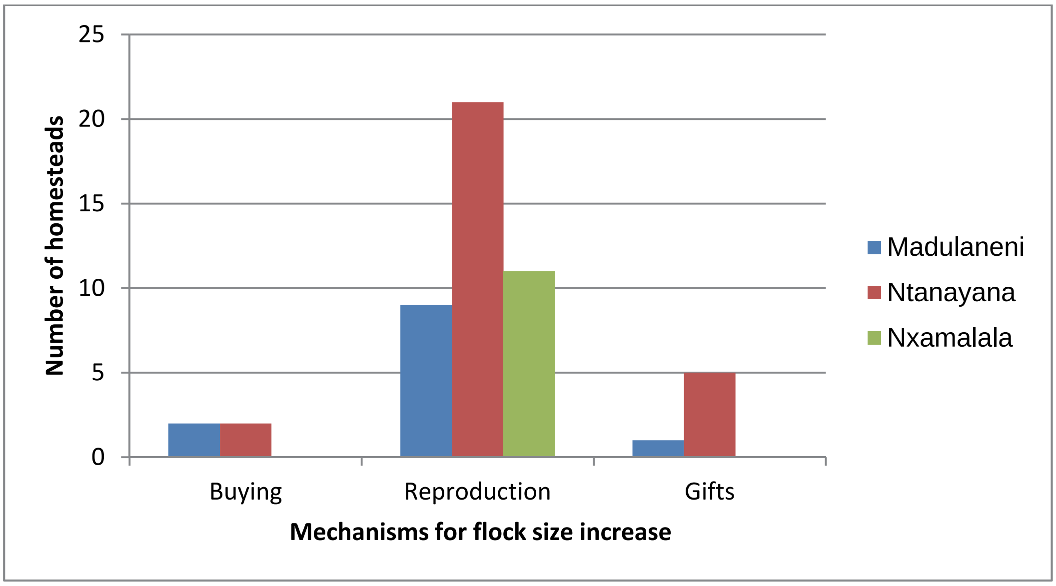

Figure 5.32 Mechanisms by which goat flock sizes increased.

5.3.5.2 Cattle production system

A similar investigation of extensive cattle systems was also undertaken.

5.3.5.2.1 Reasons for keeping cattle

Cattle production has a great influence the socio-economic aspect of the communities in Msinga. It was discovered through the FGD that cattle are used for cultural purposes such as *Lobola*, which is the gift from the groom's family to the bride's family. They are also used for cultural slaughter purposes and it is recognised that they can serve as draught animals, playing a role in opening up arable areas, especially in places with heavy soils.

Reasons provided in the household survey for keeping cattle are presented in Table 5.39. Income was mentioned by 62.9% of respondents, but meat and cultural purposes were also mentioned with relatively high frequency.

Table 5.39 Number of households keeping cattle for various purposes, n=62, 2013

Purpose	No. of households	Percentage
Income	39	62.90
Meat	27	43.55
Milk	3	4.84
Cultural purposes	26	41.94
Prestige	18	29.03
Ploughing	0	-

As with the goats, farmers were asked to recall losses or utilisation of cattle over a 6-month period from January to June 2013. The results are presented in Table 5.40.

Table 5.40 Summary of cattle number used for specific purposes across the communities in 2013.

Utilisation of cattle	Number of households	Percentage of households owning cattle	Number of cattle
Given as gifts	3	4.84	12
Consumed at home as food	5	8.06	10
Used for ceremonies	16	25.81	36
Used to pay charges / fines / damages	6	9.68	45
Sold	5	8.06	9

Table 5.40 shows that 9.68 % of households used cattle to pay damages or fines (this is traditional practice in Msinga), while 25.81% used cattle for ceremonies. This highlights the important cultural role of cattle. The number of households that sold cattle was actually comparatively low (8%), given that many respondents had indicated that this was a reason for keeping cattle.

A total of 6 households had cattle stolen, which amounted to 24 animals. While the number of cattle stolen was much lower than goats (24 cattle versus 111 goats), the cash value is fairly comparable.

5.3.5.2.2 Changes in herd size

The results for changes in cattle herd size were similar to the results for goat herds. It was found that 54.84% increased and 45.16% stayed the same or decreased. While the data are not available from the current study, it is recognised that these changes in flock/herd sizes can vary greatly from year to year depending on the incidence of drought. Figure 5.33 shows respondents' perceptions regarding different factors responsible for increases in cattle numbers across the three communities.

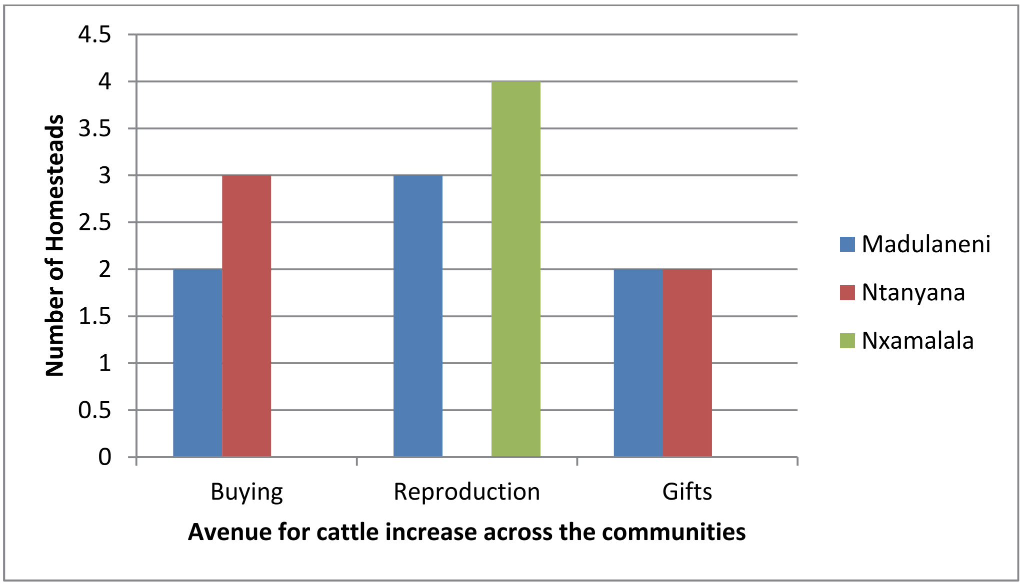

Figure 5.33 Mechanisms for increases in cattle number.

5.3.5.3 <u>Impact of the irrigation scheme on livestock production</u>

The impact of the MRIS on livestock production was discussed in terms of feed and water availability.

5.3.5.3.1 Feed availability

Many of the farmers in the area adjacent to the scheme had irrigated plots (71.11% of households interviewed). Homestead garden, which are small plots of land cultivated next to the homestead and normally used for growing vegetables, were not common in the area because of the scarcity of water and only 6.67% of interviewed households had such gardens. Some households (18.89% of respondents) had dryland cropping fields.

In addition to beds within the irrigation scheme, some households adjacent to the irrigation scheme used the water in the canals to irrigate their fenced plots. Despite the high percentage of livestock owners having access to irrigated beds, the use of crop residues (including maize stover) was relatively low. From FGDs it was apparent that many irrigation farmers did not own livestock and there was some conflict between those who did own livestock and those who did not, as livestock owners were not permitted to graze their livestock within the scheme, even after harvesting the crop.

There was some interest among irrigation farmers owning livestock to learn and put into practice ways to conserve crop residues for the next season. Given that 71.1% of respondents have irrigating beds or plots, it should be possible for many of the households to make some crop residue available to livestock during periods of feed shortage, and yet only 56.67% of respondents indicated that their livestock had access to crop residues / maize stover. This highlights that the scheme was not providing the feed inputs that it had the potential to provide.

5.3.5.3.2 Water availability

Generally farmers indicated that their livestock drank from the Mooi River or streams, however field observations revealed that many animals actually drank from the canal because the streams were not perennial and the Mooi River was not easily accessible due to the position of the irrigation scheme between the houses and the river. While 60% of livestock owners said that they took their animals to drink, when respondents were asked about how much time they actually spent on various livestock-related tasks, only 16.13% of cattle famers indicated that they spent time collecting water for their cattle or taking them to drink, while 35.53% goat owners allocated time to providing their goats with access to water. The difference may be due to the fact that farmers find the provision of water for goats manageable whereas the water requirements of cattle are too large to meet if water has to be fetched for them. During the field observations of livestock for a forty-eight hour period, it was discovered that many livestock did not come across water at all and were not given water at home either. It is interesting to note that water shortages were raised by farmers as a factor impacting on the success of their livestock enterprises. In such an environment, where water shortages are very high during winter, farmers should provide water for their livestock as part of their management routine, though it may be a difficult task.

5.3.5.4 Factors affecting livestock production

There are many factors that affect livestock production, but based on the FGD and responses from the survey, the factors that are most relevant to Msinga farmers can be divided broadly into three categories: human factors, health factors and feed factors.

Table 5.41 Changes in mean goat and cattle flock / herd sizes from June 2012 to June 2013

Goat	June 2012		June 2013	
	Mean flock size	**Range in flock size**	**Mean flock size**	**Range in flock size**
Goats	23.90	2-450	23.64	1-500
Cattle	12.62	1-69	10.73	1-54

Cattle herd sizes decreased from 2012 to 2013 which may be as a result of inadequate basic management practices since during the FGD, it was discovered that many cattle owners believed their herds could survive with minimum intervention.

Factors responsible for herds and flocks declining or not growing were explored. They included disease, dog attacks, theft, water and feed shortages, animals going missing and a lack of dipping facilities, as shown in Table 5.42. Water shortages and disease were the most frequently mentioned factors, affecting 54.44% and 57.78% of owners respectively.

Table 5.42 Factors impacting negatively on livestock owners, n=90, 2013

Factor	No. of households	Percentage of households
Disease	52	57.78
Dog attacks	41	45.56
Theft	42	46.67
Shortage of water	49	54.44
Shortage of food	41	45.56
Lost animals (Missing)	1	1.11
Poor / lack of dipping facilities	9	10.00

5.3.5.4.1 Human factor: management level and skills

Management of livestock has a direct impact on its productivity. Livestock owners were asked what items they used for their livestock. The results are presented in Table 5.43. The table shows that only 4.84% of cattle farmers indicated that they used traditional medicine for their cattle, which was slightly greater for treatment of goats (17.11%% of goat owners). There was a much greater reliance on modern medicine (100% of cattle owners and 89.47% of goat owners treat their livestock). Dipping was also common for cattle, but only 27.63% of goat owners indicated that they dipped their goats.
This is likely to be because government maintains diptanks and provides a dipping service for cattle, but this is not formally available for goats. Owners said that they took their cattle for dipping every two or three weeks and requesting assistance from the KZN DoA Animal Health officer when needed.

Table 5.43 Some items farmers in Msinga use to boost their livestock production, 2013

Items	No. of households	Percentage of those households owning that livestock type
Goats (N=76)		
Traditional medicine	13	17.11
Modern medicine	68	89.47
Dip	21	27.63
Purchased feed	29	38.16
Crop residues	8	10.53
Hired labour	0	-
Cattle (N=62)		
Traditional medicine	3	4.84
Modern medicine	62	100.00
Dip	62	100.00
Purchased feed	24	38.71
Crop residues	11	17.74
Hired labour	0	-

None of the livestock owners hired herders to take care of their animals. It is interesting to note that the survey found that only 17.78% of the total population of farmers sampled had attended any livestock training, and this raises questions regarding their capacity to manage the health of their livestock.

5.3.5.4.2 Feeding practices

Feeding contributes tremendously to the productivity of livestock, including reproductive performance. The majority of the farmers grazed their goats and cattle on communal grazing land within the study area. Of the famers interviewed, 70% grazed their livestock on communal land, approximately 24% grazed on individually held or rented land and 1 person indicated that their livestock grazed within the irrigation scheme (the other respondents did not provide answers). The communal grazing area was not fenced into camps. No farmer had personally planted pastures for his/her livestock. Livestock fed on the available selection of grasses, trees and shrubs that grow on it and these are affected by seasons and environmental conditions. Much of Msinga Local Municipality is characterised by rockiness, steep slopes, shallow soils, low rainfall and high temperatures. As a result, livestock struggle to find grass and browse during the dry winter period. There were some portions of land that had been privately fenced by individuals for their livestock. Some farmers in the area paid charges to graze their livestock on private land, especially during the dry season when feed is scarce.

Many livestock farmers expected their livestock to be satisfied with the available natural vegetation while others ensured that their livestock had access to crop residues after harvest. In reality, the amounts of crop residue available to livestock in Msinga are very limited and were said to provide feed for a maximum of two weeks.

The survey revealed that provision of supplementary feed was actually very limited. The only supplementation mentioned was winter feeding of hay (by 30% of farmers) and access to crop residues by herds belonging to 56.7% of famers. Livestock farmers need to develop new feeding practices that can support the livestock throughout the dry season.

Water availability should also be given consideration in this discussion. Apart from the perennial Mooi River and various non-perennial streams, the main water source is the water flowing in the canal which is going to beds within the irrigation scheme. The streams only flow when there has been rainfall. Livestock were not always grazed in close proximity to the canal or the river and therefore they were confronted with water shortages. To keep livestock healthy and productive, farmers should also endeavour to make water available in the kraal as part of their management practices.

5.3.5.4.3 Health management

Livestock farmer need to be able to identify and vaccinate against or treat commonly occurring and new outbreaks of diseases. The survey showed that there was a much greater reliance on modern medicine than traditional medicine. Some of the medications commonly used by farmers included Sulfazine16%, Vecoxan, Oxytetracyline (such as Hi-TET 200 LA, or Terramycin) and Ivomec.

A range of conditions, parasites and diseases that were said to affect livestock are presented in Table 5.44. It is clear that farmers saw worms and lung infections as major challenges. Other challenges that were mentioned included coccidiosis, Heart water, mastitis and bloat.

Table 5.44 Common health-related problems mentioned by livestock owners

Health problem	**No. of households**
Worms	20
Diarrhoea	2
Ticks	9
Mange	8
Pneumonia / lung infections	27
Sores	2
Footrot	1
Mastitis	2
Anthrax*	1
Warts	1

*** Note:** Farmers are aware that the State vaccinates against Anthrax using a combination of Black Quarter/Anthrax vaccine called Blanthrax. It is likely that they are aware of this rather than having actually encountered the disease.

5.3.5.5 Collective action

Participation in a livestock association is one mechanism for collective action related to livestock keeping. FGDs revealed that many farmers did not really know about the Msinga Livestock Association and the role it played / could have played. Some indicated that they are waiting to hear from their friends about the benefits that have come from joining the association. Only 4 respondents indicated that they were members of the livestock association although 75.56% showed interest in participating. This implies that the flows and sharing of knowledge/ information about livestock such as disease outbreaks, will be very low and slow. The survey found that 68.89% would be interested in joining the association if it allowed them to market their livestock more easily. Some respondents (12.22%) indicated that they had collectively purchased inputs such as medicine and feed.

Pertaining to herding of cattle, only 1 famer indicated that he had ever joined with others to hire a herder to take cattle for grazing. In general this shows that the extent to which farmers acted collectively was very limited. Although not explored in detail, operation of the diptank is one activity where farmers did act collectively. The dip was provided by KZN DoA Veterinary Services, but cleaning and replenishing of the dip is done by livestock owners.

5.3.5.6 Marketing aspects

Regarding the marketing of livestock, the survey revealed that only 29 goat farmers (38.15%) and 21 cattle owners (33.87%) had sold animals in the previous 18 month period. The numbers sold are shown in Table 5.45. In all cases, farmers said that the buyers were community members and that they came to the farmer to make the purchase. The study also found that livestock owners often only sold animals when in financial need, or when someone approached them needing an animal.

Table 5.45 Total number of livestock sold in a 18 month period.

Livestock	Number sold in 2012	Number sold Jan-June 2013
Goats	**(n=28) 88**	**(n=16) 23**
Cattle	**(n=18) 32**	**(n=11) 13**

Note: A number of livestock owners sold animals in 2012 and 2013

Marketing was found to be complicated by factors that included locality (distance to markets and poor condition of roads), lack of marketing facilities, and cultural beliefs. All but two of the livestock owners indicated that there was no livestock market place or auction in their vicinity. They also complained of the lack of good roads connecting the communities and difficulty in transporting their livestock to the market place or auction.

The DRDLR undertook a feasibility study that prompted them to spearhead a pilot programme to support marketing in Msinga. The first Msinga Goat Auction was held at Msinga on 7 March 2013 and approximately 550 goats were sold. The second auction was held on 14 November 2013. Officials from KZN DoA reported that 911 goats were sold but 379 goats were not presented as their condition was too poor and 158 of the goats presented were not sold as the prices were not accepted by the sellers. The auction was attended by 241 livestock owners and the goats were auctioned by AAM auctioneers as shown in Figure 5.34. This highlights the fact that goat owners need to improve the management of their goats so that they offer better quality animals. A more detailed report on the two sales is contained in Appendix 5.

Figure 5.34 Sellers, buyers and spectators at the Msinga Goat Auction in November 2013.

5.4 SUMMARY AND RECOMMENDATIONS REGARDING VALUE CHAINS

The analysis of the food value chains at the three study sites, which included irrigated vegetables (cabbages and tomatoes), green mealies, bananas and livestock (cattle and goats), provided a clear overview of the types of value chains that characterise smallholder production, as well as the types of markets that they typically access.

For all commodities, the value chains were very short and often involved farmers selling produce directly to members of the local community (who would be termed non-market oriented smallholders according to the typology presented in Table 4.47), or to hawkers who then sold it on to the final consumer (more market-oriented smallholders). Sometimes farmers' products were not of a standard suitable for supplying higher paying markets and thus they resorted to apparently sub-optimal decisions such as selling to hawkers. This may, in fact, be the best decision possible and for this reason it is important to have a thorough understanding of both market requirements and the production capacity of smallholder farmers (Jordaan and Grové, 2012). There was almost no value adding or processing encountered except for a limited amount of banana ripening by smallholders at Bizana and very limited cooking of green mealies at WIllowvale.

The lack of value adding (such as the washing of potatoes identified at Willowvale as a requirement for selling to retail outlets) resulted from both a lack of knowledge and the lack of appropriate processing infrastructure – including potable water.

Water is a key input in all the value chains encountered. In livestock, water use was largely restricted to drinking water, but was frequently highlighted as a limiting factor, especially in the Msinga area. Here the irrigation canal not only supported vegetable and crop production but also provided a water source for livestock. At the Willowvale and MRIS sites, irrigation water was a key input for the production of the various crops. The farmers were very aware of the role of water – and the challenges associated with the equitable provision of water. At Marina, where bananas were generally grown under dryland condition, a number of small-scale producers highlighted the limitations of dryland production and some use of mulching was already being practiced as a mechanism for retaining soil moisture. The commercial farmers in southern KZN highlighted that dryland production of bananas was too risky and were largely in the process of converting to irrigated production.

The nature of the market outlets and the marketing procedures were a key part of the value chain analysis and are further described according to the sub-objectives of the project.

5.4.1 Different market outlets for food crops, animals and animal products

Across all value chains explored, it was found that most products were sold locally (within the community) or were sold to hawkers or ‘bakkie’ traders. This marketing route was preferred because of a lack of transport to take produce to more formal markets. Most hawkers and traders were willing to come to the farmers’ fields to collect produce. There was also more scope for price negotiation with such customers than there was with more formal markets.

Overall, very little use was made of formal markets, such as fresh produce markets or auctions, for a range of reasons. Generally these markets were not easily accessible and the farmers could not compete with large-scale producers. For livestock farmers, access to formal markets such as abattoirs and feedlots was even more challenging because of the difficulties and high cost of transporting animals. The auction sales that took place at Msinga in 2013 (See Appendix 5 for a report on the auctions) provided a strong indication that livestock owners would make use of such facilities if they were more readily accessible and if there was some assurance of reasonable prices. It is still questionable whether the farmers supplying animals would actually be Category 2 farmers (non-marketing farmers with a particular need for cash at that time), or market-oriented Category 3 smallholders.

The investigation of the commercial banana value chain to identify opportunities for drawing smallholder banana producers into the mainstream economy showed a number challenges related to quality and volumes and highlighted that as long as local, informal markets can absorb production volumes, they may provide more realistic options for smallholders.

The production and marketing of green mealies, encountered in both WIllowvale and MRIS, was an example of a strong, but completely informal value chain. Bakkie traders frequent such irrigation schemes and buy up large volumes of cobs which they then sell on to hawkers in various urban centres, who then sell them on again raw or cooked. The incidence of market oriented smallholders at MRIS was fairly high as this is a commodity for which there was a local market, albeit informal. This highlights that farmers might also produce different crops for different purposes – for example green mealies to sell and vegetables for own use. This further complicates the classification of farmers.

There was some experience of supplying produce to retailers, with one of the Willowvale projects having established a relationship with a number of outlets. However this relationship broke down over time as the access road to the site deteriorated and the owner of the shop was no longer willing to send a vehicle to collect produce. This highlights that a number of unrelated factors impact on the ability of small-scale farmers to engage in mainstream markets.

5.4.2 Different attributes of the markets in these value chains

The study also explored the attributes of various markets that smallholder farmers were accessing, had accessed in the past or aspired to access in the future. For example, it was found that formal markets had fairly stringent systems and there were delays between delivery of produce and receipt of payment – if indeed the produce was sold at all. The collective marketing system that the commercial banana farmers used highlighted the skills required for effective marketing of produce.

Most of the formal markets charged commissions or levies on goods sold on behalf of farmers. In the case of retailers and wholesalers, many of them sought contracts with reliable suppliers and needed a consistent supply of good quality produce. There were complaints that smallholders were not able to meet this requirement. Some retailers and wholesalers such as Boxer, had centralized buying platforms and could not / would not buy from local producers. They also had standardised pricing structures based on market prices. Even the fresh produce markets favoured large-scale farmers supplying consistently large volumes of produce, which put small-scale producers at a disadvantage.

5.4.3 Different standards within these food value chains

The study found that, while the standards required by the various markets differed, all markets had standards of some sort. While retailers were probably the market with the most stringent requirement in terms of quality, even hawkers raised the issue of quality during interviews. They highlighted the problems they encountered with small-scale farmers who did not grade their produce. Some markets had specific needs – for example school feeding schemes needed bananas that were ripe and ready to eat, while some hawkers wanted boxes with a mixture of ripe and unripe fruit to minimise wastage. Markets for meat are even more complex as meat supplied to butcheries and retail outlets has to meet health and safety standards and is therefore generally purchased from registered abattoirs. There is very little opportunity for small-scale livestock owners in communal areas to feed into this value chain.

The different markets for fresh produce had different requirements in terms of packaging. For example, retail outlets generally wanted washed and packaged produce which smallholders were not able to supply without access to suitable facilities. These are the reasons why many small-scale farmers are forced to supply hawkers and traders who are prepared to take items packaged in bulk or sold loose and packed into the traders own packaging / vehicles. Lower standards and requirements are associated with lower prices which are a disadvantage to farmers who are already producing at a level that does not allow them take advantage of economies of scale.

5.4.4 Different opportunities and constraints to entering food value chains

The results of the study showed a range of opportunities and constraints that smallholder farmers face when accessing various markets. A general shortage of resources for purchasing inputs, coupled with a lack of technical skills and business acumen, resulted in many farmers being unable to participate in mainstream markets with stringent standards (e.g. hygiene, traceability of produce, etc.).The lack of packing facilities, limited scale of production and the lack of access to transport are some factors that constrain the participation of small-scale farmers in mainstream value chains.

Despite this, there are some value chains that small-scale farmers have effectively claimed, such as green mealie production. These are value chains where farmers have the skills necessary to produce a good quality product and where systems have developed that have allowed them to market their produce effectively. Furthermore, these are value chains that have developed spontaneously without being artificially facilitated by outside parties. They demonstrate that small-scale farmers can effectively engage in market-oriented production.

In conclusion, perhaps it is important for small-scale farmers to find opportunities that do not require that they compete directly with large-scale commercial farmers. Furthermore, an integrated approach is required to address the range of barriers and constraints that limit the extent to which small-scale farmers produce and market agricultural products.

6 COLLECTIVE AND INDIVIDUAL ACTION

The fifth Specific Objective of the study was to analyse and describe collective and individual use of water resources for crop and animal production, in relation to collective and individual marketing with reference to amongst others:

(1) Land and water resource use
(2) Production input acquisition
(3) Marketing within selected food value chains
(4) Alternative co-operative governance structures for input/product marketing
(5) Public-private partnerships for resource use and input/product marketing.

The chapter covers findings from the three sites in terms of the extent to which farmers engaged in individual and/or collective action in relation to land and water use, input acquisition and marketing. Alternative governance models were investigated, as well as the need for cooperative governance between different levels of government and/or government departments. Private-public partnerships (PPPs), as another form of multi-stakeholder collective action, were also explored, drawing on the literature to investigate the potential of PPPs to strengthen agricultural development in South Africa.

6.1 LAND AND WATER RESOURCE USE

Land and water access and utilization were explored in more detail at the three study sites, with a particular focus on whether activities were undertaken individually or collectively.

6.1.1 Willowvale, Eastern Cape

6.1.1.1 Land access and utilisation

For rural agrarian communities, land is a key resource. The study revealed that 84% of the people used land for agricultural purposes. The process whereby households gained access to land for agricultural purposes was investigated and results are shown in Table 6.1. In terms of land acquisition, 39% of the people indicated that they acquired land by inheritance while 59% indicated that they got their land through the traditional allocation system (these could be closely related as land inherited would in all likelihood have originally been allocated to the household through the traditional system). Only 2% of those interviewed leased the land they farmed.

Table 6.1 Land acquisition modes at Willowvale, Eastern Cape, 2010

Land acquisition mode	Ciko (n=41)	Mbozi (n=59)
Leasing	2.4 %	0%
Inherited	12.2%	57.6%
Allocated by traditional elders	85.4%	42.4%

Though land was acquired predominantly for residential and agricultural purposes, there were other uses to which land was Putin these two communities. For instance, a discussion with key informants in both villages revealed that apart from farming purposes and homesteads, land in the two villages was also used for small business activities such as shop buildings, etc.

6.1.1.1.1 Local systems for land acquisition

The local systems that were in place to allow access to land for housing, crop production, etc. were also investigated. Of the people interviewed, 79% recognised that there were laws and rules governing land tenure and acquisition. An interactive discussion with key informants revealed that the process of land acquisition started with an individual who expressed interest in a particular piece of land. The individual then approached his neighbours – in this case, these would be the people living very close to the land the individual wanted to acquire. It was important that these neighbours agreed that the individual could make use of the land. Once the consent of the neighbours had been sought and a mutual agreement established, the individual proceeded to the sub-headman who was in charge of the area where the land was located.

The sub-headman would ask whether an agreement had been reached between the individual wishing to access land (referred to in this section as the “potential land owner”, though it is recognised that access to land does not equate to ownership thereof) and his neighbours. Once this had been ascertained, the sub-headman would tell the “potential land owner” to bring traditional beer for a mini ceremony with the community members at which they would be notified about the intended land acquisition and the individual who wished to acquire it. This process was said to ensure transparency and avoid conflict of interest in respect of the particular land under consideration.

After the mini ceremony, and subject to there being no objections to the proposed land acquisition, the sub-headman and the “potential land owner” would inform the ward committee that represented the municipality at the village level. The sub-headman would then take the “potential land owner” to the headman who was the overall traditional head in the village. The “potential landowner” was required to give gifts to the headman (often alcoholic beverages).

The headman would then write a formal letter to the Eastern Cape DoA informing them that an individual had expressed interest in a particular piece of land in the village and that a mutual agreement has been reached between the community and the potential land owner. The “potential land owner” would take the letter to the ward councillor. The ward councillor would confirm that the ward committee had been informed about the intended land acquisition. Once the ward councillor has ascertained this from the ward committee, he would also write a letter to the DoA to confirm his awareness. The “potential land owner” would take both letters to the DOA for endorsement, and the DoA would set a date for land allocation. It was the duty of the “potential land owner” to inform the headman and the sub-headman about the date for the land allocation, who would then inform the community members. After the land had been officially allocated, it was the duty of the DoA to apply for Permission to Occupy (PTO) on behalf of the “potential land owner” from the Department of Land Affairs. However, the “potential land owner” could begin to use the land before the PTO was issued, as the process usually takes some time. The study revealed that land allocation and acquisition usually followed the procedure highlighted above, regardless of the purpose for which the land was to be used. However, corporate organisations or registered companies had to submit copies of their Constitution to the DoA as part of the conditions to be fulfilled before land was officially allocated to them.

The key informant discussion also stated some of the problems associated with land acquisition in the community. These include the death of a “land owner”. If a “land owner” dies, the clan might not want to release the land to someone else who is interested in putting the land to productive uses. Another problem is that of religious belief – some religions do not encourage their followers to give alcoholic drinks to the headmen, yet buying brandy or other alcoholic drinks for elders of the community is one of the informal conditions that must be fulfilled before land is allocated to any interested person.

Grazing land was also considered. Within the study site there were areas of land designated for communal grazing purposes where every community member was permitted to graze their livestock. No rules or processes controlling access to the grazing area were identified through the study, apart from those excluding livestock from the cropping lands.

In both communities there were allocated lands that were not being used by the farmers that had use rights. The study revealed that 33% of the people across both communities had allocated lands that were not being used for any productive purposes. The reasons given for non-use of allocated land are summarised in the table below. Reasons included lack of money (16 responses), lack of fencing (13 responses), input challenges (10 responses), poor health (5 responses), distance to fields (4 responses) and unsuitable topography (4 responses).

Table 6.2 Reasons given for under-utilisation of land at Willowvale, Eastern Cape, 2010

Reasons	Frequency
Other reasons (especially poor health)	5
Lack of fencing	4
Lack of money and fencing	4
Lack of money and input problems	4
Lack of money and fencing and input problems	4
Lack of money	3
Unsuitable topography	3
Too distant	2
Input challenges	1
Too distant and unsuitable topography	1
Lack of fencing and input challenges	1
Lack of money and too distant	1

Studies conducted elsewhere have found a number of reasons for the observed abandonment of arable lands. According to Aliber and Hall (2010), as much as 75% of land in ex-Bantustans is underutilised, although this is complicated by the fact that substantial variation does occur between consecutive years. A study of findings from 18 different rural and peri-urban communities in Limpopo, Mpumalanga, KwaZulu-Natal (KZN), and Eastern Cape by Andrew *et al*., (2003) documented large-scale abandonment of previously cultivated land in KZN and Eastern Cape – especially in areas where people were moved into villages through government resettlement programmes known as ‘betterment schemes’. This has, amongst other impacts, resulted in increased distance between households and fields as well as the lack of flexibility in land-use (Fay, 2009).

Reasons encountered elsewhere for abandonment of lands include: low potential of the soils resulting in poor yields; uneconomical maize production in years when farmers have received lower prices for maize; and a move away from crop lands to homestead gardens because of the risk of theft, and lower associated production costs (Manona, 2005). Drimie *et al*., (2009), in a study of agricultural production in the Greater Sekhukhune District of Limpopo, suggest that the rural poor are becoming increasingly less involved in agricultural production because of poor access to agricultural land and inputs, including labour, and biophysical factors such as declining fertility. The situation is exacerbated by a loss of agricultural knowledge, inappropriate extension services, poor credit facilities and HIV/AIDS with poverty reducing people’s ability to invest in agriculture.

Other reasons for abandoned fields include: the shortage of labour, with men being away and women having other responsibilities; a shortage of oxen for land preparation and manure for soil improvement; a shortage of capital for purchasing inputs; difficulties in accessing tractor services and agricultural inputs locally; soil erosion due to poor cropping practices; the risk of livestock damage (one reason being the lack of fencing); a lack of markets for produce; competition from the commercial sector as well as a loss of cooperative/collective activities that previously supported agricultural production (Andrew *et al*., 2003).

Manona (2005) identified a number of institutional factors that could have contributed to the decline in cropping activity on arable land. He found that the systems for land allocation in the Eastern Cape had deteriorated and that 74% of people with households in the area did not have user rights to arable land. In addition he found that rights to arable lands change hands through inheritance along the male line from one generation to the next and are often held by people with no interest in farming. These “land owners” often ‘hold onto the land’ as a type of insurance policy for the future, which means that this land is effectively taken out of production. Aliber and Hall (2010) also refer to institutional challenges, in particular tenure-related challenges, having contributed to the abandonment of fields. They highlight specifically the lack of institutional mechanisms authorised by Traditional Authorities that allow for land to be lent, or leased out to others, without the risk of losing it. It is interesting to note that institutional issues, such as the lack of security of tenure or challenges with land allocation procedures, were not mentioned by the respondents in this study and their focus was on technical or financial challenges.

6.1.1.1.2 Collective land utilisation

The way arable land was utilised differed between individual households and community projects. Individual households used their cropping lands individually, while members of projects utilised land collectively. The next two sections cover acquisition and utilisation of land at FCP and Ciko Santrini Project.

Foundation Community Project

Individual members did not have access to individual plots within the project area, therefore land usage was classified as collective usage.

At the time of the study, FCP was benefiting from a 10 year lease on the land for its agricultural activities. The land belonged to Mbozi villagers, and through government facilitation, a lease agreement was entered into between the community and the project, and signed by the Headmen, Ward Councillor, Project members and witnessed by lawyers. Five project members and 28 non-project members contributed their lands to make up the 66 hectares of land available to the project. The lease was renewable after 10 years, should the project continue and the community still agree to make the land available. Project members were confident that they would be able to renew their contract, and did not anticipate any take-over of the land by the community, as the original decision to allocate the land to the project had been based on the fact that the land had not been in use for years, and the project provided a way of putting it back into use. According to the FGD, the 28 non-project members did it to help the community develop its food production potential. Some of the benefits said to be accruing to the community members included paying cheaper prices and sometimes having access to free fresh produce.

Only 5 ha of the 66 hectares available to the project was fenced and under cultivation at the time of the study. The FGD revealed some of the reasons for the underutilisation of project land: lack of monetary support; inadequacy of farm implements; attitude problems on the part of the community members, which made human resources a challenge for the effective implementation of the project. During the same discussion it was stated that members were not allowed to use the land for individual purposes. In addition, the fenced project land was used strictly for crop production since the project members did not engage collectively in livestock production.

The study also explored some of the challenges associated with collective land usage at the project sites. The major challenge was said to be the lazy attitude of some project members. Some members participated more regularly during harvesting period than during the bulk of the growing season and this often led to disputes, as the hard working members felt cheated. Despite the various challenges and problems, most farmers who were active members of the project indicated that they preferred collective land utilisation to individual usage as it was a pre-requisite for accessing government support. For example, the Department of Social Development (DoSD) policy only supported projects practicing collective farming. Through such support initiatives, the project members had access not only to equipment and infrastructure, but also to some periodic skills training on community development and how to improve agricultural production.

Ciko Santrini Community Project

Ciko Project was started as a community initiative by 25 community individuals who pooled their individual rain-fed fields for collective farming. This idea was borne out the need to secure government funding available to community projects rather than individual farmers. The project started in 2008 with a total of 20 hectares of land, of which only 10 hectares were fenced. Of this fenced area, only 2.5 hectares was being utilised for crop production purposes. Land utilisation was collective and no member was allowed to use the project land for individual purposes.

A FGD conducted at the project site in August 2010 revealed that the total number of project members had been reduced to 10 members, of whom only six were active. It is also interesting to note that all remaining 10 project members were women. Some reasons given for the drastic decrease in the number of project members since the inception of the project included:

- Death of members (two out of the founding members died)
- Old age (some of the project members left because they had become too old to farm)
- Poor health
- Attitude (laziness was said to be another reason why some people left the project).

An interactive session with an official from the DoSD revealed that the reason why some of the project members left was because they wanted monthly stipends to sustain themselves, as the project was not generating enough funds to cater for its members. The official stated that the Department was investigating whether the provision of stipends would motivate some of the local farmers to take part in agricultural community development projects. Unavailability of labour was a major problem affecting both FCP and Ciko project sites and this study considered it a major factor affecting land utilisation in the study sites. The projects might not be sustainable in the long-term due to the fact that youths are not attracted to the agricultural projects. This is why virtually all the project members were old and some had poor health. Developing incentives to encourage the youth to participate in agricultural development initiatives would not only reduce unemployment among the youth, but would also supply the human capital (labour and skills) necessary for improved land utilisation in the study areas.

6.1.1.2 Water access and utilisation

Discussions about water access and utilisation also further explored “collective resource use”. Some cases of collective behaviour included:

- At the project sites, the members collectively contributed resources that were used to purchase fuel for the pump. The water was then used to irrigate a collectively managed field. This is collective behaviour in its truest form.
- Communal water taps and rivers were communally owned sources of water. People used this communal source of water for their own individual purposes. They did not collectively draw water or collectively utilise it. Use of communal taps was actively managed, with local rules, while use of water from rivers and dams did not seem to be actively managed or controlled in any way.

In terms of the legislative requirements of the DWA, the survey revealed that there are no formal water user associations in either community. Respondents had no knowledge of this legislation, and neither of the projects was registered as a water user when the projects were initiated.

The communal taps subject to local rules had been installed by the Amatole District Municipality. According to the responses from the individual household farmers, the communal taps were not allowed to be used for washing clothes, moulding bricks or washing cars. Other rules were that nobody was allowed to store water in large quantities and nobody was permitted to sell the water. There was a penalty for breaking any of the rules and the penalty could be imposed on an individual or a group of people living in an area. According to discussion, there was a penalty fee of R5000 and an area could also be banned from getting access to water for a specific period of time. Furthermore, if anybody wanted to use a large quantity of water for a ceremony or any big gathering, permission had to be sought from the Amatole District and if such permission was granted, the municipality would supply the quantity of water projected to be needed for the ceremony in tanks.

Direct observation in the study area revealed that although people referred to communal taps as a source of water, water scarcity was actually very severe in the two villages. This is evident from the photograph below (Figure 6.1), which shows some villagers washing clothes on the field near a very small muddy dam. An attempt was made at getting information from them on how the dam was serving the communities and it was revealed that the dam was used communally by the villagers for washing clothes and it was also said that some brought their cattle to the dam to drink. It was also highlighted that water supply from this particular dam was seasonal.

Figure 6.1 Local water source at Willowvale, Eastern Cape.

6.1.2 Marina, Eastern Cape

6.1.2.1 <u>Land access and utilisation</u>

Land in the study area is used mainly for three purposes: cultivation, grazing and residential purposes. Land for cultivation was used to grow crops, such as maize, potatoes, beans, *amadumbe* (taro), sweet potatoes, various vegetables, as well as fruit trees, including bananas. The crops were primarily for household consumption. Surplus was sold, mainly to members of the community. In the case of bananas, some households planted with the intention to sell and generate supplementary income, and these families had relatively large banana stands. Settlements were characterised by a range of housing establishments, including traditional *rondavels* as well as modern square houses with corrugated or tiled roofs. Grazing land was communally utilised and managed, i.e. it was an open access system where all members of the community had equal access. Traditional land allocations were found to govern the acquisition and regulation of land allocation in Bizana. Elements of these are discussed below.

- **Settlement and cultivation:** For settlement development (residential stands) and cultivation, there was a standard process that new applicants were required to follow before land could be allocated to them. This process involved consultation with various role players at different levels, including neighbours living close to the land that was being applied for, *Izinduna / Izibonda* and the *Inkosi* as the highest authority in the community's Traditional Authority system. The role of each stakeholder is captured in Figure 6.2.
- **Grazing land:** The process of acquiring grazing land was different. Grazing was open access, i.e. there was no need to apply for a specific area for grazing animals. This meant that animals could graze freely, wherever there was available grazing material. However, some people kept livestock as a business, i.e. they kept and sold animals to generate income. If a person wished to apply for a piece of land to use for grazing animals with the purpose of generating income (i.e. a business), they were required to follow the same process as for settlement development and cultivation. There appeared to be no limit on how much land people can apply for, and this applied to all forms of land use mentioned above. People were generally limited by resources such as fencing and irrigation, which determined the size of the tract of land for which they applied.
- **Land for banana establishment:** Banana fields were generally established as part of the homestead garden. Most banana establishments were small, and therefore farmers were able to fit them in their main garden. The main homestead gardens were often fenced, and therefore farmers were not required to invest in or buy new fencing material just for bananas. However, some farmers did have land elsewhere outside the main homestead gardens that they wanted to use for banana fields but indicated that they would have to be fenced to keep livestock out. Instead, these separate pieces of land were used to plant other crops, i.e. short season growing crops that were grown for the summer season when livestock were traditionally out grazing elsewhere or herded. Because bananas are a long term crop (ten year ratoons) farmers did not think it would be a wise decision to plant them in unfenced or unsecured areas as they would be permanently vulnerable to vandalism, theft and destruction by livestock.

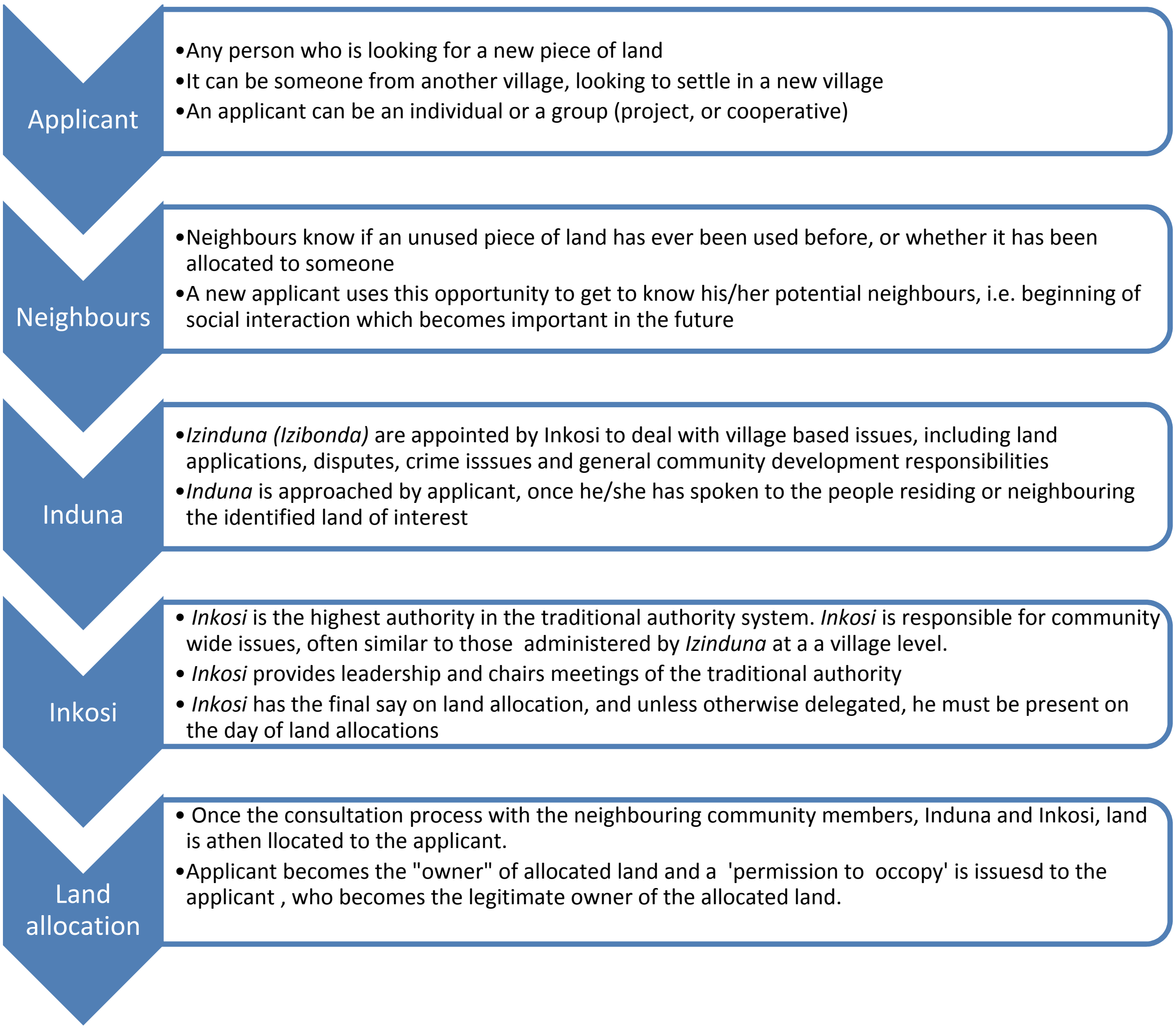

Figure 6.2 Land application process for settlement development, cultivation and grazing at Marina, Eastern Cape.

The study found that land was allocated to a household for use but sometimes households were unable to use the allocated land for various reasons such as unaffordability of inputs, lack of fencing materials, etc. Apparently, the applicant was warned during the application process that land left unused for a period of three consecutive years would be re-allocated to another person. Reallocations were particularly easy for land that was not fenced. A member of the local leadership confirmed that it was difficult to take land away and reallocate it if it was fenced.

The cost of land acquisition was also explored and the following emerged:

- **Traditional arrangements:** Land in rural Bizana was found to be under traditional administration and consequently there were minimal financial costs involved in acquiring or retaining it. There was no direct payment made to the Traditional Authority for any land acquired, however, there were costs associated with the system which an applicant was required to follow. For example, it was customary for applicants to provide the local leadership with a token of appreciation when they visited the land to allocate it to the applicant. Participants interviewed indicated that the tradition of donating a case of beer and bottle of brandy still remained and was still being practiced. In addition to this, the applicant was expected to provide catering for “witnesses”, who attended the allocation ceremony to confirm and witness the presence of the Traditional Authority and allocation of land to the applicant. The food and alcohol was said to be shared with all people present as a form of celebration to ‘close the deal’.

- **Lease and informal sale arrangements:** In addition to legitimate land allocation by the Traditional Authority to applicants, there were also private arrangements where previous “owners” had sold the land allocated to them for reasonably high amounts of money, e.g. R6 000. Prices varied from one case to another depending on size of land and existing immovable assets, e.g. houses and sanitation facilities. This process was, however, not sanctioned by the traditional leader. Informal sale of land usually involved open fields without infrastructure that had not been used for some time. Usually, those who sold land did do so when they moved to other areas or had land under their name which they were no longer using. Rather than buying and paying a lot of money, some people choose to rent land, either as individuals or as a project. The rates for the rental of such land were negotiated by the parties involved and were generally dictated by the size of land in question. For example, a vegetable project in the area negotiated and paid about R1000/year for a 2 ha field.

It was revealed by a local leadership representative (*Isibonda*) that the availability of arable land was not a problem. This was confirmed to be the case by the presence of many old fields that had not been used for a long time. According to *Isibonda*, these fields had previously produced large amounts of food and therefore people should not complain that there is insufficient arable land when there were many hectares of arable land lying fallow. Land was left unused for various reasons according to community members interviewed. These included but were not limited to the following:

- Historically, older people cultivated land and had a passion for cultivating land. Many of the older generation have become too old or too ill to go to the fields.
- Some of the fields were far from households, and as people grow older walking to these fields became a challenge, resulting in lands being abandoned.
- Some land was cultivated because people had come together as a project to cultivate. Once the project collapsed, people vandalised project equipment and land was abandoned.
- Young people, who should be taking up from their parents, were not interested in agriculture. They saw agriculture as hard work, which did not guarantee income generation.
- Sometimes people planted crops, but when it was time to harvest them there was almost nothing to harvest. This was attributed to drought or insufficient rain to encourage plant growth.
- Finally, it was revealed that ploughing had become expensive. In the past people used their cattle to plough land but most people no longer had access to cattle. Hiring a tractor was very expensive and not many people could afford it, and as a result the size of the cultivated land declined over time.

Despite this, some respondents reported challenges related to accessing land. The rules for access to land were considered a great challenge by farmers that were interviewed. Land that has been allocated to others but was not being used was a common occurrence and was very frustrating for farmers who wished to expand their production but could not access new land. In some cases, landholders exploited a loophole in the land allocation system by ploughing a single line in the land, claiming that they intended to plant, but for some or other reason could not. This meant that the land was in theory not fallow and therefore could not be reallocated to another person or group.

Some problems with land access were rooted within extended families. In one case, a man who had given the land to a group of farmers died. His widow continued to cede the land to the group but the brother of the deceased man, after some time, claimed the land from the widow and terminated the agreement with the group. The widow had no say in the matter and no recourse or support was obtained though the Traditional Authorities.

The challenges of securing additional land for production

The study found that a local farmer had recently followed the necessary procedures and processes with the Traditional Authority to secure access to unused land, but ultimately the landholder refused to give up the land. The farmer seeking additional land said that there were many farmers who needed land for production but could not access it as people were very possessive when it came to land allocation. Landholders were not even prepared to lease their land to others for fear of losing access or control of this land. This was seen to be a major impediment to farmers who wished to expand.

Two of the other banana farmers who were both *izibonda* noted that most land transactions in the area were done privately and that this was illegal. They also pointed out that there were no clear rules and regulations regarding the leasing of land from the Traditional Authorities. Once people had been allocated land, they would not relinquish it, even if they had no intention of using it, and it remained a sensitive issue. They highlighted that there was a need for the Traditional Authorities to intervene on land leasing issues and to show good governance, but this was not occurring. There were *bona fide* farmers seeking land for production, and though they saw much fallow land available, they were not able to access it.

A woman banana farmer noted that there were no formal rules on leasing of land and that people became greedy when they saw someone producing on the land they had leased to them, so they tended to claim it back.

Through the study, one case was encountered where the process of reallocating unused land worked successfully. The Thuthukani group successfully secured land from a landholder who was no longer using it, with the approval of the Traditional Authority. When asked whether it would be possible for an individual to secure land in this manner, it was felt that it would be more difficult for an individual than for a formal group. However, another banana producer and five other farmers had also tried as a group to get access to land that was not being used. They got as far as securing a PTO from Bisho. Although the landholder had initially agreed to hand over the land, he subsequently changed his mind and refused to hand over the land.

6.1.2.1.1 Local rules governing land-use

Despite the fact that the study area was a communal area, there were rules and regulations that governed the use of resources such as land and water. There were also general rules aimed at maintaining social cohesion among community members. The following rules existed in the villages where the study was taking place, and were identified during discussions with farmers and representatives of the Traditional Authority:

- No activities were permitted to be undertaken in wetlands
    - Some indigenous plants (such as *Umgwenya, Umsenge* and *Isikhomakhoma* (tree fern) were not supposed to be harvested at all, while harvesting of others, such as *ikhwane*, was permitted.
    - Wetlands were open to the members of the community for subsistence cultivation / food production. People used the wetlands in winter when the surrounding areas were too dry for people to cultivate their homestead gardens.
    - Winter wetland cultivation was for vegetable cultivation, including spinach, cabbage and *amadumbe*.
- No random burning of grazing lands
    - Those who wished to burn, even if it was within the confines of their homesteads, were required to inform their immediate neighbours as they also needed to be party to the

burning process. This ensured that neighbours were aware of the planned activity should anything happen, e.g. a runaway fire.
    - Burning during the day was prohibited, i.e. people were allowed to burn in the evenings. During this time, the weather was said to be cooler and winds not too strong, thus reducing fire related risks.
- It was a traditional requirement that should the *Inkosi* die, there should be no agricultural (soil turning) activity for a week. During discussions it emerged that people no longer respected these rules and did not abide by them.
    - Between September and May, which is the growing season, no cattle were allowed to roam freely without herders being present to ensure that they stayed away from crop lands. This was the time when there were food crops in the ground. If they were not herded, livestock could damage and destroy crops.
    - *Izinduna* were instructed to call gatherings, locally referred to as *Izimbizo*, to remind people about making sure that they herded their livestock. *Izimbizo* were held twice a year. The first one was used to inform people to herd their livestock as there were crops in the ground, while the second one was used to inform people that people had harvested their crops and livestock owners or herders could let their livestock graze freely.
    - Harvesting times varied, but in the past there used to be a strongly embedded concept of *ukweshwama*[17], where members of the community would harvest some of their crops and gather at the *Inkosi*'s house. These would be cooked, and the *Inkosi* would announce harvesting season opened. The *ukweshwama* activity was also used to bring the nation together and reflect on the harvesting season and also to build social capital and cohesion as well as to reinforce traditional and cultural values. Over time these rules and regulations seem to have weakened. The change and weakening in social governance and traditional structures was considered to have disturbed the implementation and enforcement of rules and regulations.

A major complaint by farmers interviewed was the lack of control of livestock when crops were being grown and the unnecessary burning of veld. Two of the banana farmers highlighted uncontrolled livestock movements in arable land as a serious problem as it results in damage to crops. One farmer pointed out that this was often done by people who were not cropping and did not appreciate the problems that this caused. Offenders were sometimes taken to the Traditional Authorities, however the punishments were not very severe and did not act as a real deterrent. Furthermore, in most cases livestock owners did not adhere to the specified time of moving livestock to the grazing land after winter grazing. In addition, there were no longer herders managing the movement of livestock.

6.1.2.1.2 Collective use of land

Use of land in the area was mainly individual in nature however there were examples of people who had accessed land collectively, in the name of a group or project. The process for acquiring land by groups was similar to that followed by individuals. Evidence from FGDs indicated that groups had more chance of accessing land than individuals (especially larger areas of land). For example, the members of the Lungisani Vegetable Project revealed that it was easier for them to get land as a project than as individuals. The reason cited for this was that projects were seen to be more likely to bring about a greater beneficial impact to the community (employment creation and income generation) than individual farming initiatives.

[17] Traditional first fruits festival / ceremony

6.1.2.2 Water access space and utilisation

Households in the study area were found to use water for domestic use (cooking, washing, drinking, building), irrigation and for watering livestock. The main sources of water were rivers and springs, although some households had access to standpipes. In addition, some households harvested water using Jojo tanks to supplement their domestic water needs. Water harvesting off the roof was a common practice in the study area. Water harvesting was said to reduce time spent by households collecting water from rivers, and it was cleaner than river or spring water which was often shared with livestock.

6.1.2.2.1 Local rules governing water usage

Rivers and springs were considered common property resources, i.e. members of the community had open access. Individual households and projects (cooperatives) had access to these sources of water. Cooperatives or projects often accessed water from the rivers or streams using a pump (see textbox below).There were, however, some rules and regulations regarding the access to and use of water sources. These rules were as follows:

- Tanker trucks were not allowed in the rivers. They were said to collect water and then go and sell it to the community.
- Using sources of drinking and cooking water for washing clothes was not allowed.
- Toilet systems (pit latrines) were not allowed to be located too close to water sources.
- Projects needed to inform or engage other water users if they wanted to draw water from a shared source for irrigation, as extraction impacted on other people. There was no evidence of individuals extracting or pumping water for individual irrigation use.
- Some rivers were said to dry up quicker than others, so if there were planned projects in 'dry' catchments the local office of the Eastern Cape DoA was expected to check if there was sufficient water, especially for irrigation purposes.

Some of these rules were not written on paper, but seemed to be verbal and informal arrangements that community members agreed to collectively. Powerful individuals, such as the rich and socio-politically connected individuals, were said to consider themselves to be above these rules and did not obey them. These people were said to often get away without punishment as they are feared by authorities and there was reluctance on the part of community members to report them to the relevant authorities.

6.1.2.2.2 Collective action related to water use

There was no demonstration of collective action related to water use in respect of the small-scale banana farmers, who were the focus of the study at Marina, Eastern Cape. This seems characteristic of projects. For example, the Lungisani Vegetable Project was a small vegetable production project started by twelve members with an intention to generate income and support their families. The project focused on vegetable production as they felt that vegetables had a short growing period.

During its inception, the members realised that they were going to need water to be able to plant vegetables effectively. They then decided to put money together on a monthly basis until they had enough to buy an engine to pump water from the nearby stream to the garden. During a discussion with the members, it was revealed that the members decided where to put the engine as there was no formal advice from the DWA and although the DoA assisted with the transporting of the engine, their officials were not involved in deciding where the engine should be located. Thus collective action related to water use is generally around acquisition of equipment and infrastructure. The process of using the water at the project site would also constitute collective action.

6.1.3 Mooi River Irrigation Scheme, KwaZulu-Natal

6.1.3.1 <u>Land access and utilisation</u>

The study found that use of land was allocated to an individual/household by the *Inkosi.* This process was called '*ukukhonza*'. With this process, a person wanting to acquire land approached the local *induna* who referred the matter to the *Induna Nkulu* who in turn approached the *Inkosi* with the matter. During the FGDs it became clear that local community members perceived that "once you get use of land it is yours forever", but the *Induna Nkulu* highlighted that, traditionally, land that is not being used can be given to someone else by the *Inkosi*, but that this process is not actually happening. The members of the FGDs highlighted that it is difficult for newcomers to acquire land in the area – both within and outside the irrigation scheme.

The processes used to acquire land, the cost thereof, and the land use practices related to the MRIS were investigated. FGDs revealed that farmers in MRIS were generally allocated 2 plots (each 0.1 hectares in size) per household. However, some farmers also rented additional plots, so that the maximum area held by an individual was 1.4 ha, as shown in Table 6.3. The average land held per household was 0.268 ha.

Table 6.3 Scale of land use in MRIS, KwaZulu-Natal, 2011

Irrigation area per farmer (hectares)	Number of farmers	Percentage
0.1	16	22.5
0.2	32	45.1
0.3	6	8.5
0.4	8	11.3
0.5	4	5.6
0.6	2	2.8
0.7	2	2.8
1.4	1	1.4
Total	**N = 71**	**100.0**

Farmers were asked to reveal the amount of their land not being utilised during the period August 2011 to September 2012 and the results are presented in Table 6.4.

Table 6.4 Area of available irrigation land not used between August and September 2012 by individuals at MRIS, KwaZulu-Natal

Area not used by individual farmers (ha)	Number of farmers	Percent
0.0	54	76.1
0.1	14	19.4
0.2	2	2.8
0.4	1	1.4
Total	N=71	100.0

The results in Table 6.4 show that 76.1% of the farmers used all their irrigation land during the survey period. Reasons for underutilisation of land ranged from shortage of inputs, cost of production inputs and machinery, to lack of will to engage in agriculture and water shortages, especially in the tail-end blocks (Blocks 13, 14, and 15).

Irrigable land appeared to be in short supply within MRIS, evidenced by a substantial amount of land under irrigation outside the scheme boundaries. The irrigated plots outside the scheme were held by both scheme and non-scheme members and the MRIS main canal was the main source of irrigation water.

The process of land allocation in the area was investigated. Firstly, all land allocation (both dryland and under irrigation) was only done by the local traditional leaders i.e. Izinduna (headmen) with authorisation from the *Inkosi* (Chief). If the land to be allocated was within the scheme, the block committees were also involved in identifying vacant plots and notifying the headmen. Once an individual was allocated land through the above mentioned process, no one in the community could dispute the allocation or dispossess the land holder. A once-off admin fee of R50 was paid to the *Inkosi* by the recipient of the land. Once this process was completed, a community member could permanently own the allocated piece of land. Another way of accessing land in MRIS involved renting from those not using it. The major challenge in MRIS was an unprecedented increase in irrigation land outside the scheme, which was putting pressure on the limited water resources. Traditional leaders could not deny landless individuals access to land, if it was available. In most cases, those in need of land would identify such land within reach of the canal, so that they could access water for irrigation. Furthermore, personal and family relations deterred people from excluding such beneficiaries from accessing both land and water within or outside the scheme. These issues were not discussed in the public domain or in community meetings for fear of victimisation and constraining relations among community members. The beneficiaries also argued that none of the individuals in the area paid for water or land, hence it was every community members' right to access and use the natural resources.

The study found that different institutions existed in the Msinga communities, and these were important in the formulation and enforcement of rules governing resource acquisition and utilisation. The most dominant institutions in relation to land access within MRIS were the Traditional Authority and the irrigation scheme committees, who regulated both water and land access. An interview with a female farmer from Block 3 revealed information about land access and allocation (see textbox below).

Use right of land in MRIS

During an interview, one female farmer within MRIS shared the following:

"I have access to 8 beds (plots) in Blocks 2 and 3. I don't have any plot of my own. I am married and my husband is not interested in farming and hence does not own any land. Because I like farming, I go around the scheme identifying fallow plots and negotiate with owners to use them. I pay R300 to rent a 0.1 ha plot for a single crop cycle i.e. from planting to harvesting. I have 2 full time employees that I pay R700 per month. At times I hire extra labour for harvesting and negotiate payment depending on the task".

Source: Personal interview: 26 October 2012

The above interview showed that land was also accessed through informal arrangements and trust between community members. There were no written contracts between the land holder and the tenant. The fee of R300 was neither documented nor discussed at any meeting, but farmers acknowledged this as the normal fee for renting a plot in MRIS. Some tenants paid the land holder with a portion of the produce, and again verbal agreements were used. No specific quantities of produce were said to be specified during the agreements and the tenant gave the land holder a quantity dependent on the yields obtained. Sometimes old people leased out their land, waiting for their grandchildren to grow up and take up the plots for farming purposes. Leasing was therefore done to secure land and avoid re-allocation of the plots to the landless community members by traditional authorities. Some tenants of the leased land, however, cited laziness as the major reason for land holders leasing their beds to others.

FGDs and interviews with different groups of community members or individuals revealed different perceptions regarding the availability of land within the scheme. Some groups indicated that vacant land was no longer available in the scheme and those in need of land could only lease from others or inherit their relatives' plots. Inheritance was found to be a very important custom determining allocation of irrigated land in the area. According to scheme members from Ward 10 who participated in the FGD, there were still some vacant plots in the irrigation scheme and everyone in the community was fully aware of this. It was their perception that individuals who did not have beds were not interested in farming within the scheme. Some beds were non-functional or lay idle. According to the farmers, community members with formal user rights commonly loaned out a bed to other family members or to any interested party. They added that in the event that the "owner" of a bed was unable to work, or passes away, his son assumed "ownership" of the bed but ultimately the sister or wife ended up actively working it. According to a FGD with Ward 8 scheme members there were no vacant plots in the scheme. They said that in order to acquire a plot on the scheme, non-scheme members would have to approach the *Induna* and *Induna Nkulu* and even then, the occupant of the land had to be in agreement to release the land. They said that if the occupant was not willing to give up their land, it could not be taken away. During interviews in 2013, committees of Blocks 1, 2, 3 and 4 argued that new entrants into the scheme could only access land through inheritance. They stated that all land was already occupied and no vacant plots were available for new entrants. New farmers could therefore engage in other forms of agriculture such as livestock farming or dry land cropping or they could negotiate for irrigated plots from those with multiple plots. Inheritance of land therefore played a key role in land ownership in the communities.

The group interview with five headmen in the area showed that land pressure was increasing. They said that approximately 20 years previously, an average of 15 to 20 farmers would farm a block, but at the time of the study, more than 100 farmers held plots (beds) within the same block. They indicated that there was growing demand for farming land in Msinga Local Municipality and i*zinduna* therefore used their powers to identify and allocate rainfed arable land to villagers who could not access irrigation plots in the MRIS. These people were mainly those who had recently got married and were interested in farming.

6.1.3.1.1 Local rules governing land-use

The study found that traditional leaders played an active role in land allocation and conflict resolution in MRIS. They worked in conjunction with block and scheme committees. Their roles were mainly policing and ensuring compliance with rules. Some of the agreed rules and regulations governing land ownership and usage in MRIS included the following:

- Plot holders were expected to use their allocated land productively.
- Plot boundaries had to be maintained and no farmer was permitted to encroach into other people's plots.
- Unused land was re-allocated to individuals on the waiting list
- Plot holders were not allowed to leave their plots fallow because this would lead to spread of pests and diseases that were harboured in the grasses.

It was said that a breach of the above guiding principles could lead to the land being re-allocated to other people interested in irrigation farming. Although these guidelines existed, group discussions revealed that enforcement was a challenge because of social ties between the leaders and the community members. Most families were related through extended families involving most of the traditional leaders and block committee members. Nonetheless, farmers who were not utilising their land were encouraged to lease the land to avoid losing it to others. By so doing, the land remained productive and could not be repossessed by authorities.

6.1.3.1.2 Collective use of land and associated activities

Land allocation in MRIS was found to be strongly dependent on social relations and inheritance issues. A given parcel of land was regarded as family property and was passed down the generations within the same family. This made effective collective action difficult as the death of an older family member (who might have been working collectively with other farmers) could change the arrangement depending on who took over the plot. Some family members might give away their plots, while others rented out or continued farming. As such, members of the collective unit had no right to claim the land as a group or as individuals. FGDs with farmers in the area revealed that collective action was hampered by a lack of commitment by some members and therefore farmers preferred individual production systems.

The FGDs and the key informant interviews also explored the extent to which farmers engage in collective action/behaviour related to activities outside of the MRIS. Outside the scheme there was no collective use of resources related to dryland agriculture, but a few of the women in Ward 10 had formed small groups and produced traditional mats. A few members of the community were also involved in *stokvels* (informal savings clubs).

The most accomplished and well organised example of collective behaviour was within the irrigation scheme in Ward 10. Here the scheme members from Blocks 14 and 15 had formed a cooperative. Each member of the co-op paid a predetermined amount at a specified time. This helped in acquiring inputs, undertaking repairs such as fencing and maintaining the pump at the irrigation scheme. Although all FGD respondents recognised the benefits of collective action, fears of non-compliance, distrust, and lack of accountability were key factors which have led to individual rather than collective action.

6.1.3.2 Collective management of irrigation water at the MRIS, KZN

Given that access to water formed a key part of a PhD study being undertaken under the WRC project, additional attention was given to the matter of water access at MRIS (Muchara, 2014). People’s perceptions regarding water use at MRIS was explored with the use of a structured questionnaire that was administered to members of the MRIS. The results are summarised in Table 6.5 below.

Table 6.5 Summary of variables characterising farmers and anticipated to be affecting access to irrigation water at MRIS, KwaZulu-Natal, 2011

Description of variable	Category	Frequency (N =71)	Marginal Percentage
Gender of household head	Male Female	22 49	31.0% 69.0%
Block in which farmers' plots are located in the scheme	Block 1-5	14	19.7%
	Block 6-10	24	33.8%
	Block 11-15	33	46.5%
Farmers 'awareness of irrigation meetings in their area	Yes	56	78.9%
	No	15	21.1%
Sources of information pertaining to irrigation	Committee members Fellow farmers Meetings no feedback	12 11 33 15	16.9% 15.5% 46.5% 21.1%
Farmers' participation in water management structures	Yes	11	15.5%
	No	60	84.5%
Farmers' irrigation training background	No training	59	83.1%
	Received irrigation training	12	16.9%
Farmers' participation in water infrastructure maintenance	Yes	36	50.7%
	No	35	49.3%
Belong to a group/cooperative	Yes No	46 25	64.8% 35.2%
Farmers' level of satisfaction with water access	Satisfied Indifferent Not satisfied	11 18 42	15.5% 25.4% 59.2%
Farmers' willingness to participate in water management structures	Not participating and not willing to do so	25	35.2%
	Willing to participate but not participating	15	21.1%
	Willing and participating as an ordinary member	26	36.6%
	Willing and participating as a committee member	4	5.6%
	Willing and participating as a chairperson of the committee	1	1.4%

From Table 6.5 it is evident that the majority of the farmers (59%) were not satisfied with the level of water access in the scheme. The reasons for dissatisfaction with water access among farmers in MRIS were broad, ranging from location of the block along the main canal (upper, middle or tail-end), which affected the reliability of supply, and the number of irrigation days allocated to farmers per week. As mentioned earlier, there were also NSMs who were making use of canal water for production outside of the scheme. This behaviour was especially common in Ward 8. Sometimes water was diverted through breaks in the canal wall and sometimes people with gardens adjacent to the canal manually removed water from the canal to irrigate their crops.

Farmers' willingness to participate in water management processes is critical at the local level. Participation involves taking part in in the decision-making process or undertaking to perform activities that can improve water supply in the scheme. Such participation encompasses attendance of irrigation meetings, voting for suitable block or scheme committee leaders, membership of irrigation related committees and involvement in infrastructure maintenance (e.g. the removal of sediment from the canals). An investigation was undertaken to determine whether farmers' dissatisfaction with water supply in the scheme would encourage them to participate in decision-making. It revealed various positions. Although farmers were dissatisfied with the level of water supply in the scheme, about 35% of these farmers were not participating in water management structures and were not willing to do so, while a further 21% were willing to participate but were not doing so. This could indicate that farmers in MRIS had little influence on the way irrigation water was distributed and managed in the scheme. Increased willingness to participate in activities such as cleaning the canal would be likely to improve water availability/access by scheme members.

It is important to note that although 78% of the interviewed farmers were aware of the various irrigation related meetings going on in the area, only 46% of these farmers actually attended the meetings. This raised the question of how farmers who did not attend irrigation meetings became aware of the deliberations and outcomes of the meetings. In answer, 21% of the respondents revealed that they did not get any feedback from the irrigation meetings held in their absence, while 15.5% and 16.9% got the information from fellow farmers and committee members, respectively. Although farmers were supposed to attend irrigation meetings organised by committees in MRIS, there were no procedures in place to deal with non-attendance. Both attendance of meetings and participation in critical irrigation activities was based on the willingness of the individual farmer.

The activities most affected by these circumstances were those that required collective action, such as canal cleaning, canal repairs and equitable water distribution among members. The nature of the scheme, which relied on canal water supply diverted at various points along the main delivery canal, made it impossible to enforce exclusive water use actions. In fact, there were no mechanisms to encourage compliance with the established rules of the scheme. This might be one of the reasons why illegal water use, both outside and within the scheme, was prevalent in MRIS.

The other dominant feature among MRIS irrigation farmers was their lack of irrigation training. Farmers were asked to indicate whether they have received any form of training on irrigation, in respect of scheduling, repairs to, and maintenance of, infrastructure, as well as general irrigation management. The survey revealed that 83.1% of the farmers had never received any form of training from government or private service providers. Irrigation training of farmers would give them the capacity to:

- Assess water demand and availability
- Set seasonal objectives and targets
- Prepare realistic cropping patterns
- Prepare budgets and
- Prepare maintenance works programmes.

The ability to assess seasonal water demand and availability, both by individual farmers and collectively as a scheme, is a very important aspect of managing irrigation water.

6.1.3.2.1 Local rules controlling water use

Irrigation water in MRIS was drawn from the perennial Mooi River. Water was diverted from the river along a concrete lined canal, to supply downstream crop fields through gravity. Allocation of irrigation water in MRIS was done according to blocks. Farmers in each block were allocated irrigation water one day a week as per the schedule in Table 6.6 below.

Table 6.6 Specified irrigation days per block at MRIS, KwaZulu-Natal, 2011

Day of the week	**Blocks**
Monday	1, 2, 3, 4, 5 & 6
Tuesday	7, 8 & 9
Wednesday	10, 11, 12 & 13
Thursday	14 &15
Friday	Filling storage dams in blocks 14 &15
Weekend (Saturday and Sunday)	Anyone was permitted to irrigate depending on water availability.

An irrigation day in MRIS was defined as 5 am to 5 pm of the same day. During this time, irrigation was only permitted to farmers within the designated day. However, all farmers in the scheme were free to irrigate their plots after 5 pm each day. Furthermore, there was no stipulated time to stop irrigation; hence some farmers resorted to irrigating at night. Night irrigation had a negative effect on the volume of water that reached the overnight storage dams (balancing dams), and adversely affected Blocks 10 to 15 who relied on dam-stored water for irrigation. A FGD with farmers from Blocks 7-11 revealed that night irrigation was a common practice among farmers in these blocks. Farmers actually rested during the day and worked all night to irrigate their crops. Whilst night irrigation was regarded as a norm by farmers in the middle and tail-end section of the scheme, those at the upper section of the scheme only did it in emergencies or when farmers had daytime commitments such as meetings or were travelling during the day.

Some farmers with more than two plots irrigated every night. However, when asked how many days they irrigated per week, they counted day time irrigation only and excluded their nightly irrigation. Day time irrigation was regulated throughout the scheme unlike night irrigation. This was a clear indication of institutional failure as night irrigation had a direct impact on the amount of water available for day time irrigation. Middle and tail-end blocks (Blocks 10-15) were regularly short of water for their scheduled day time irrigation. These blocks relied on storage dams which were supposed to fill up overnight for the next irrigation cycle, but because of night irrigation, the reservoirs were always empty. Table 6.7 below shows the number of people irrigating, and the number of irrigating days per week. It is clear that there were many farmers irrigating two or more days per week, which shows the lack of adherence to the scheduling programme. It also shows that irrigating once a week was not seen to be sufficient by the majority of farmers.

Table 6.7 Cross tabulations of number of people irrigating for specific days per week (from Monday to Friday) at MRIS, 2011

Actual number of irrigation days	Number of farmers per block			Total	Percentage (N=71)
	Block 1-5	Block 6-10	Block 11-15		
1	3_a	8_a	13_a	24	**33.8**
2	4_a	10_a	10_a	24	**33.8**
3	6_a	$5_{a, b}$	5_b	16	**22.5**
4	1_a	0_a	4_a	5	**7.0**
5	0_a	1_a	1_a	2	**2.8**
Total	**14**	**24**	**33**	**N=71**	

Note:

1. Each subscript letter denotes a subset of BLOCKPOSITION categories whose column proportions do not differ significantly from each other at the .05 level of significance.
2. Only day time irrigation is included in Table 5

A Chi-Square test of association was performed for two variables, that is, 'number of irrigation days' and 'block position' for participating farmers. The purpose of the test was to establish whether there was a relationship between the two. It was anticipated that farmers located on the upper section of the scheme (Blocks 1-5) would irrigate more days than those on the middle and tail-end of the scheme (Blocks 6-15). A two tailed Chi-Square test of the association between block position and actual number of irrigation days showed that there was no significant difference in terms of number of days irrigated by farmers across the different blocks (See Table 6.8). More than 66% of the farmers irrigated between 2 and 5 days with approximately 10% of the farmers irrigating either 4 or 5 days per week. The distribution in terms of the number of farmers engaging in irrigation outside the allocated days was even across the scheme (Block 1-15).This might be an indication that there was generally no compliance with the allocated irrigation days by farmers.

Table 6.8 Chi-Square Tests for block position and actual number of irrigation day sat MRIS, KwaZulu-Natal, 2011

Test	**Value**	**Degrees of freedom (DF)**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	8.462	8	.390
Likelihood Ratio	9.933	8	.270
Linear-by-Linear Association	.371	1	.542
N of Valid Cases	71		

6.1.3.2.2 Factors impacting on farmers' satisfaction with water supply

By using non-parametric correlation models, the magnitude of association between water related variables and access to irrigation water in MRIS was investigated. Correlation was used to investigate possible systematic relationships between variables.

Pearson correlation was applied to test the association between 'farmers' satisfaction with irrigation water access' with respect to 'gender', 'farmers' involvement in canal infrastructure maintenance', 'location of farmers' block', 'farmers' membership of a farming organisation/group' and the 'plot area irrigated by individual farmers'. The results are presented in Table 6.9.

A strong negative correlation ($p<0.001$) was confirmed between 'satisfaction with irrigation water access' and 'farmer's involvement in canal infrastructure maintenance'. This might imply that although farmers took part in canal maintenance in the form of cleaning, they still got less water than expected. This situation might actually lead to further decline in farmers ‘involvement in irrigation maintenance activities, which are normally done in groups. Furthermore, the possibility of excessive free riding by some scheme members might also be one factor contributing to the negative association between water access and canal maintenance activities. Farmers who did not take part in maintenance activities got equal access to irrigation water, leading to dissatisfaction by the active members of the scheme.

Another variable that revealed a strong negative association with satisfaction over water access was the ‘number of plots per farmer’. Farmer’s satisfaction with water access was negatively associated with an increase in the ‘number of irrigation plots per farmers’ ($p=0.006$). This is to be expected as water is a common pool resource in MRIS, and farmers had limited capacity to increase the quantity supplied to their plots, especially during peak periods. Some farmers rented plots from those not utilising them. This resulted in utilisation of a number of plots by certain farmers, which posed a serious irrigation challenge to the farmer because farmers in each block were only allowed to irrigate one day per week which was not sufficient time to irrigate three or more plots. Such farmers ended up irrigating at night or breaking the rules and irrigating on days that were meant for other blocks.

Table 6.9 Correlations of variables affecting water access, 2011

		Farmers' satisfaction with irrigation water access	farmers' involvement in canal infrastructure maintenance	Gender	Location of farmers' block	BELONGCOOP Membership of an organisation	Plot area irrigated by individual farmers
Satisfaction with access to irrigation water	Pearson Correlation	1	-.392**	.025	.288*	.178	-.321**
	Sig. (2-tailed)		.001	.838	.015	.137	.006
	Sum of Squares and Cross-products	39.465	-16.817	.606	11.704	12.423	-3.396
	Covariance	.564	-.240	.009	.167	.177	-.049
	N	71	71	71	71	71	71
Involvement in canal maintenance	Pearson Correlation	-.392**	1	.092	-.105	-.148	.229
	Sig. (2-tailed)	.001		.445	.382	.218	.054
	Sum of Squares and Cross-products	-16.817	46.648	2.451	-4.662	-11.197	2.638
	Covariance	-.240	.666	.035	-.067	-.160	.038
	N	71	71	71	71	71	71
Gender	Pearson Correlation	.025	.092	1	.114	-.006	-.109
	Sig. (2-tailed)	.838	.445		.342	.959	.367
	Sum of Squares and Cross-products	.606	2.451	15.183	2.887	-.268	-.713
	Covariance	.009	.035	.217	.041	-.004	-.010
	N	71	71	71	71	71	71
Location of farmer's block	Pearson Correlation	.288*	-.105	.114	1	-.285*	-.155
	Sig. (2-tailed)	.015	.382	.342		.016	.198
	Sum of Squares and Cross-products	11.704	-4.662	2.887	41.915	-20.451	-1.685
	Covariance	.167	-.067	.041	.599	-.292	-.024
	N	71	71	71	71	71	71

Membership of an organisation or farming group	Pearson Correlation	.178	-.148	-.006	-.285*	1	-.029
	Sig. (2-tailed)	.137	.218	.959	.016		.807
	Sum of Squares and Cross-products	12.423	-11.197	-.268	-20.451	122.930	-.551
	Covariance	.177	-.160	-.004	-.292	1.756	-.008
	N	71	71	71	71	71	71
The plot area irrigated	Pearson Correlation	-.321**	.229	-.109	-.155	-.029	1
	Sig. (2-tailed)	.006	.054	.367	.198	.807	
	Sum of Squares and Cross-products	-3.396	2.638	-.713	-1.685	-.551	2.835
	Covariance	-.049	.038	-.010	-.024	-.008	.041
	N	71	71	71	71	71	71
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Farmers believed that location of the block along the main delivery canal affected water access (blocks higher up had more chance of receiving water) by farmers. This belief was supported by a positive correlation between water access and block position (top, middle, tail-end), which was statistically significant at 5% level (p=0.015).

The results did not suggest any relationship between ‘satisfaction with water access’, and either gender or membership of a cooperative or farming group. This is in line with outcomes of FGDs, where farmers revealed that water allocation did not take into account gender issues or membership of groups. The current water policies in South Africa do not exclude individuals from accessing the resource based on gender. However, all farmers are encouraged to join groups to improve access to water resources (by being members of a WUA), but this has not yet yielded additional benefits to the farmers in MRIS.

6.1.3.2.3 Factors affecting functioning of the scheme

The Chi-squared test of independence of categorical variables was used to determine whether the effects of one variable depended on the value of another. As such, the study applied the Chi-square to test if there was an association between scheme membership status of each household and water related variables such as 'training in water management', 'membership of a WUA', 'member involvement in water related conflicts in the past year', 'membership of a group/cooperative that uses water', 'mode of water supply', 'position of block along the main canal', 'whether user draws water directly from the Mooi River to supplement canal water', 'whether there is need for water measurement devices along the conveyance structures', 'perception on irrigation water adequacy', 'perceived effectiveness of the committee members', 'frequency of attending water related meetings' , 'whether the respondent was a full-time farmer or not' and 'perception on infield water distribution'. The statistically significant Chi-squared values mean that there is an association between 'households' scheme membership status' and the respective variable. The results are shown in Table 6.10.

Table 6.10 Description of household variables affecting scheme function at MRIS, 2013

Descriptive Statistics	Units	Total sample (N=307)	Scheme members (n=246)	Non-scheme member (n=61)	x^2-square
Variables					
Training in irrigation water management	1=Yes	111(36.2%)	101 (41%)	10 (16%)	0.00***
	0=No	196 (63.8%)	145 (59%)	51 (84%)	
Membership of a Water User Association (WUA)	1=Yes	26 (8.5%)	26 (28%)	0 (0%)	0.019**
	0=No	281 (91.5%)	160 (65%)	61 (100%)	
Member has been involved in water related conflict in the past year	1=Involved	97 (31.6%)	83 (34%)	14 (23%)	0.044**
	0 =Not	210 (68.4%)	164 (67%)	46 (75%)	
Membership to a group/cooperative that uses water	1=Yes	75 (24.4%)	71 (29%)	4 (7%)	0.000*
	0=No	232 (75.6%)	175 (71%)	57 (93%)	
Mode of water supply	1=Gravity	228 (74.3%)	185 (75%)	43 (70%)	0.274
	0= Pump & Gravity	79 (25.7%)	61 (25%)	18 (30%)	
Position of block along the main canal	1=Upper	62 (20.2%)	53 (22%)	9 (15%)	0.385
	2=Middle	112 (56.7%)	86 (35%)	26 (43%)	
	3=Tail-end	133 (43.3%)	107 (43%)	26 (43%)	
Whether user at times draws water directly from the Mooi River	1=Yes	129 (42.0%)	99 (40%)	30 (49%)	0.131
	0=No	178 (58%)	147 (60%)	31 (51%)	

Whether there is need for water measurement devices in the area	1=Yes	136 (44.3%)	111 (45%)	25 (41%)	0.560
	0=No	171 (55.7%)	135 (55%)	36 (59%)	
Perception on irrigation water adequacy	1=Adequate	64 (20.8%)	46 (19%)	18 (30%)	0.049**
	0=Otherwise	243 (79.2%)	200 (81%)	43 (70%)	
Perceived effectiveness of the committee members	1=Effective	188 (50.2%)	162 (66%)	26 (43%)	0.292
	0=Not effective	153 (49.8%)	119 (48%)	35 (57%)	
Frequency of attending water related meetings	1=More often	198 (64.5%)	174 (71%)	24 (39%)	0.00***
	0=Otherwise	109 (35.5%)	72 (29%)	37 (61%)	
Whether the respondent is a full-time farmer or not	1=Full-time farmer	174 (56.7%)	159 (65%)	15 (25%)	0.00***
	0=Otherwise	133 (43.3%)	87 (35%)	46 (75%)	
Perception on infield water distribution (	1=fair	105 (32.2%)	99 (40%)	6 (10%)	0.00***
	0=Unfair	202 (65.8%)	147 (60%)	55 (90%)	

Note: ***, ** and * mean significant at 1%, 5% and 10% levels respectively

The results indicate that training in water management; membership of a WUA and membership of a group that uses water were all closely associated with scheme membership status (p<0.05). Scheme membership was critical as it offered the opportunity for water users to access services, including training, from government. Furthermore, there was a high association between scheme membership and frequency of attendance to water-related meetings. Most of the scheme members are also full-time farmers who might have been committed to the day-to-day running of the scheme, hence a statistically significant relationship between scheme membership and occupation of the respondents (full-time farmer or otherwise). There was a general perception that infield water distribution among block/scheme members was unfair. Both scheme members (60%) and non-scheme members (90%) indicated that water was not fairly distributed among users. According to the farmers, the problem of unfair water distribution had existed for a long time. This had a negative impact on farmers' relations. Farmers could not trust each other especially when it came to sharing resources, and this had also affected their commitment to performing most activities in group. This limited the level and intensity of networks to interactions with relatives, close family friends and church members.

Unfair water distribution in the scheme also raised the question of what could be done to ensure equitable access to water as a critical means of production in MRIS. Although the results above (Table 6.10) indicate lack of association between scheme membership and the need for water measurement devices along the canals, other researchers have revealed this to be an important part of irrigation design (Gomo, 2012). Water measurement devices ensure that irrigators allocate the right amount of water to the crops, hence reducing the chances of over irrigation and water wastage. Although farmers in MRIS believed that water measurement devices could help to improve the current water inequalities, there is a strong view that farmers' willingness to comply with scheme regulations regarding water distribution had potential to offer much more sustainable solutions to the water shortages being experienced.

A farmer in Block 15, which is at the tail-end section of the canal, indicated that water measurement devices were of no use in their block because there had never been a consistent supply of water.

> "*You can't put a flow meter, where there is no water. Bring the water first, and then put the devices. The committees and those in leadership must address the water problems starting from the upper section of the canal (Blocks, 1,2,3,4 & 5) to ensure that the irrigators in these blocks are responsible and comply with the requirement that allows them to irrigate on Mondays only. Currently most of them irrigate 7 days a week, which is unfair."*

These sentiments were also echoed by a female farmer whose plots were also located in Block 15. She had access to four plots in Block 15 but none were fully utilised because of water shortages.

> *"I use a small portion of one of the beds for vegetable production. I often use a bucket to water the vegetables. I fetch water directly from the river, which is about 200 m from the plot. Unlike other families who stay close to the main canal, my homestead is located far from the main canal, hence I cannot access water to establish a homestead garden".*

Since 2012, farmers in Blocks 13, 14 and 15 had tried to supplement their irrigation with a diesel pump, but the water shortage persisted. The farmers indicated that the pumping capacity of the installed pump was not adequate to fill all the balancing dams in Blocks 13, 14 and 15. Furthermore, the cost of diesel deterred the farmers from pumping water continuously. Crops were permanently wilted due to water shortages as demonstrated in Figure 6.3, and farmers reported that they had suffered losses in terms of input costs, labour costs and machinery cost (in the form of tractor hire). As a result, these farmers were forced to rely on other non-farm income such as social grants and remittances, to buy inputs for the next planting season. This had an adverse effect on the food security status of these households, and highlights the need for more institutional intervention to ensure compliance and fair water distribution in MRIS.

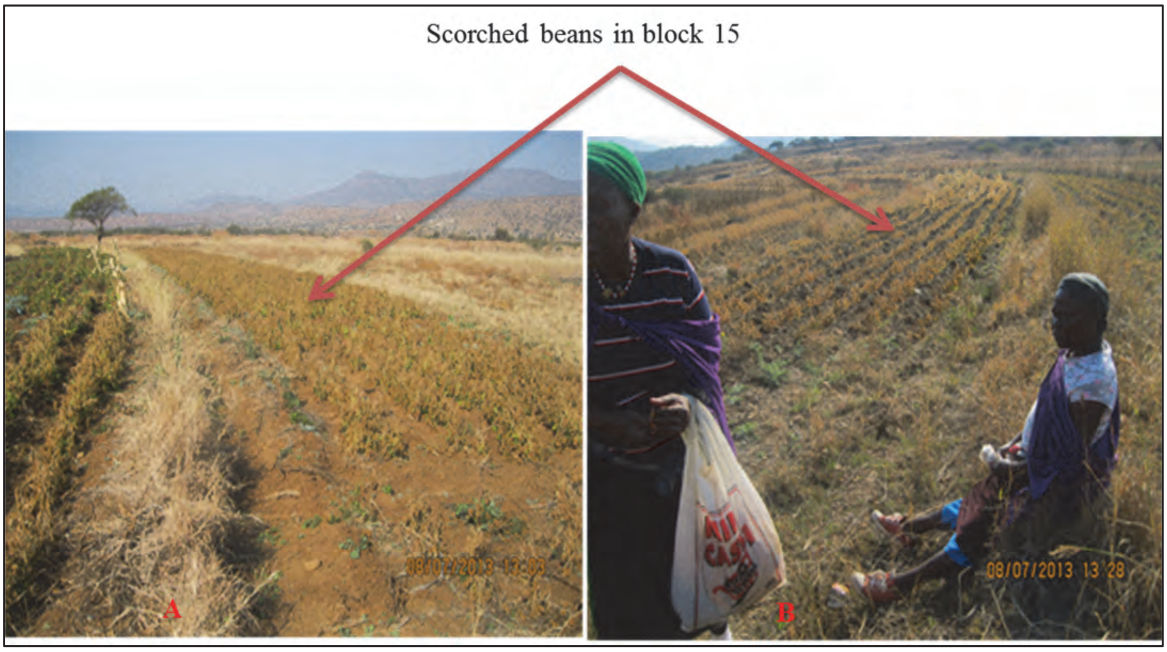

Figure 6.3 Scorched crops in Block 15 at MRIS, KwaZulu-Natal.

6.1.3.2.4 Water user associations (WUAs) in MRIS

It has to be noted that when the new democratic government of South Africa took power, the Department of Water Affairs and Forestry (DWAF), later known as DWA, started a national registration of all water users. With the abolition of the riparian rights, water rights were no longer attached to land ownership and therefore water no longer belonged to commercial farmers (Pollard

and Du Toit, 2011. Although the registration process started some time back, most smallholder farmers are not yet compliant with this requirement.
At the time when the study was initiated, the MRIS was not a member of the Muden Water Users Association (MWUA) but DWA was in the process of facilitating the establishment of a WUA in the area. It was to encompass both smallholder farmers in MRIS and the commercial farmers around the Muden area. The DWA was also facilitating the registration of agricultural cooperatives by members of MRIS. The cooperatives were registered for each block and were coordinated by elected committee members. The approach of registering cooperatives was being done to improve coordination of the farmers and their subsequent registration as members of the WUA. This was because it was difficult to coordinate the large number of individual farmers who held small plots of land to join the WUA hence the need was identified by DWA to encourage group membership as cooperatives. Capacity building/training of cooperative representatives and commercial farmers was conducted by DWA in 2012. According to the DWA officials who facilitated the training, the focus of the training included:

- The constitution governing the WUA
- The operation of the WUA
- The role of farmers as members of the WUA
- The role of various stakeholders involved in water management (DWA, Co-ops, WUA)
- Current challenges emanating from the absence of a WUA in the area.

During the course of the study, the MRIS joined the MWUA. The MWUA encompassed all water users around the Muden area who drew water from the Mooi River for agricultural purposes. The same farmers also got water from Craigieburn Dam, located on the upper part of the Mooi River. The MWUA was comprised of farmers drawing water from: (1) the main canal, (2) the KwaZulu Canal, (3) the northern Canal and (4) directly from the Mooi River (river side), which is demonstrated in Figure 6.4.

While commercial farmers were represented by selected committee members, the arrangement was different with smallholder farmers at MRIS. Due to high numbers (824 farmers) in the scheme, representation of smallholder farmers in the MWUA was through elected cooperative members. The entire scheme was represented by two elected members in the MWUA, who gave feedback of all meeting proceedings to the committees of the cooperatives. It was believed that the above structure would go a long way in improving water access by farmers along the Mooi River. The structure had already managed to improve communication channels between the DWA and the farmers. During winter and dry seasons, smallholder farmers in MRIS faced challenges of water shortage emanating from declining water levels in the Mooi River. This necessitated the opening of Craigieburn Dam to boost water supply to all users. The opening and closure of the dam was controlled by DWA and it had been difficult for the Department to allocate water to non-registered users because this was in contravention of the departmental regulations. Under this legislation, farmers in MRIS were illegally accessing water, hence the need to draw them into a WUA, through which they could be recognised as legal users of the resource. The other challenge emanating from the non-registration of the scheme as a water user, was poor coordination with regard to water requests or orders from Craigieburn Dam. For water to be release from Craigieburn Dam, the DWA authorities require knowledge of the approximate area under irrigation and the volume of water required at each given time. This information had not been forthcoming given that farmers in MRIS operated individually and without a centralised committee to communicate with DWA. This had resulted in disputes with commercial farmers who ended up being accused of having an unfair advantage over smallholder farmers. Commercial farmers used overhead irrigation infrastructure and some pumped water directly from the river. This made smallholder farmers complain that commercial farmers used all the water in the river and reduced the flow into the canal (previously known as the KwaZulu canal) that supplies MRIS.

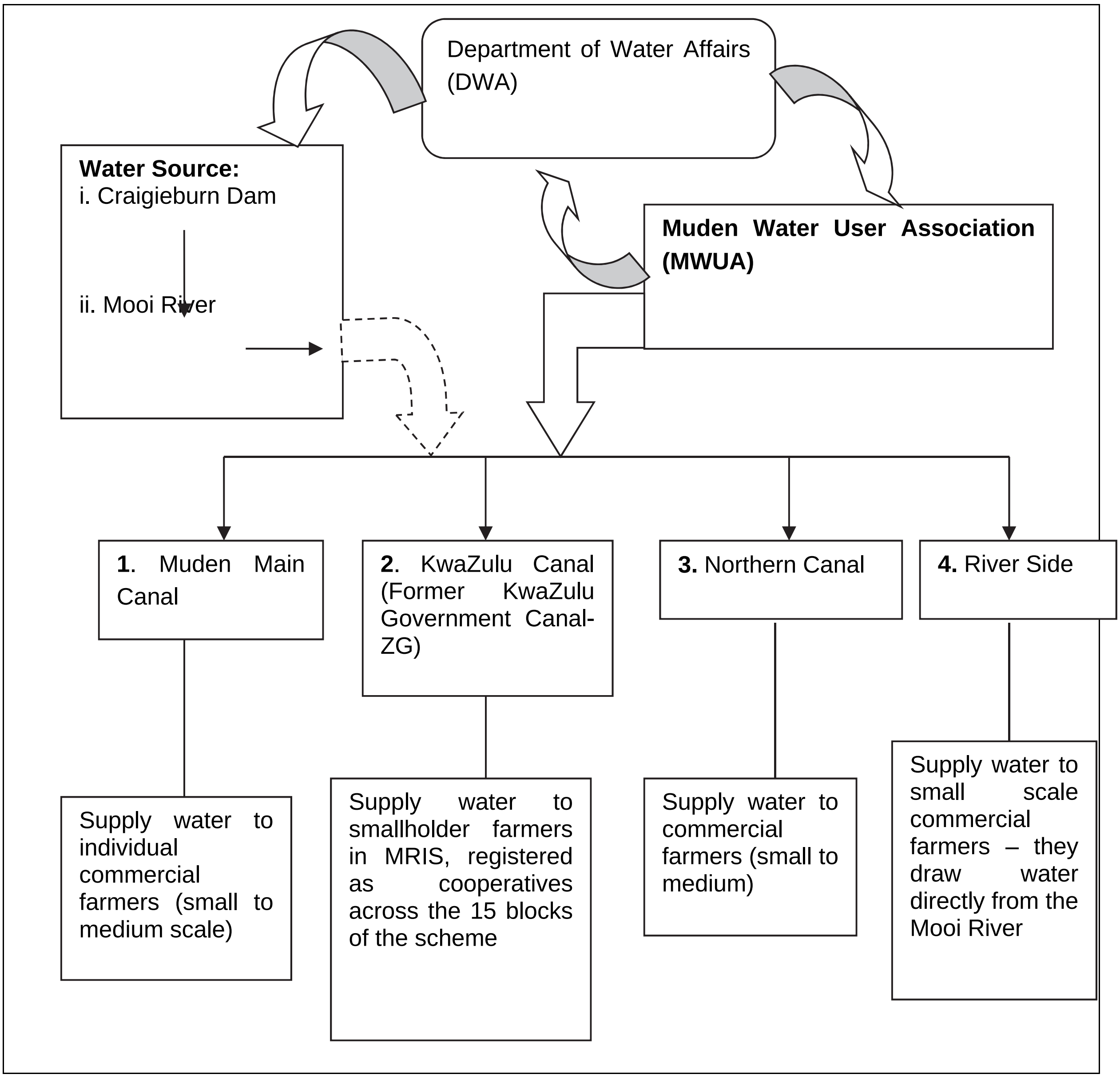

Figure 6.4 Operational presentation of Muden Water User Association (MWUA), 2012

Source: Survey data, 2012 (Discussions with DWA official)

Smallholder farmers had been reluctant to join the WUAs for fear of being charged for water use. However, due to the training and capacity building processes provided by DWA, the farmers were slowly accepting the need to join the WUA in the area. Acceptance was also driven by challenges of water supply along the Mooi River during the 2012 winter season (June-August). The advantages of membership to MWUA for the MRIS farmers were improved coordination with regard to water management and easier access to water from Craigieburn Dam. The registration of MRIS farmers as members of the MWUA, which took place in 2013, came with its own institutional and management challenges, which can be summarised as follows:

- Firstly, there were individual farmers of the scheme who are not prepared to be part of the cooperatives but still expected to get water. The institutional set-up did not offer exclusive rights to water for the cooperative members. As long as water was available in the canal, anyone could access the resource – hence members of cooperatives would not receive any additional benefits from joining the cooperative and the MWUA.
- Secondly, MRIS farmers did not pay for water and their inclusion as members of the MWUA meant they had equal rights to those of the commercial farmers who paid for irrigation water.
- Thirdly, the nature of irrigation infrastructure used by MRIS made it difficult to measure actual volumes of water used by individual farmers unlike the sprinkler systems used by commercial farmers in the same area. Whilst furrow irrigation is cheaper to maintain and much easier to operate, water budgeting remained a problem because of the lack of measuring devices (flow meters) and uncoordinated cropping patterns.
- Fourthly, farmers strongly believed that the existing irrigation programme was not adhered to and that rampant illegal diversions of water negatively affected tail end blocks. Of concern were farmers irrigating plots outside the scheme. These farmers were not members of MRIS but were benefiting from canal water without approval from authorities. The same farmers were also not members of the WUA. Furthermore, there were scheme members who also accessed water for irrigation purposes in the scheme without permission from canal rangers or block committees.

Given the above challenges, institutional mechanisms to ensure additional benefits accrue to those who pay for water and those who comply with membership of user associations might need to be developed by the stakeholders as well as the DWA. To ensure fairness of water governance, it is important to assess how the diversity of interests is considered in the decision-making processes. Stakeholder meetings called by government departments could be an important tool both in reducing tensions between different users and in establishing fair systems of water distribution.

6.1.3.2.5 Water-related collective action

A number of activities requiring collective action were identified through the study and are discussed below.

Canal maintenance:

According to discussions with scheme members, the canal became shallower when it was lined with concrete. As a result, sediment / residue collected in the canal after it had rained, causing blockages that stopped the flow of the water. At times the residents from Ward 10 had to travel to Ward 8 where the blockage had occurred to assist in removing the sediment as the water would not flow down the canal from Ward 8 to Ward 10 until the canal had been unblocked. In effect, clearing the canal of sediment was actually the only agricultural activity that had resulted in collective action directly related to the scheme.

Domestic water provision:

The supply of domestic water to Ward 10 was under the management of Thukela Water. There were no taps within individual homesteads. Taps were located along the roads and were primarily used by households for drinking purposes. Wheelbarrows were frequently used to transport buckets and containers for water collection. There were differences in the management, distribution and accessibility of water between Wards 8 and 10.

Ward 10 experienced many water problems. The taps were often dry and it took an average of 3 months for the water to return. When there was water in the taps, it took an average of 30 minutes to travel to the taps to collect water, which could be a strenuous process. According to the respondents in the FGDs, there was a noticeable trend in the availability of water in taps after in relation to rainfall events. For instance, if there had been no rain, then there was no tap water. The community also said that there was a noticeable deterioration in water quality from when the taps were initially installed, with the quality of the water having become questionable, especially when the taps had been dry for some time. The erratic water supply meant that it was sometimes collected as late as 10 pm or whenever it was available. This posed the greatest challenge to households on a daily basis.

There were complaints raised in the FGDs that the water was managed very badly and that since the taps were installed, there had been no further development of the infrastructure, such as installation of water in homesteads. Community members were frustrated about the management of water and had individually, on several occasions, tried to address this issue with the ward councillors, without any success.

During FGDs, Ward 8 members shared very different experiences when it comes to water issues. They said that they had hardly experienced any water shortages and that on the few instances that the taps had run dry, the water returned within a week or so. They did say, however, that when the taps were dry, residents had to travel long distances to gather water. Prior to the installation of taps, water was collected from the Mooi River and the canal and the FGD participants said that the taps had improved their livelihoods. They also said that the quality of the tap water was acceptable. Water for use in gardens in Ward 8 was from the canal, but where the canal was too far, some people were said to use tap water for their gardens.

Rain water was collected off roofs for drinking purposes and some people had drawn water illegally from the municipal pipes by installing their own connections. Often the water used to bath or wash dishes was later used to water the gardens. These water conservation techniques made a difference to households, but the limited size of containers meant that drinking water ran out quickly. The suitability of canal water for drinking purposes was discussed. FGD respondents said that it sometimes smelled of urine which they thought resulted from contamination by livestock.

6.1.4 Synthesis of findings related to land and water use across the three sites

When the three study sites are considered in terms of collective and individual action related to land and water access and utilisation, some generalisations can be made. While arable land is traditionally individually allocated to individual households, there were indications that it was sometimes easier to access land if individuals formed a group as this was seen as benefiting more people within the community. The status of arable lands changed from an individually allocated resource while under production, to a communally owned resource after harvesting, when it became an available grazing resource for cattle owned by the broad community. The establishment of perennial crops (such as bananas) on communal land was complicated by the lack of fencing and resultant uncontrolled movement of livestock – especially during the winter months when crops had already been harvested. Farmers in Bizana indicated that they could not risk expanding their banana stands without having fencing. Grazing land is a communal open access resource that all livestock owners make use of. Although there were some local rules controlling land use, the extent to which these were enforced was variable and had generally declined over time.

Collective use of tracts of land was largely restricted to projects, such as the projects at WIllowvale as well as a number of the projects within the Bizana Local Municipality. There was some variation between people farming individual plots within the larger project area, and those farming in a truly collective manner. At the MRIS, plots were allocated to individuals and land use took place on an individual basis.

The situation of water access and use also showed variation in terms of collective and individual action. Generally water was a communal resource available to any community members – whether it was in rivers or taps supplied by municipalities. Access to equipment (pumps and sprinklers) that allowed people to access the water was largely reliant on collective action as community members generally could not afford to purchase equipment individually and most government departments would not supply equipment to individuals, thereby forcing people to form groups. At MRIS access to water was not equitable as those farmers in the upper blocks had better access to water than those downstream. More effective management of the irrigation scheme would require more effective governance. WUAs are another example of a water-related structure calling for collective action. Generally it was found that projects were not registered as water users and did not participate in WUAs, though at MRIS the DWA was in the process of drawing the scheme members into the Muden WUA and was establishing cooperatives to facilitate this process.

6.2 PRODUCTION INPUT ACQUISITION

Collective and individual action related to various inputs and equipment is described below.

6.2.1 Willowvale, Eastern Cape

6.2.1.1 Access to inputs and machinery

The farmers at the study site used a combination of production inputs and equipment such as fertilizer, herbicides, manure, pesticides, labour, seeds, tractor and other equipment. However, utilisation was greater at the project site than for individual household production, which was largely of a subsistence nature. The sources of inputs and equipment were investigated through the study.

- Fertilizer: There are different sources or outlets for the procurement of fertilizer in the study area. This survey revealed that most farmers usually procured their inputs from more than one source. For example, out of the 57% of the farmers who made use of fertilizer, 37% procured it from shops, 2% procured it from farmers' cooperative group, and 14% got theirs from the municipality. Some farmers made use of more than one source:, 1% of those that purchased fertilizer procured from both shops and from farmer cooperative groups; 1% procured it from farmer cooperative groups and private institutions; 2% procured it from shops and the municipality.
- Herbicides: Herbicide procurement by farmers in both villages was very low (only 14% of farmers mentioned the purchase of herbicide). Of those purchasing herbicides, 9% procured from shops, 2% from farmers' cooperative group, 1% procured from both farmers' cooperative group and private institutions such as Umtiza.
- Manure: Manure was obtained mainly through collection of animal dung from the kraal – 78% of the people obtained manure either from a kraal belonging to them or from other farmers having kraals.
- Pesticides: Pesticides were procured mainly through shops as indicated by 23% respondents. In addition, 4% said that they procured from farmer's cooperative group, 2% procured from the municipality while only 1% procured from a combination of a farmers' cooperative group and private institutions.
- Labour: The supply of labour in both villages was generally achieved through individual household arrangements, with most farmers making use of members of their household for labour. Collective labour provision was, however, practiced by some farmers. This was an arrangement which enabled individual farmers to share labour between each other. The people who provided their labour were rewarded through different means. Some were paid in paraffin, while others were paid a wage (in the region of R25 per day). When people were employed at harvest time, some of the crops were sometimes shared among the labourers.

Labour sharing practices

The concept of labour sharing was practised by individual farmers in both Ciko village and Mbozi. This is a collective way of accessing labour. In Ciko village it was found through discussions that, because there were only a few project members, labour was always required. To address this, they sometimes received labour assistance from members of the community who were not project members. This came with compensation in cash or in kind. At Mbozi, this type of labour sharing was only practiced among individual farmers and did not apply to the irrigation project.

- Seeds: Seeds play a fundamental role in any farming activity. The survey revealed that out of the 88% of the farmers who used different types of seeds for crop production, 73% procured them from shops, 5% obtained them from farmer's cooperative group, 3% procured from the municipality, 4% procured from both shops and farmer's cooperative group, and 1% procured from both a cooperative group and private institutions. The municipality played a major role in assisting the farmers to procure seeds and seedlings. The discussion of procurement did not consider the storing of seed from one season to use the following season.

The survey revealed that collective procurement of inputs was mainly practiced by project members – very few individual farmers procured inputs collectively as summarised in Table 6.11 below.

Table 6.11 Methods of acquiring production inputs for individual households at Willowvale (n=100), 2010

Production inputs	Collective acquisition (No. of respondents)	Individual acquisition (No. of respondents)	Total no. of households acquiring input
Fertilizer	9	47	56
Herbicides	4	10	14
Manure	0	81	81
Pesticides	3	26	29
Labour	0	98	98
Seed	4	83	87
Tractor and other equipment	2	30	32

Acquisition of purchased production inputs among individual farmers in the study site was relatively low. This is partly because of the subsistence nature of their farming system. Procurement problems identified by these household farmers were:

- Financial constraints: This limited the ability of some farmers to procure inputs.
- Distance to suppliers: Not all required inputs were locally accessible – the farmers needed to travel to places as far as East London to source some of these inputs.
- Transportation problems: Some of the production inputs could not be transported manually, as they had to be transported over a long distance. The fact that the roads leading to the villages were in a bad condition further compounded their problems.
- Lack of technical know-how: Some farmers were still ignorant about the application of inputs such as pesticides or herbicides.

In terms of the frequency of procurement of inputs, the study revealed that most were procured on an annual basis. This was mainly because of the seasonal nature of the farming operation system.

A FGD with members of the two project groups indicated that procurement of inputs was done collectively, on behalf of the project, and the frequency of procurement was quarterly or biannually. The project members had their own peculiar challenges with respect to input procurement; transportation was a major challenge and the road network leading to the project farm sites also complicated the situation. At FCP the project members sometimes made use of their tractor to transport these inputs to the project site and at other times they hired transport. The cost of transportation from Willowvale to the project site was R100-R150, R200-R300 from iDutywa to the project site and R600-R1000 from East London to the site depending on the weight and the quantity of inputs being transported.

In order to mitigate some of these problems, the FCP members had started their own nursery to ensure that essential seeds and seedlings were raised and nurtured by the project in order to avoid having to travel long distances to procure them. In addition it was believed that in the long run, if the nursery initiative was sustained, the FCP could serve as a centre for individual farmers and other projects in the area to procure seeds and seedlings. The FCP usually procured and utilised the production inputs such as fertilizer, herbicides, seeds and seedlings when the need arose. The situation was slightly different at Ciko Santrini Project with respect to production input procurement and the general level of production. Transporting inputs to the project site was very challenging. In terms of labour input, the project usually made use of labour sharing activities with the community in order to compensate for the low human capital in the project group.

6.2.1.2 Access to machinery and implements

Regarding access to tractors and other equipment, the study found that none of the individual farmers owned a tractor but they were able to hire tractors from individuals within the community. The FCP was provided with a tractor by Amatole District Municipality, as it was not being used at the site to which it had originally been donated. Other farm implements and equipment were procured from the shops/malls and private institutions such as the Umtiza Farmer's Corporation.

A FGD revealed that the project members from Ciko Project had little or no equipment. Since the project had no tractor, they usually hired one from Idutywa at R250/hour during a normal planting season.

6.2.2 Marina, Eastern Cape

The discussion about acquisition of inputs and access to equipment at the Marina site was focused on small-scale banana producers. Their mechanisms were contrasted with those of the large-scale commercial farmers from southern KwaZulu-Natal.

6.2.2.1 Small-scale banana producers

6.2.2.1.1 Access to inputs

As mentioned previously, the study found that some of the farmers interviewed made use of inputs to enhance their banana production. The main inputs used for improved production were fertilizers and pesticides, which were sourced from retailers. The only locally procured input reported by informants was the purchase of planting material (suckers). This was generally obtained from local, well-established banana farmers. These farmers had larger fields and were already obtaining young plants that could be used to start new fields or to expand existing fields. Although the planting material was sourced locally, farmers paid for the suckers, with the usual price being R5 per plant. Some farmers make use of fertilizer to stimulate banana growth, primarily LAN, superphosphate and a specifically formulated banana fertilizer (4:1:12). The main chemicals used were herbicides to control weeds during crop establishment and between ratoons. A number of farmers reported that they used Springbok (glyphosate) for weed control.

Of the 11 farmers interviewed, 9 farmers purchased individually and 2 had not yet purchased any inputs. Most farmers that had purchased inputs bought them in Port Edward at Bargain Wholesalers or from Coastal Farmers, which was just outside Port Edward. The majority made use of public transport, but two indicated that they either used public transport or their own vehicles. Some farmers made use of metered taxis to travel between Port Edward and Coastal Farmers, a return trip costing R20. Public transport costs were R28-R32 for a return trip to Port Edward, with an additional cost for goods being transported (i.e. R10 for a 50 kg bag). Vehicles could be hired but cost R100-R140 per load. From the point where the public transport dropped them, goods were generally carried home in a wheelbarrow. One of the farmers indicated that he had bought plants locally and had made use of a wheel barrow to transport them. There were no local shops selling fertilizer or agricultural chemicals. There used to be individual who sold inputs but he stopped because he could not compete with the cheaper prices in Port Edward which resulted in him having very few customers. This was also exacerbated by the fact that very few smallholder farmers made use of such products.

There was no evidence of people working collectively to buy inputs outside of formal cooperatives or projects and in these cases inputs were normally provided by a funder, such as the DoA or the DoSD. There were a number of reasons cited by farmers during the FGDs as to why people preferred individual action over collective action (often based on their experience from being members of projects), which are summarised as follows:

- "If you wait for other people, you will not get anywhere", i.e. there will be no progress.
- "People have good ideas but often funds or finance becomes a problem".
- Money was said to come at different times, and this made it difficult to pool financial resources for collective purchasing.
- Individual priorities were found to differ from one person to the next. Many farmers depended on social welfare grants and these were used to buy food that households could not grow themselves. As a result, there was often no money left to cover agricultural inputs which yield results months later.
- "We do not want to work collectively" – some of the reasons given for this were:
    - There was a serious lack of trust between farmers, mainly because of their experiences from previous projects that had collapsed.
    - Some people were said to become "smarter" than others and this was often not good for group dynamics.
    - Misuse of funds, where "clever" members were said to go behind other members' backs and misuse project funds for their own individual benefits.
    - Project members can never be equally committed to their project. This was said to cause tensions between projects members as some thought they worked harder than others.
    - Despite unequal contributions, projects tended to promote the sharing of benefits equally among members – some project members did not like this, and often quit as a result.

Although there are challenges that discouraged people from working collectively, there were some cases in the study area where people did work together as members of their respective projects. The existence of these projects was mainly driven by prospects of acquiring funding, where projects or cooperatives were more likely to be considered for funding than individual initiatives.

The interviews and discussions with farmers in the Marina area indicated that there were limited opportunities for collective action among producers because of distrust, power relations among individuals limiting collective action and unequal individual contributions to a common goal. It appears that for these farmers, the *costs* associated with collective action outweighed the *benefits*. This was despite the fact that farmers acknowledged the potential benefits of collective action, which they reported to be:

- Bulk buying – which could be cheaper than individual buying because of savings in transport costs and better negotiating power with larger volumes.
- Working collectively means you should be speaking with one voice – and this makes it easier to approach government and access assistance, mainly funding and extension support for agricultural projects.
- Sharing of information and undertaking activities should be easier when working in a group.
- If roles and expectations were clearly defined, communication would be enhanced and good collective progress could be made by groups.

6.2.2.1.2 Access to equipment

Farmers in the study area had limited access to agricultural equipment. Land preparation was done through:

- Hired tractors (mainly by projects)
- Banana farmers using spades to dig holes
- Own or hired cattle (animal traction)
- Hand-hoes
- Rotavator (it was donated by the National DOA to be shared among farmers in Ward 27).

There was some level of sharing of this equipment, especially smaller equipment such as spades, among neighbouring farmers. If a farmer wanted to use a tractor it was at his own cost as the field belonged to him. Certain other projects, such as vegetable gardens and poultry projects, had benefited from equipment supplied by external institutions, but banana farmers had not received any equipment from external institutions. While there was some sharing of equipment by members of the community, there was a lack of responsibility in the maintenance and management of equipment, especially equipment donated by government. The rotavator donated to Ward 27 of Bizana Municipality was a useful case for understanding the role that lack of responsibility can play in the collapse of machinery and equipment (See text box below).

Lack of ownership and responsibility results in the destruction of equipment

The National Department of Agriculture donated a rotavator to each ward in the Bizana Local Municipality. The idea was that the rotavators would be shared among individuals and projects in each ward. The basic condition was that individuals or projects using the equipment would be responsible for general maintenance and fuel. Announcements were made at the meetings to raise awareness about the rotavator and to encourage people to use it. It was then left with a master farmer. One of the projects, Mahlathini Vegetable Garden, borrowed the rotavator to plough their field. During a meeting with the members of Mahlathini project, it was revealed that the rotavator was used in the beginning but, when it broke, it was left at the edge of the garden and never repaired. The members of the Mahlathini group did not see it as their responsibility to fix the rotavator.

The Mahlathini project also had access to an irrigation pump, which was donated by Lima. The irrigation pump was installed to assist with irrigation needs at the project. At installation, the condition was that the members of the project would be responsible for the general maintenance of the pump, including the provision of fuel. The members of the project revealed that the pump had broken down three times, and on each occasion, the project members were able to save some money and take the pump to the mechanics to be repaired. However, at the time of the visit, the pump was not functional because the members had not been able to fix it again. This was partly because they strongly felt that the engine was too small and that this was the reason why it kept breaking.

To some extent it appeared that project members lacked the ability to use their own initiative. They seemed to rely heavily on external support and hope that someone from outside would come and offer to fix the engine or buy them a new one.

6.2.2.1.3 Access to finance

According to the farmers involved in the focus group discussions, access to finance by farmers in the study area was a major challenge, whether individually or collectively. As a result, all activities related to banana production were financed by the farmers themselves, often using their pension grants. Sources of finance that could play an important role in providing financial support to the farmers include local social clubs (also known as *stokvels*), financing from registered finance institutions, and grant funding. *Stokvels* could play a role in making cash available to purchase inputs for production, but these were generally not used for agriculture.

Ithala Bank was identified as a financial institution that made loans available to individual farmers. Farmers were required to repay this loan with interest. The DoA assisted farmers with the development of business plans, as a good and realistic business plan provided credibility when applying for funding. However farmers reported that they were generally unable to access funding from banks. Furthermore, they were reluctant to take loans from banks as they were risk-averse and feared not being able to repay their loans. In addition, farmers reported that there was nothing they could use as surety for the finance institutions and this made it even more difficult to secure finance.

The primary method of accessing funding was by forming groups, as required by government departments to secure grant funding for agricultural inputs and infrastructure. While this was not stated explicitly by farmers interviewed, it was evident from discussions with farmers and government departments that this is the main source of funding for agricultural development in Bizana.

6.2.2.2 Commercial banana producers

Historically, farmers from Southern KZN purchased inputs for bananas (and other crops) through the Coastal Farmers' Cooperative. In principle, the cooperative would source inputs from suppliers at the lowest cost and pass these savings on to the farmer who was a member of the cooperative. With the deregulation of the agricultural sector in the early 1990s, the input supply cooperatives, such as Coastal Farmers, had to evolve a new business model to secure their financial sustainability. This resulted among others, in greater mark-ups on inputs, to the detriment of the farmer. The new business model also created perceptions on the part of farmers that Coastal Farmers had got 'too big and bulky' by diversifying into new markets (e.g. gardening and outdoor supplies for urban markets) and by building relationships with a single supplier of a specific input (e.g. a single fertilizer company) and not providing the best price to the farmer.

Inputs were also sourced through agents of large input suppliers ('reps') who would visit farmers and advise on the use of inputs (e.g. based on fertilizer recommendations from soil samples or specific disease problems, etc.). This form of sourcing inputs had benefits in terms of getting 'free' information and knowledge from a company representative regarding optimal use of the input to increase production. The drawback was that prices were negotiated with the 'reps' and often discounts were passed on to larger farmers, while smaller producers would pay a premium, in effect subsidising the larger farmers. In addition, because there was a tendency not to share information regarding prices being paid for inputs (by reps or farmers) there was no benchmark against which farmers could judge the price they were paying for their inputs. To avoid these issues and to get the best price for inputs, a number of banana farmers in southern KZN had, at the time of the study, joined a buying group, called NGS. This buying group was based in Umhlali, near Durban and serviced mainly sugarcane and other crop farmers. NGS was established in 2000 when it started off with ten farmers, and had grown to 70 farmers by 2012. The advantage of buyer groups is that they order large amounts of farm inputs (mainly fertilizer and pesticides) and in so doing can negotiate discounted prices as they have increased buying power.

Farmers who were part of the group submitted their fertilizer and chemical requirements on a monthly basis. The orders were pooled into a list of requirements that were put out to tender to agrochemical companies who quoted to provide the listed agrochemicals. This open process ensured that farmers were getting the best cost savings for their agrochemical inputs. For this service, farmers paid a 1% commission on fertilizer and a 3% commission on other agrochemicals to the buying group.

While the buying group did ensure best prices for the farmer, there were two drawbacks related to this form of collective action. Firstly, reps who visited the farms held significant knowledge on their products and systems required to optimise fertilizer applications or, in the case of pesticides, how to best identify and control pests. This part of the service that reps provided cannot be accessed if purchasing through a buying group. Secondly, product effectiveness and quality could differ between products made by different suppliers. This represented an additional management requirement for the farmers to monitor product use and its effectiveness. Farmers utilising a single brand consistently would be familiar with the product and therefore would not be faced with this challenge.

6.2.3 Mooi River Irrigation Scheme, KwaZulu-Natal

Limited financial, human and physical assets often caused smallholder farmers to form groups to overcome some bottlenecks in the production and marketing activities. The level of participation of community members in various formal and informal groups was examined to ascertain whether some community members were excluded from participating in group activities because of characteristics such as income level, gender or ethnicity. Some may decide not to participate because of lack of time or perceptions that they will not benefit adequately from participation (Liverpool-Tasie *et al.*, 2011). Households that are excluded may be vulnerable to food insecurity because they do not have access to resources.

In general, farmers within MRIS farmed and marketed individually. As mentioned earlier, at the time of the study, DWA had been promoting the establishment of cooperatives at MRIS to aid the process of registration with the local WUA. It was perceived that formation of such co-ops and their subsequent inclusion in a WUA would not change the way they utilised their individual plots, but that it was necessary to legitimise water access and use by farmers in MRIS.

6.2.3.1 Access to inputs

Although scheme members farmed individually, an aspect of collective action was practiced during input procurement. This was largely informal, based on family ties or existing relationships. Based on mutual trust among farmers, a group of farmers would gather their finances and assign one farmer to travel to a town of their choice to buy agreed quantities of inputs for everyone in the group. This was a cost saving measure used by farmers. Farmers in Blocks 14 and 15 of MRIS also practiced collective farming in procuring cabbage seedlings from nurseries. Each farmer who intended to plant cabbages ordered his/her seedlings through the block committee who in turn communicated with nurseries for supply on agreed dates.

Farmers in Blocks 1, 2, 3 and 4 highlighted that the lack of trust among members, and fear of being sabotaged by fellow members, were the major reasons for individual procurement of inputs. Some farmers were not committed to farming and did not adhere to production schedules, so collective behaviour with specific farmers could happen once or twice within a given year, whereafter it became difficult as farmers differed in terms of crops grown and timing of planting operations. This was a challenge because a committed farmer had to look for new farming partners every season. The major challenges of input acquisition included:

- The period between placing an order and receiving seedlings was long – especially with cabbage
- High market prices for most inputs were prohibitive for smallholder farmers
- Suppliers were located some distance away, and farmers spent much time and resources travelling to Greytown and Pietermaritzburg.

Irrigation farming is labour intensive and farmers mostly relied on family and hired labour. Once a parcel of land was allocated to a household by the authorities, this was farmed individually. Decisions on what to plant and when to plant were taken by the holders of the plots.

Although there was no evidence of collective utilisation of plots, collective action was practiced in operations such as planting, weeding, harvesting and at times marketing. This saved money, rather than paying to hire labour. Farmers grouped themselves informally in groups of not more than five, to help each other during the peak periods for specific operations. Farmers said that they took advantage of trust among themselves based on religion, culture and family relations to assist each other in carrying out farm operations. Even when such collective practice was done, it remained the responsibility of the plot owner to decide what he/she would do with the output. This indicates that collective action at farm level was an important mechanism to ensure access to sufficient labour.

6.2.3.2 Access to equipment

The initial survey of 71 irrigation farmers explored how they prepared their land for crop farming. The survey revealed that 62% of farmers in MRIS used hired tractors to carry out land preparation on their beds between August 2011 and September 2012. The main land preparation activities included ploughing, discing and ridging. Tractors were sometimes hired from fellow farmers. Farmers highlighted that although government tractors could be hired from the DoA offices at Tugela Ferry, they were not always available when needed. Due to the large number of scheme participants, farmers resorted to private hire instead of waiting for government tractors, to ensure correct timing of their planting operations. Access to municipal tractors (belonging to the Msinga Local Municipality) required that farmers operated collectively as farmers could only hire municipal tractors in groups of ten. Farmers indicated that they had challenges with this arrangement, because planting times differed between farmers and hence they required tractor services at different times. In addition, some farmers did not have the funds to pay for the tractor. This sometimes resulted in insufficient farmers to make up a group to access the municipal tractors. Some farmers used animal draught power for tilling their land (see Figure 6.5). This was normally done in cases where tractors were not easily available, money for tractor hire was not available or when fields were too wet to be accessed by tractors. FGDs however indicated that livestock owners charged the same rates as tractors for tilling the standard 0.1 ha beds in MRIS. There was therefore no cost saving incentive for using animal power over tractors other than if the plot holder had his/her own livestock for use and did not need to hire.

Figure 6.5 Draught animals ploughing a field at MRIS, KwaZulu-Natal.

6.2.4 Synthesis of findings across the three sites regarding access to inputs and equipment

The exploration of input acquisition also gave attention to access to equipment and machinery. These aspects all require access to financial resources. For this reason, access to finance was also considered. Inputs were generally greater in projects, where they were often funded, than when used by individuals. In Willowvale, individuals accessing inputs such as fertilizer did so through government programmes. This may have required some collective action, but this was not explored further. Labour was another input that was considered. The study encountered cases of labour sharing but this generally led to some form of remuneration by the person whose land was being weeded, harvested, etc. Truly collective action was only encountered within the projects where members collectively farmed the land and collectively engaged in various farming activities.''

The banana producers at Marina, KZN revealed a slightly different situation as a number of these farmers purchased inputs individually. Discussions with them about the possibility of reducing costs by collective action revealed a general feeling that the costs outweigh the benefits and that effective collective action relied on strong relationships and trust. They also highlighted practical constraints such as different requirements in terms of timing of planting. Some informal collective action was encountered where small groups of farmers bought inputs on behalf of each other to save on travel costs. Collective use and maintenance of equipment emerged as problematic – for example the rotavator at Marina which no one had taken responsibility for repairing. Access to municipal tractors for MRIS was another example of the challenges of collective action,. In this case, there were often not enough farmers with the necessary resources to form the required group of ten timeously.

Access to finance often required collective action, and both formal and informal options were encountered. Government and other funders generally required the formation of groups, while *stokvels* operated as informal savings groups. Groups that formed spontaneously appeared more effective than those formed specifically for the purpose of accessing funding programmes.

6.3 MARKETING WITHIN SELECTED FOOD VALUE CHAINS

Marketing of agricultural produce provides the much needed opportunity for smallholder farming to contribute to the mainstream economy and allows for a cash injection back into the local community. It is important to ensure that all farmers in South Africa have equitable access to opportunities to compete in the market. This helps to promote the optimal utilisation of agricultural resources and also generates income and employment linkages in the market. The behaviour of farmers regarding marketing of their produce was explored to determine the extent to which farmers acted collectively or individually.

6.3.1 Willowvale, Eastern Cape

At Willowvale, the majority of households did not market any of their produce (for example 89.5% of households growing maize and 80.8% of households growing spinach). The situation was slightly different with those households producing butternuts – where only 36% of the farmers grew this crop and only 58% of those growing butternuts did not sell any portion of the crop. The investigation of markets showed that most sales were made to individual consumers (i.e. neighbours), though hawkers also provided a market for some produce. In terms of livestock production, marketing was even less apparent – and there was negligible sale of animals even within the local community.

The two projects at Willowvale were more market oriented than individual households within the local community, although marketing was a challenge. While initially some buyers visited the FCP site to collect produce, this arrangement ceased as the road to the site deteriorated and buyers were not willing to travel on it. Agricultural production at the projects took place collectively and thus the produce was also marketed collectively. In the case of FCP, the project coordinator identified markets and negotiated prices on behalf of the members. At Ciko, produce was grown and marketed collectively, with customers mainly being the local community.

No examples of collective marketing outside of the projects were encountered during the study which suggests that if it were to occur, it is likely to be on an informal and *ad hoc* basis.

6.3.2 Marina, Eastern Cape

The nature of banana farmers' behaviour related to storage and marketing are described below, in respect of both smallholder and large-scale commercial producers.

6.3.2.1 <u>Smallholder banana producers</u>

For smallholders, storage and ripening was entirely an individual activity. Farmers harvested the almost ripe bananas and stored them, either in separate buildings at their homestead or in the kitchen. Farmers used different strategies to facilitate the ripening process, but all operated individually. For example, one of the larger smallholder farmers had built a separate house where he kept his bananas covered in blankets for about five days. After five days, he kept them in an open space so they could dry out. Another farmer hung her banana bunches and covered them with a maize meal sack for about a week. A third farmer used a metal box (trunk) to store his bananas for about a week. For those banana farmers engaging in marketing, ripe bananas were sold to one of three market outlets:

- The community: general public who were interested in the product
- Hawkers: from Flagstaff and the local community
- Schools: for school feeding schemes.

At the time of the study, very few examples of collective marketing were encountered and farmers reported that collective marketing and storage would not be beneficial under current production, as there were minimal quantities of bananas being produced. They emphasised however, that suitable storage facilities would be needed in future to cater for production by farmers who expected to expand their operations. Farmers mentioned that increased volumes would allow them to compete in the market and that collective action might be necessary when the local market demand is saturated and they are forced to seek markets further away. They also highlighted that storage facilities and increased volumes would ensure that they would be able to supply the market consistently. One example of collective marketing was encountered through the study and is described in the textbox below, though it only involved two neighbouring households.

Example of collective marketing

Two community members, one male and one female, were neighbours who grew *amadumbe*, sweet potatoes and bananas. These two families worked closely in producing and marketing their own produce as well as buying from their neighbour. Produce was stored and sorted in one of their rondavels. Most of the produce was taken to Durban where it was sold at the Warwick street market. They also supplemented their own produce with produce bought from commercial farmers and from the Ugu Fresh Produce Market. They shared the transport costs (fuel only) of a vehicle belonging to one of them. In Durban they each rented a table provided by other hawkers with whom they had established a relationship. They did not have a permit of their own and thus were forced to rent from a licensed hawker. One of them was in the process of applying for a permit through the Municipality. Previously, they used to sell their produce to a hawker who had a stand at the Warwick market, but he dictated the price and sometimes would not pay for produce that was provided to him. They decided it would be better to sell the produce themselves although there was a lot of competition in Durban and sometimes they made a loss due to low prices and the cost of transport and table rental.

Much of the banana crop grown by communal smallholder farmers was sold at the farm gate, and traders with bakkies often purchased from smallholder farmers. These traders negotiated prices on an individual basis and were prepared to drive around to secure a low price for the bananas. In doing this, they used their market knowledge to their advantage while keeping producers in the dark regarding the value of their product. Working collectively, communal smallholder farmers could possibly have negotiated better prices with the traders.

The research team suggested that a small supply chain could be developed with the traders, and that a simple, but robust packing system based on size and quality could be established. Linked with this would be a system to split costs among banana suppliers, requiring record keeping systems and a responsible person allocated for this task. This would serve the interests of the farmers and ensure that a fair price is paid to producers for their bananas.

6.3.2.2 Commercial banana producers

Historically, banana marketing was regulated through the Banana Board, which was established in 1958. The Banana Board operated as a single channel pool scheme and the Board determined prices and adjusted these on a weekly basis. The Banana Board was disbanded in 1994 and the single channel pool scheme terminated. With the deregulation of the marketing of bananas, market forces now determine the prices of bananas (NAMC, 2000), and banana growers recognised the need for effective marketing. As a result, KwaZulu-Natal Banana Cooperative, a cooperative operating as an agent for the Banana Board, evolved into the KwaZulu-Natal Banana Cooperative Limited (KNBC), a private company formed specifically to market bananas from southern KZN. KNBC had become a limited company by the time of the study, but still operated in the manner of a cooperative in that producers were members or shareholders in the company.

A number of different producer pools, reflecting levels of banana quality were established by KNBC to serve banana farmers. Smaller and less commercially-oriented producers tend to produce bananas of a lower quality and were therefore placed in a separate pool. Each pool was branded separately, based broadly on the quality of the bananas produced by the growers concerned. Table 6.12 below provides an indication of how the prices received for the different pools varied. KNBC provides a full market service to banana growers. They identify the best markets in a given week, conduct credit checks on clients and provide a guarantee of payment through vetting of clients. KNBC also arranges for the ripening of the bananas, transport to the market and tracking sales of produce. Producers simply contact KNBC with their pack outs (i.e. amounts of each grade and size) and KNBC instructs them on amounts are required for the requisite form of packaging (different coloured plastic crates represent different end markets, while cardboard boxes are for the Sunrise Valley branded stock). From the market's perspective, KNBC also had internal control systems to ensure that producers were compliant with the standards set by the market. This was achieved through regular spot checks of producers' pack houses.

Table 6.12 Price received for bananas supplied by KNBC, week ending 6 February 2010

Pool	Price received per grade					
	PXL	PL	XL	L	M	S
Individual	66.87	63.25	65.00	59.85	50.54	41.53
KNBC	74.13	63.09	65.00	73.99	57.81	0.00
Pack house	74.69	41.93	0.00	40.08	0.00	0.00
Sunrise Valley	81.63	74.36	77.30	68.67	61.66	47.91

(Note: zero value means no sales of that grade during the week specified)
Source: KNBC

This table demonstrates the premium advantage enjoyed by Sunrise Valley. Prices received were consistently higher across all the grades of bananas. This was because Sunrise Valley had developed a reputation of quality bananas for which the market was prepared to pay more. This was borne out by the fact that only 8% of the bananas produced by individual growers for the 2009/2010 season were PXL, while for Sunrise Valley producers, 28% of bananas produced in that year were PXL. Commercial farmers therefore aimed for their produce to be part of the Sunrise Valley pool.

Destination markets for the different grades also varied. Premium Extra Large and Premium Large were sold directly to retail chain stores, primarily to Freshmark (Shoprite/Checkers). Surplus PXL and PL that could not be absorbed by retailers were sold at Municipal Markets. Conversely, when bananas were in short supply, retailers would accept standard grade bananas. Standard grade bananas were usually sold only at Municipal markets. The main Municipal Markets for KNBC were East London, Mthatha, Ugu, Durban and Pietermaritzburg, as prices were more competitive because transport costs were lower. Farmers paid a 2.5% commission on the gross price received to cover the operating costs of KNBC. In return, KNBC provided the following advantages:

- Greater market presence due to pooling of produce.
- Consistent supply to markets to retain customers.
- Established strong relationships with Fresh Produce Markets and Retailers.
- Reduced costs of packaging inputs from bulk buying. For example, blue bags used for protecting bananas while ripening on the tree cost R250 per roll from Coastal Farmers' Cooperative, while KNBC provided these to farmers at R190 per roll. Similarly, banana boxes were also provided at a competitive price to farmers.
- KNBC arranged for ripening of bananas, transport to markets and tracked sales of produce.
- KNBC provided internal control systems and regular farm audits to ensure compliance with market standards.

The greatest advantage to the farmers of this form of collective action was that the specialised marketing functions are externalised at a cost of 2.5% of gross price. If the farmers were to undertake this function on their own, the management cost would have been higher. One farmer indicated that he would happily have paid 5% of gross, which highlights the value of this service to commercial farmers in southern KZN.

6.3.3 Mooi River Irrigation Scheme, KwaZulu Natal

The initial investigation of the MRIS revealed that more than 90% of the farmers in MRIS marketed at least a portion of their produce, either formally or informally. Farmers mostly marketed vegetables to raise funds to buy inputs for the following crop. Despite this fact, rural producers in MRIS did not have proper access to markets for their cash crops. Access to cash crop markets, from the rural producer's point of view, was hindered by many factors, including policies with regard to financing. Even if producers could identify a potential market for their crops, lack of both sufficient household income and resources to access the market hindered their participation. The lack of income was aggravated by the lack of any effective outside market link-up, which might have provided households with an outlet for their product. Reliable markets ensure consistent flow of income from agriculture and hence farmers can financially commit their labour and resources to minimise migration to other areas seeking employment and concentrate more on agriculture.

In respect of the main value chains in the MRIS, farmers specialised in the production and marketing of fresh produce. There appeared to be no investment in storage facilities for fresh produce by farmers at MRIS. Farmers harvested their produce after they found a buyer or when they wanted to take the produce to the nearest towns for trading. Common crops were cabbages, tomatoes, spinach and potatoes. These crops were destined for the informal market through hawkers and farm gate trading to community members. Farmers sold their produce on a cash basis. Farmers and traders negotiated for better prices depending on prevailing market conditions. Where *bakkie* traders were not involved in the movement of produce to the market, farmers indicated that they had difficulty in hiring transport to take produce to Greytown. Transport problems actually prohibited/discouraged some farmers from producing highly perishable vegetables such as tomatoes. Farmers interviewed indicated that the farmers growing tomatoes on a large scale were those who had their own transport and did not have to rely on others to market their produce.

While there was no evidence of collective action in storage of produce, farmers indicated that they collectively hired transport to take their produce to the market. Pooling of transport was found to be common when (1) an individual farmer secured a specific market but he/she could not cope with the volumes required, (2) a group of farmers jointly secured a common market for their produce, or (3) farmers wanted to avoid harvesting lots of produce without a definite market. In the third instance, farmers in the group harvested different produce (tomatoes, cabbage, potatoes, etc.) and hired one truck to take it to the informal roadside market in Greytown. Each farmer therefore had limited quantities of a specific product that he/she was able to sell within a day or two, depending on the market conditions. This minimised post-harvest losses through loss of quality and disposal of unsold produce by farmers.

Another example of a collective activity among MRIS farmers was price negotiations. Farmers discussed and set prices at which certain commodities could be sold in the scheme. However, the same farmers were not obliged to sell as group since they produced individually. However, these prices were not necessarily adhered to. As the number of buyers coming to the scheme for fresh produce was limited, some farmers would negotiate lower prices with buyers so that they could sell their produce and minimise post-harvest losses, so there was benefit in marketing individually.

Some challenges were identified in relation to collective action associated with marketing. Lack of consistency in member participation was a major drawback to collective action. For instance the cooperative that represented Blocks 14 and 15 obtained a contract in 2010 to supply Dundee Hospital with fresh cabbages and tomatoes but the contract collapsed because the farmers could not supply the required quantities consistently. Another challenge was that farmers viewed each other as competitors in the local market. This destroyed the concept of collective action. Some farmers, especially those with resources such as pick-up trucks and finances, preferred to produce individually so that they could dominate the market. Those with limited resources were the ones that combined transport to the market and collectively harvested and marketed their produce. Lack of trust was another challenge facing collective action at smallholder level. Farmers informally agreed on selling prices for commodities in the scheme, but due to different financial needs, some farmers sold the produce at lower prices and asked buyers not to reveal the prices to other farmers. As a result, some farmers would sell all their produce at low prices, while farmers adhering to the negotiated price were left with unsold produce. Farmers therefore preferred to market individually or in partnership with a few trusted friends or relatives.

6.3.4 Synthesis of findings across the three sites regarding marketing of produce

An investigation of farmers' actions / behaviour in relation to marketing revealed that collective action was largely restricted to projects. Some examples of informal collective behaviour existed but these normally involved very small numbers of farmers and were based on trust, family relationships and friendships. Such efforts were normally aimed at reducing transport costs and limiting post-harvest losses, rather than the need to meet demands for larger volumes which is often cited as a key reason for collective action. Where efforts had been made to use collective action to access market contracts, successful outcomes were not recorded. Effective collective marketing was only encountered with the commercial banana farmers in KZN. They had a sophisticated system and the market agent charged a commission on bananas sold. Farmers were willing to pay for this service rather than acting individually. The same situation was encountered regarding storage facilities – through collective action the commercial farmers had access to storage and ripening facilities for their bananas. None of the smallholder farmers at the three sites collectively stored or processed their produce. Finally, it should be noted that while the commodity association model supported by Lima at Bizana provided farmers with the opportunity to share knowledge about technical issues as well as market information, this had not yet led to collective marketing. Since farmers do not market collectively, they sometimes see each other as competitors rather than potential partners – this was particularly noticeable at MRIS.

6.4 ALTERNATIVE CO-OPERATIVE GOVERNANCE

One of the objectives of the study was to investigate whether any alternative cooperative governance structures existed that could assist with input acquisition or product marketing. This was based on the assumption that certain organisational arrangements can facilitate access to inputs and markets, addressing issues such as small volumes and irregular supplies of produce, as well as small individual requirements for inputs, which are often coupled with high transportation costs. The establishment of structures that allow for collective action by small-scale farmers is seen as a mechanism to increase their bargaining power, on the assumption that they are stronger if they function collectively than if they function as individuals.

There are essentially two kinds of farmer organisations encountered in the small-scale farming sector in South Africa: farmers' associations and cooperatives (Bernard *et al*., 1986). The former are informal bodies created at the local level by farmers to represent their interests. The latter are legal entities created in terms of legislation and designed to provide services for farmers. The establishment of farmers associations and primary cooperatives continues today, as government departments seek a mechanism that will strengthen smallholder agriculture. Given that governance refers to the internal processes and operations of an organisation, the study sought to identify alternative models of governance that were effective in assisting with input acquisition and product marketing.

6.4.1 Willowvale, Eastern Cape

An interactive session with an official from the DoA revealed that it is their mandate to form structures, and that such structures existed at various levels from the ward level up to the provincial level and national level. The official indicated that some farmers were aware of the existence of these farmers associations (cooperatives) but very few were actively involved. The official stated that the activities of these associations were being coordinated by the Eastern Cape Department of Agriculture.

The study revealed that a greater number of individual households in both Ciko and Mbozi villages were not aware of the existence of these structures, and efforts needed to be intensified in terms of information dissemination on the part of the DoA to ensure that these famers were better informed about the objectives of these associations and why they needed to be actively involved. The study found that 58% of the individual farmers interviewed thought that there was need for collective structures to strength their productive activities in both villages.

The primary reason for setting up the two project groups was not for marketing. According to the DoSD; the primary reason was to produce food for the community, with selling the surplus being secondary. Both projects indicated that they wanted to see major improvements in general administration, skill acquisition / training and more equipment and farm implements. The interviews revealed that the major aims of the community projects were:

- To fight poverty through food production
- To provide job opportunities
- To improve the quality of life of the rural community.

However, these aims were still far from being realised as is evident from the challenges and constraints identified in this study. While both projects at Willowvale had formed groups with committees and designated roles for office bearers, they had not been registered as cooperatives. Furthermore FCP has a coordinator that was responsible for day-to-day operations of the project. He was a skilled person who was also well able to seek potential markets and negotiate marketing arrangements and prices. His presence strengthened the governance of the project considerably.

The nature of farming operations at the two villages and the challenges that they faced suggests that it would be beneficial to consider the establishment of structures to facilitate access to water, land and production inputs and marketing their produce. This would probably require two levels of structures – one at the farmer level (to encourage cooperation between farmers) and one at the service provider level (to facilitate cooperation between different spheres of government and other key parties such as the private sector, NGOs and CBOs). Other stakeholders who should participate in some sort of agricultural development forum include representatives of the irrigation projects and the Traditional Authority. Coordination could also consider the concept of innovation platforms as a mechanism for drawing together key stakeholders to work together to develop solutions to challenges or to take advantage of opportunities that emerge. The role of the Municipality or one of the provincial government departments in 'brokering' linkages could also have potential for strengthening the agricultural sector.

6.4.2 Marina, Eastern Cape

The main aim of the study at the Marina site was to explore the smallholder banana sector. However, an investigation of projects in the Bizana Local Municipality that Lima had been involved with directly or indirectly, also provided some useful information. In addition, the study investigated the large-scale commercial banana producers from southern KZN, and considered government's requirements for collective action if farmers are seeking support.

6.4.2.1 Experiences of various smallholder producers and projects

A "buying group" was established in Lusikisiki through the ComMark "Making Markets Work for the Poor" Programme. This buying group consisted of a number of individual producers from an outlying area. These people all worked for themselves, but grouped together in order to purchase inputs to take advantage of economies of scale. By collectively placing orders for fertilizer and other inputs, they received better prices, and could also order directly from the supplier (Sasol) who was willing to deliver to site because of the size of the orders. This is an example of collective action working in the favour of individual producers. At the time of the study, the buying group was still working on a small scale, and informally. A local woman coordinated the buying group. She placed orders with the suppliers, and all deliveries were made to her house. It is possible that she made a business out of it by buying in bulk and adding a mark-up onto the prices, before selling to her neighbours.

A case of individual entrepreneurial action was identified. The entrepreneur owned and ran a holding nursery in Lusikisiki, established with the assistance of Lima. Sunshine Seedlings supplied seedlings to the holding nursery, and also acted as a mentor to the owner. Lima had helped with the nursery structure, facilitated the establishment of a supply chain, and provided support, even monitoring cash flow, profits and sales for the first four years. The nursery was very successful, with high turnover and profits. The entrepreneur employed staff and had even purchased his own vehicles from his profits. He wanted to expand the nursery structure. The market was sufficient for him to double his space. He had been advised to re-invest his profits back into his business, but had not yet done this, preferring to make funding requests to expand his business despite being financially successful. A Lima employee was of the opinion that, although a large part of his success was attributable to personal characteristics (self-motivated, energetic, etc.), he also benefited from being the sole owner responsible for making all the business decisions, and not being reliant on group consensus.

After the success of the Lusikisiki Nursery, it was decided to replicate this in other areas with a big market potential for seedlings. Msukeni Co-op in Mount Ayliff had approached Lima for support, and a nursery was established. Again, Lima assisted in construction, training, the provision of start-up loan to purchase seedlings, and setting up a mentor / supply relationship with the supplier, Sutherland Seedlings. Sutherland Seedlings provided a lot of support and also supplied on-farm training. The difference with this business was that it was owned and run by a group (a cooperative). The cooperative appointed a lady to work in the nursery (handling orders, sales, seedling care, etc.). The nursery never became viable, and was soon closed. Although this could be attributed to many factors, one factor that stood out was internal politics within the cooperative. Apparently there were arguments over who had been appointed to run the nursery, and attempts of some members to appoint their own family members instead. It seemed there was a power struggle within the cooperative, and no-one took responsibility for managing the nursery. The nursery structure was damaged, and no-one fixed it. At the time of the study, attempts had been made to resurrect the nursery, and it appeared to be operational, but on a very small scale.

One interesting case that was identified involved a combination of individual and collective action. The

Lungisani Vegetable Project was initiated in 2007 by 12 members of the community, made up of men and women. The purpose was to sell locally and to feed families from income generated from sales. At the time of the study, the project had a membership of 10 members, as 2 had passed away and no new members had joined. Initially, the project started with all members working the same plot, planting the same crop, and harvesting to sell as a project. However, over time some members of the group had other commitments and this made it difficult for other members to work ‘on behalf’ of those that were unable to make it to the project.

Eventually the members decided that each member should have their own individual plot. This would preclude members from having to work “on behalf” of other people. If a project member came late or did not come at all, it was their problem and did not affect project agreements and plans, such as buying of seeds, petrol for the pump and monthly contributions. If a member did not have enough money to buy a large amount of seed, they were allowed to buy what they could afford at that particular time. However, this did not affect a person’s monthly contribution, as it was compulsory to contribute the agreed amount by a particular date. Although there were individual plots, various activities were undertaken collectively. These included the following:

- Buying seedlings, seed and other inputs for planting.
- Buying fuel for the irrigation pump
- Buying fencing materials
- Maintenance of the pump and fencing
- Compulsory monthly contributions to generate savings
- Sometimes members hire a bakkie from a project member to take their produce and sell it in town.

Lima Rural Development Foundation, which is a non-governmental organisation, has been working with emerging farmers in the Eastern Cape for over 20 years. Lima’s current agricultural work in the Eastern Cape focuses on providing agricultural support, training and technical advice to farmers; providing business skills and mentorship; marketing (both input and output) support (through creation of linkages) and institutional support. Their rural development work has raised the issue of collective versus individual action within the agricultural producer and agribusiness/entrepreneurial contexts. The Lima representative highlighted that many farmers were organised into informal producer groups of 10-15 members, generally comprising family members, or close community members. Generally the farmers had formed groups for the following reasons:

- Sharing of resources: This included the issue of accessing land, as well as that of access to water. Generally, groups preferred to purchase inputs collectively (economies of scale), and also marketed produce collectively, rather than as individuals. Some groups farmed one big piece of land, but each member farmed a sub plot of their own within that bigger area – thereby acting collectively but still working and farming on individual plot. In these cases, inputs were generally still purchased collectively, and output marketed collectively.
- Access to funding: Groups were formed to facilitate access support, such as fencing from DoSD, an irrigation scheme, etc.
- Security: There was a sense of security when one was part of a collective rather than being on one’s own.

Many of these farmer groups were said to be very successful, with different models for sharing of profits and costs etc. Successful group projects involved setting up strong systems, including a constitution, elected chairperson, and formalised roles and responsibilities. However there were some issues and challenges which arose as well. These included:

- Power and leadership: Generally a chairperson was elected who was in control of all profits, bank account, etc.. It was said that a lack of strong leadership could see the downfall of a project.
- Lack of ownership: When problems arose, there was a feeling that someone else should sort out the problem. People tended to pass the responsibility to others and take the stand of “it being someone else’s problem”.
- Illiteracy: Illiterate members could sometimes be taken advantage of. For instance not knowing what profits had been generated or how much money was in the group bank account.

Similar issues were faced by agribusiness enterprises that had been established with Lima’s assistance. Those that were owned or run by groups had shown a marked pattern of failure when compared to those run or owned by individuals. Research had shown that an individual takes more pride in, and responsibility for, their own business, leading to improved rates of success. Individuals were seen to have the power to make decisions, and if challenges occur, the individual was able to resolve them rapidly, without having to consult and obtain buy-in from other members.

Other issues that were found to affect success included expectations for more funding and continued support. When agribusinesses were set up or assisted financially through grants, even if supported for a fair amount of time, there was an expectation for continued support (in terms of finance, infrastructure and technical support). It was revealed that when the funder or supporter withdraws, projects often begin to fail (particularly if a group was involved). This is was thought to be because the group was used to having an individual take responsibility and make decisions and often there was a fear of doing that themselves (or intimidation from the rest of group, if a chairperson was not elected to take control).

6.4.2.2 Commercial, large-scale banana producers

In order to compare smallholder banana farmers on Traditional Authority Land (under communal tenure) with large-scale commercial farmers operating on private land, discussions were held with members of the NBA and the KwaZulu-Natal Banana Cooperative (KNBC), to investigate the extent of individual and collective action in the commercial banana value chain.

Primary production of bananas occurred mainly as an individual activity, with limited collective action. Primary production was organised either as individual farmers, or in the form of a limited company or trust, owned by the farmer and in some cases with shareholders or partners. There were three broad areas where collective action was pursued by commercial farmers in KZN to support or enhance banana value chain development. These were:

- The purchase of inputs (already covered)
- The generation and sharing of knowledge
- Marketing of produce (already covered).

Collective action occurs mainly around an area of common interest (i.e. banana farming), resulting in a relatively small, but focused group working collectively to achieve a common goal, namely reducing costs, increasing production and obtaining good prices for their bananas. The areas of collective action identified by NBA are discussed in the sections below.

Through the study a number of different structures / platforms were identified that encouraged the generation and sharing of knowledge. The NBA was a voluntary association that met quarterly. The primary purpose of the organisation was to act as a study group for farmers to share information and test new ideas and products related to the production of bananas. Members of the association used the study group to share information regarding production and for benchmarking inputs against outputs, updating economics of production from a practical perspective (e.g. benchmarking break-even points between farmers) and to identify and test new products and technologies for production.

Members paid an annual fee to support the organisation / study group. These funds were used mainly to fund specialists to share their knowledge on a specific aspect of banana production. Guest speakers were invited on the basis of their knowledge of emerging technologies or of management or production interventions, to address challenges that needed to be resolved. Members agreed on which challenges were to be addressed and the relevant specialists were then invited to share knowledge on a specific subject. Recently, for example a specialist was invited because his knowledge of monocropping enabled him to advise on the best ‘break crops’ to be used to control disease and enhance soil fertility.

Agents for agricultural products also had the opportunity to promote their products at these meetings if they are considered to have potential application in banana production. The association collectively decided who should test this product or technology and once it had been tested, the farmer reported back on the results / efficacy. An example provided by the association was that recently, a new irrigation management system, using soil probes and weather data, had been introduced at the quarterly meeting. One farmer agreed to test the system and reported back that water and electricity consumption had been reduced by 30% as a result of the system. This impact was then compared against capital and management costs to understand the costs and benefits of the technology so that farmers could make an informed decision regarding the adoption of the technology / management practice. This means that not only was new knowledge being generated for banana production, but farmers with a common interest could test products or technology among themselves, which resulted in a much higher confidence of the efficacy of the product / technology and how to best use it for banana production.

It was the opinion of the team that collaboration with NBA in the generation and sharing of knowledge could significantly improve smallholder production systems for bananas. Government extension officers required more skilling to provide effective support to smallholder banana producers. NBA had on a number of occasions invited agricultural extension staff to attend their quarterly study group meetings However, there had been no attendance during the timeframes of the project, even though participation in these forums could have enhanced practical knowledge. Participation in the meetings could also increase institutional knowledge related to banana production and extension officers could impart this knowledge to smallholder producers.

Another way to build capacity would be to send extension officers on an apprenticeship with a banana farmer to learn the intricacies of banana production. This knowledge could then be shared with smallholder producers and build links between commercial and smallholder producers. Lastly, banana growers could also participate in these meetings, although this would require some degree of literacy in English and a basic level of education to understand the technical aspects of the discussions. Another more practical option would be to request NBA to visit the producers on a quarterly basis in order to advise on how to improve banana production. Such arrangements could also be considered as a basis for public-private partnerships to improve support provided to small-scale producers.

Collective knowledge is also shared through the privatisation of extension. In terms of subtropical fruit, there were a number of different commodity associations providing support to different subtropical fruit producers (e.g. Banana Growers Association of South Africa, SA Mango, South African Macadamia Producers, etc.). This resulted in significant duplication as each organisation had its own extension staff, research, administration and management. Subtropical fruit production is confined to specific areas and many farmers grow more than one type of subtropical fruit on their farms. This meant that many farmers would be members of a number of different producer associations, and had to pay membership fees to these organisations. It was eventually recognised that the pooling of the resources of the different representative associations would allow for improved research and extension support on subtropical fruit production. Consequently, SUBTROP, an umbrella organisation, was established to generate knowledge in relation to subtropical fruit production in general. SUBTROP conducts research (related to both marketing and production) and also provide extension support to subtropical fruit producers. This means that a single specialist extension support provider could advise a mixed subtropical fruit farmer on the whole farming operation. SUBTROP was regionally based, so farmers in KZN could more easily access knowledge and support. Before this, it was difficult for banana farmers in KZN to get this support as banana production in KZN represents a small proportion of national production. This is an example of collective action between commodity organisations to reduce costs, increase efficiency and better support the advancement of subtropical fruit production in South Africa.

6.4.2.3 Government's requirement for collective action

According to representatives from the Eastern Cape DoA and DoSD, projects were usually required to be of a collective nature (formal groups or cooperatives) in order to secure assistance and funding from Government. However, representatives from both these Departments recognised that there were individual farmers who were functioning effectively without being part of a group.

The DoSD provided support to emerging farming enterprises, i.e. cooperatives and non-profit making enterprises. At the time of the study, the Department provided support through its three (3) programmes, namely Sustainable Livelihoods Programme; Women Development Programme and Youth Development Programme. With the Sustainable Livelihoods Programme, the Department only funded existing projects and this resulted in people forming projects because there was funding available and not because they wanted to work together. With the Women Development Programme, eligible projects had to consist of a minimum of 15 members. The Youth Development Programme also provided funding for group activities. It was emphasized that DoSD did not fund individuals. The representatives of the DoSD acknowledged that the functioning and funding of projects was coupled with various challenges, one of which was that projects with insufficient members to qualify for funding would bring in new members and this caused tensions between old and new members. As a result, the Community Development Supervisor was allowed to motivate for projects that did not have enough members to qualify for funding as long as she/he was convinced that the project members were serious about what they were doing.

As with the DoSD, the focus of the Eastern Cape DoA was on providing support to groups. This reflected prevailing national policies that sought to maximize support to benefit as many people as possible. The Departmental officials recognised that there were challenges associated with supporting groups and projects that focused on collective action. While the Department generally had a policy of no support to individuals, indigent households were supported to improve food security and nutrition. It was also acknowledged that some of the inputs for communal gardens, such as seedlings and fertilizers, were sometimes diverted to homestead gardens. The DoA supported and implemented a variety of programmes, one of which was the Siyakhula Maize Massification Project. The Department required a minimum of 6 ha for a farmer to participate, which meant that most of the participants were groups not individuals, as it was difficult for an individual to access such large areas of land. The Siyazondla Programme focused on household food security objectives and targeted the most poverty stricken households. Community members as well as the Municipality participated in the identification of the neediest households. On-going support was provided by the Department through its extension services. The Department also provided inputs and technical support to projects or groups that produced food for food security purposes.

The Bizana Local Municipality, through its newly established Agricultural Development Office (ADO), endeavoured to support agricultural development within the municipality. There were five programmes under the auspices of the Municipality geared towards providing both financial and technical support to agricultural initiatives in the Municipality. The Municipality had programmes that were aimed at supporting both groups and individuals, but it was suggested by a municipal official that provision of support to a cooperative would have a greater impact than provision of support to individuals. It was however, also recognised that issues and challenges came with cooperatives and that being in a cooperative did not guarantee success and in fact, the opposite was often true. It was suggested that cooperatives hamper entrepreneurial spirit, i.e. they discourage individuals with great business ideas from implementing them.

From the discussion with Eastern Cape DoA, DoSD and the Bizana Local Municipality, it was evident there were not many success stories among the collective or cooperative initiatives that they supported. However, this does not mean that there are no success stories, as the Lungisani Vegetable Project could be seen as a success from the point of view of collective action. However, in terms of scale, the project was relatively small.

6.4.2.4 Summary of lessons from Marina, Eastern Cape

The analysis of collective action among communal farmers in Bizana Local Municipality indicated that there was limited true collective action among producers, irrespective of the commodity being produced. Although individuals did form into groups for communal gardens, the primary driver of this was to secure funding for inputs and infrastructure. In most of the cases reviewed, these funded initiatives rarely achieved their objectives, which included food security, agricultural development and commercialisation of emerging producers. Discussions with the DoSD and Eastern Cape DoA, key informant and FGDs revealed that there are a number of factors that retard effective collective action. These can be summarised as follows:

- Eroding traditional institutions (e.g. *ukweshwama*) and the resultant decline in social capital caused disintegration, lack of cohesion and mistrust, which jeopardised effective collective action.
- Lack of enforcement of legislation in relation to resource use and planning (e.g. water abstraction, draining of wetlands) resulted in the plundering of common property resources (e.g. water tankers selling water).
- Policy frameworks that required groups to be established to secure funding and support resulted in individuals simply joining together for the purpose of securing funding. There was no common vision and purpose or long term goals within the group, which ultimately resulted in conflict, attrition of participants and eventual failure.
- It is possible that the policy requiring groups to be formed to maximise benefits was based on the flawed assumption that this approach delivered the maximum impact in terms of benefits to the community, such as income generation and employment creation. The requirement for the formation of groups also hampered entrepreneurial spirit.
- Lack of organisational management capacity retarded the groups' ability to manage finances, to engage in effective planning and to coordinate activities for the advancement of the group. In communal gardens, most individuals wanted to farm their own portion of the garden in their own way. Although this enhanced household food security, it retarded commercial agricultural development.
- There was a worrying lack of support for individuals and entrepreneurs who had the potential to create jobs and employ people.
- Ineffective extension support to address group dynamics and other socio-institutional issues – it was often the case that extension providers could advise on the technical aspects of production, but could not adequately deal with the social and institutional dynamics.

- Power dynamics within the group often resulted in one individual dominating the group and pushing their own agenda, resulting in disunity. The dominant individual in groups was often elected as chairperson by virtue of a higher level of education and gained control of the groups' financial affairs, leading to opportunities for fraud and corruption.

The study found that local spheres of government departments were beginning to recognise many of these issues, but there was a lack of communication between provincial and national spheres of government when policy is developed. This needs to be addressed through enhanced inter- and intra-departmental communication and cooperation. There were some successful examples of collective action, such as the Lungisani Vegetable Project, where the group collectively purchased a pump for irrigation and continues to contribute to purchases of inputs. Transparency in organisational decisions, collective decision making and the sharing of responsibility, were found to be the key elements of the success of this project. Another critical element of success in this case was that the group was initially formed for a common purpose, rather than to secure funding.

Commercial banana farmers were found to engage in primary production as individuals or as companies and were able to make their own decisions on all aspects of primary production. In this sense, they operated as individuals. They did, however, recognise the importance of collective action in some areas. Key elements for successful collective action from the analysis of the commercial banana sector in KZN were trust, cohesion (this highlights the need to work with like-minded people), people working together with a common purpose and real benefits from collective action (reduced costs, improved production, better marketing). Access to relevant technology (internet, email and cellular communication) has also made the development of collective action much more effective.

6.4.3 Mooi River Irrigation Scheme, KwaZulu-Natal

At the MRIS, the main finding in terms of alternative cooperative governance structures was the impact that the establishment of cooperatives has had on farmers' ability to access both inputs and markets. In order to access infrastructure support through the KZN Department of Agriculture, the tail-end blocks registered as cooperatives. The members continued to produce on individually held plots, but accessed some inputs (e.g. cabbage seedlings) collectively. Apart from this initial process of cooperative registration, which was facilitated by DoA, the formation and registration of cooperatives has also been facilitated by the DWA as a mechanism for ensuring representation of scheme members at the WUA. There is some concern that the formation of the cooperatives has not been directed at improving agricultural production and marketing. It is yet to be seen whether the cooperatives will provide any other services to their members.

A number of opportunities for introducing new or strengthening existing collective action were identified through the study:

- The institutional set-up for accessing water at MRIS had much room for improving water resource usage at local levels. It was suggested that this could be achieved through intensive capacity building programmes at grass roots levels to ensure that rural smallholders understood the need to join water management structures and participate in infrastructure maintenance.
- In terms of water resource access and use, there were opportunities for cooperatives to improve the process whereby releases of water from Craigieburn Dam were requested when the flow in the Mooi River was low.
- Improved farmer coordination could have improved access to municipal tractors where a minimum number of farmers were required before the tractors would be made available.

- There were opportunities for farmers to benefit from collective marketing action at local level. Better organisation of the members of the cooperatives would enable farmers to enter the formal market, such as supplying fresh vegetables to schools and hospitals.
- Pooling of produce from different farmers to transport it to the market could reduce the cost of transport for the individual.
- Pooling of finances for bulk purchase of inputs (and associated discounts where applicable), could assist with access to inputs as suppliers might be willing to deliver goods if sufficient quantities were ordered.

6.4.4 Synthesis of findings across the three sites regarding alternative cooperative governance

This section of the report focused on the governance of cooperatives and other famer organisations at the three sites, but also gave attention to the need for "cooperative governance" as defined by the South African government. This was important because of the range of government departments supporting farmers at the three sites and the overlap of roles and responsibilities. It was also clear that, despite the many problems pertaining to collective action identified by most stakeholders, government departments still mainly focus on group efforts and provide very little support to individual farmers.

Farmer groups/ cooperatives promoting collective action exhibited variations in terms of how they were governed as well as how they engaged in collective action. Some groups had registered as cooperatives to comply with government requirements. Most had constitutions and committees and successful projects were generally characterized by strong and effective leadership. The concept of having a project coordinator responsible for day-to-day running of project activities was only encountered at FCP but showed potential as a mechanism to improve the functioning of groups. However, not all problems can be addressed by such a position. In FCP, the coordinator was not able to address the issue of road maintenance to the site, and this ultimately led to the failure of the project after the timeframe of the current study.

The commercial banana farmers in KZN provided the best example of effective collective action encountered through the study. This focused on input acquisition, marketing and knowledge sharing. Individual farmers were willing to pay for the services provided to them but continued to produce individually.

Examples of collective action by smallholders that were encountered included a buying group supporting individual producers (a ComMark initiative), groups that produced collectively, groups that produced individually on sub-plots but engaged in some level of collective action, and groups that only engaged in collective action to access to water. Generally, there were two types of groups encountered – those that formed naturally with a common purpose of producing collectively and those that formed specifically to acquire access to funds through government programmes.

At MRIS, the establishment of different structures representing the same farmers within the irrigation scheme was an interesting case. The scheme had a structure of block committees overseen by a scheme committee. This was focused on managing water-related matters affecting members. Superimposed on this structure were the cooperatives being formed with support from KZN DoA and DWA with the purpose of strengthening production and ensuring access to equipment (in the case of DoA) and to ensure effective representation of scheme members in the WUA, given the large number of scheme members. The extent to which these structures will be able to integrate their functions has yet to be seen.

What is clear from the study at all sites is that governance plays a key role in the successful operation of structures aimed at supporting collective action amongst small-scale farmers.

6.5 PUBLIC-PRIVATE PARTNERSHIPS

Another aspect of collective action considered in the study was public-private partnerships for resource use and input/product marketing. Public-private partnerships (PPPs) are seen as an effective mechanism for agricultural development through a number of interventions including access to technologies and innovations. Such partnerships also bring together the skills of these two sectors so as to address farmers' needs better (Croplife International, 2009). PPPs have different objectives and can support agricultural development in different ways. Some facilitate access to microfinance and credit schemes, while others provide access to skills and knowledge. Other partnerships lead to research and the development of new technologies and genetic varieties (Croplife International, 2009).

A study by Okunlola *et al*., (2013) considered the role of private sector partnerships in supporting smallholders moving into commercial agriculture. They considered a variety of linkages that can exist between smallholders and the private sector, including market facilitation, processing, resource donation, procurement, financial support, mentorship and training. Some of these linkages offer opportunities for public-private partnerships. One of the PPPs identified through the study was that between Nestlé and the KZN DoA for the procurement of chicory from smallholder farmers. Other initiatives included a partnership between KZN DoA and South African Breweries to procure Grade 1 non-genetically modified yellow maize from smallholders operating on communal land. The Nestlé partnership included the element of collective action as the private company was procuring chicory from nine emerging farmers in the Weenen area of KZN as part of its corporate social investment. A report by the National Agricultural Marketing Council (NAMC) highlighted that there were also plans to venture into value adding, with the establishment of a farmer-jointly-owned processing plant, which is expected to improve the prices that farmers received for their material (Mkhabela, 2014).

As this section of the report focuses on PPPs as a mechanism for facilitating the integration of small-scale farmers into the mainstream economy, it is important to understand what legally constitutes such partnerships in South Africa.

Public-private partnerships as defined by National Treasury

South African law (http://www.ppp.gov.za/Pages/whatisppp.aspx) defines a PPP as "a contract between a public sector institution / municipality and a private party, in which the private party assumes substantial financial, technical and operational risk in the design, financing, building and operation of a project". Two types of PPPs are specifically defined:

- Where the private party performs an institutional / municipal function.
- Where the private party acquires the use of state / municipal property for its own commercial purposes (A PPP may also be a hybrid of these types).

Payment in any scenario involves either the institution / municipality paying the private party for the delivery of the service or the private party collecting fees or charges from users of the service (or a combination of these). National Treasury clearly states the simple outsourcing of functions where substantial financial, technical and operational risk is retained by the public institution does not constitute a PPP as defined by government.

6.5.1 Willowvale, Eastern Cape

In some situations, public-private partnerships are said to have provided effective mechanisms to improve service delivery to smallholder farmers, either through providing access to inputs or land, technical support, equipment or reliable markets.

During the survey the farmers affirmed that there were no existing public-private partnerships within the study site. However, an interactive session with an official from the Eastern Cape DoA revealed that the Department had a form of a partnership with Umtiza Farmers Corporation. The partnership was based on Umtiza facilitating workshops to train farmers and ensuring that certain production inputs were made available to the farmers. Umtiza was a private organisation that dealt with marketing of agricultural production inputs. The impact of the partnership was not evident to the farmers in either Ciko or Mbozi villages as 64% of respondents indicated that they were not aware of the activities of Umtiza. The farmers also indicated that they had not ever received any direct assistance from Umtiza, but they did confirm that they procured inputs from them occasionally.

The relatively long distance between commercial farmers and the study site limited opportunities for public-private partnerships that involved commercial farmers. Opportunities should however be sought within the business sector, especially businesses located within the towns of Idutywa and Willowvale. Such partnerships could ensure access to reliable markets and technical support.

6.5.2 Marina, Eastern Cape

In Bizana Local Municipality, the study found two examples of public-private partnerships improving access to inputs and markets. The first case involved Old Mutual, which is an international financial services group. It emerged from interviews that the Eastern Cape Department of Agriculture works closely with Old Mutual to assist individuals to access financial support from Old Mutual. Old Mutual helps individuals to develop and implement business plans. They also provide on-going support as the sustainability of the business impacts on repayment potential.

The Siyakhula Maize Programme also had an element of a PPP. This programme was part of the Maize Massification Initiative. At the time of the study there were approximately 15 projects that had benefited from the programme. Through a private company, Bizana Agricultural Supplier, farmers took dry maize to Harding. Farmers were required to have access to 5 ha or more of land to participate in the programme.

6.5.3 Mooi River Irrigation Scheme, KwaZulu-Natal

The study found that there was an increasing role of private companies in famer advisory services. As contact between the farmers and the government extension officials was limited, farmers consulted input suppliers to get advice on how to control problem pests and diseases. By taking leaf samples to their nearest agrochemical dealership, farmers were able to get advice or recommendations of the chemical they could buy and how they could control the pest or disease. This was very helpful for many farmers.

Agronomic information could also be obtained from the input suppliers. Most of the shops highlighted that their sales staff received training from manufacturers of agrochemicals on how the chemicals can be applied. Furthermore, seed producers indicated that they train the same sales staff on crop varieties. The information available to farmers from sales personnel in most agricultural shops included knowledge about disease-resistance, drought-tolerance, and yield potential of specific crop varieties. The multiple roles of input suppliers seem to be appreciated by farmers and can therefore be considered as a driver to the overall crop value chains. Opportunities for establishing PPPs with such private companies should be pursued as they already have a relationship of sorts with the farmers.

6.5.4 Synthesis of findings across the three sites regarding public-private partnerships

Public-private partnerships have been widely recognized as an effective mechanism for achieving agricultural development, and thus have potential for enhancing the participation of small-scale farmers in the mainstream economy. A number of cases were identified, notably the chicory production being supported by Nestlé, where Nestlé – in collaboration with KZN DoA was providing technical support as well as a secure market for the produce. While no such cases were identified at the three study sites, a number of cases were identified that could be seen as PPPs. In the Eastern Cape, a partnership was encountered between Umtiza Corporation and the Eastern Cape DoA, which was meant to build technical capacity and improve access to inputs. In Bizana, discussions revealed that there was an initiative where Old Mutual was partnering with Eastern Cape DoA to improve access to finance for small-scale farmers. At MRIS, the only example of private sector support that was identified through the study was the provision of technical support to small-scale farmers from various outlets supplying agro-chemicals. This was addressing a shortcoming of the government extension support programme and offered potential for scaling up extension support. To some extent one could also consider the outsourcing of project implementation to Lima as an example of a public-private partnership.

Although not all these cases fit within the definition of PPP provided by National Treasury, it is clear that the private sector has a role to play in supporting agricultural development – either as part of their corporate social responsibility or as part of their business model.

6.6 SUMMARY AND RECOMMENDATIONS REGARDING COLLECTIVE AND INDIVIDUAL ACTION

The extent to which small-scale farmers engage in collective or individual action to access or utilise land and water resources, acquire inputs (including access to machinery and labour) and market their produce, was found to be highly variable. Some informal groupings of people were identified. These were generally formed between people who already had relationships of trust and the man aim was to reduce costs – for example by pooling produce to reduce transport costs.

A number of groups had formed because they recognised that it was a requirement for accessing funding through government. An investigation of funding conditions of various spheres of government reinforced that this was a requirement for most of their programmes. The extent to which the members of these groups engaged in collective and individual action was variable. Some members collectively used a portion of a land. In this case most of their activities were undertaken collectively. In other cases, members farmed individually on sub-plots within the project area but engaged in some level of collective action – either jointly acquiring inputs or hiring equipment or marketing their produce. Some of the organisational arrangements had changed over time as the members encountered challenges such as unequal participation of members in collective activities. Some small-scale farmers that were interviewed highlighted that the costs of collective action outweighed the benefits and therefore they preferred to operate individually. The best example of collective action was displayed by the commercial banana producers, but this highlighted the supportive environment and capacity that is needed to ensure that collective action yields the anticipated benefits.

One key aspect that affected the functioning of groups was the level of governance and leadership of the decision-making body, often a committee. With the MRIS, the lack of governance was largely responsible for the poor distribution of water between the upper and lower blocks. The effective management of an irrigation scheme of this nature requires compliance with rules imposed by the scheme and block committees – not only for operating the scheme, but also for cleaning and maintaining it. This same issue was found to affect the functioning of many of the smaller groups encountered through the study. Given that the groups that had effectively engaged in collective action had generally been successful with limited support from Government and were characterised by good organisational development and a common purpose with mutual benefits, the lessons learned from these successes should be shared with support agencies as well as farmers to build capacity to support emerging farmer development.

Some of the challenges limiting effective collective action among communal smallholder farmers included eroding traditional institutions, loss of social capital and lack of organisational capacity. Together, they resulted in poor cooperation between producers. Policy and implementation of agricultural support and development projects were not taking adequate cognisance of these challenges and the existing policy was not achieving the objectives of smallholder farmer development, namely commercialisation and entrepreneurial development. Policy should consider new approaches to supporting individuals and organisational development to enhance collective action. In addition to support for groups, policy development has to consider mechanisms to support individual producers and entrepreneurs effectively. Possible methods to achieve this include:

- Provision of low interest or zero interest loans for successful emerging farmers, with effective extension support and capacity building for entrepreneurial development.
- Enhancing the capacity of extension and other support providers to strengthen local institutions and develop capable and accountable organisations.

In terms of supporting collective action among individual producers, some successful Lima projects and the activities of commercial farmers suggest the following approaches:

- Strengthen the governance of groups and cooperatives – ensuring that members have a thorough understanding of the functioning of their organization.
- Facilitate collective purchase of inputs for cost savings – collective purchasing of inputs for production can reduce the cost of inputs. Even simply sharing transport costs can result in reduced costs.
- As an alternative to forming production groups, small-holder farmers can consider forming small buying groups within in a specific geographic location as these have the potential for achieving savings on inputs.
- Promote cooperation between individual farmers to achieve economies of scale for improved marketing and income generation. This is potentially more effective than collective production and the challenges that such arrangements encounter.
- Strengthen linkages between producers and markets.
- Support partnerships and cooperation within smallholder farmer groups, between smallholders and commercial farmers, and between extension officers and commercial farmers, to share and generate knowledge.

Although the project did not identify any public-private partnerships within the specific study sites, the possibilities that they offer for linking smallholder farmers with technical knowledge and markets holds much potential for strengthening smallholder agriculture. The role of government should be to ensure that the capacity of farmer groups is enhanced so that they are able to engage in more equitable partnerships with private sector partners.

Lastly, strengthening small-scale production and integrating producers into the mainstream economy calls for collective action involving multiple stakeholders. Multi-stakeholder innovation platforms are just one mechanism that has more recently been recognised as an effective mechanism for ensuring that different stakeholders engage effectively to solve the challenges of small-scale farmers. This also addresses the need for improved coordination of stakeholders and the clarification of roles and responsibilities.

7 SUPPORT SERVICES AND INFRASTRUCTURE

According to the original project terms of reference (ToR), the sixth Specific Objective of the study, which this report directly addresses, was the analysis and description of the existing support structures of physical and social capital within food value chains with reference to amongst others:

(1) Institutional arrangements including property rights, norms and values;
(2) Social embeddedness including trust, loyalty and power relationships;
(3) Mentorship and skills transfer;
(4) Transport and marketing infrastructure;
(5) Information to access markets.

This chapter seeks to address the concept that social capital could be regarded as one asset which must be available to complement the other forms of capital supporting smallholder production – physical capital in particular – if they are to have the anticipated benefit (Grootaert, 1998). The opposite situation should also be considered: i.e. even when social capital is functioning well in any giving community, its impact on the various economic agents could be jeopardised if the support structure of physical capital is not functioning accordingly. For example, a shop owner might be willing to purchase from a farmer, but if the road infrastructure is so poor that the farmer cannot deliver the goods, then the opportunity provided by the social capital is lost.

7.1 THE CONTRIBUTION OF INSTITUTIONAL ARRANGEMENTS TO SOCIAL CAPITAL

As mentioned earlier, social capital refers to the institutions ("rules of the game"), relationships (with other individuals and socio-economic institutions), and norms that shape the quality and quantity of a society's social interactions (World Bank, 2014). In exploring existing support structures of social capital, this research gave specific attention to the institutional arrangements, including property rights, norms and values that form a part of the social capital available – or not available – to smallholder farmers. In order to analyse the formal and informal institutional arrangements that impact on social capital, the concept was considered to include:

- Traditional laws such as those relating to the allocation of land and control of livestock movement.
- National legal requirements, for example permits from Department of Water Affairs for water use and from Provincial Departments of Agriculture for ploughing land.
- Policies, for example Department of Social Development requiring the establishment of cooperatives as a prerequisite for funding.
- Formal and informal agreements – people with a common purpose normally arrange themselves around these agreements to work together (for example farmers deciding to source inputs or market produce collectively).

It is helpful to identify rules which are no longer being obeyed / practiced and to understand what the impacts of these changes are. Situations where rules differ depending on gender are important, for example the number of days that a woman may not till land following the death of a spouse compared with the number of days that a man is not permitted to 'break soil'. The impact of rules on production, marketing (e.g. pricing) and transportation must also be considered. 'Norms and values' are elements that define culture. Norms can be defined as attitudes and behaviours common to members of a particular community / group. There are different types of values that can be at play in any situation, for example, family values, cultural values, work values, etc.

Relationships with other parties / actors are also considered a form of social capital as they unlock opportunities for knowledge sharing, marketing, sharing labour and so on. Such parties include stakeholders within the local community (i.e. fellow farmers or traditional authority structures) as well as government departments. Social capital also refers to the effective organisation of people into groups. Where groups are not functional, this is sometimes the result of low social capital.

7.1.1 Willowvale, Eastern Cape

The first step in understanding institutional arrangements impacting on smallholders was to analyse the nature of the organisations supporting / controlling the activities of smallholder farmers, and the rules that they apply.

7.1.1.1 Traditional leadership

Besides the role that government departments played in regulating the institutional environment, traditional leaders played significant roles, especially in the allocation of land in the study area. According to the findings of the study, the traditional authority structures played a key role within both Mbozo and Ciko villages. The study site was headed by a local chief who was supported by headmen and sub-headmen. A key informant interview with the local Chief revealed that smallholder farmers in the study area were greatly influenced by the decisions of the traditional leaders. The sub-headmen were the ones to take the matter to the headmen before the chief became involved in the matter. The sub-headmen were most accessible to the people. They were the first level of leadership within the community and villagers reported issues to them, especially matters relating to disputes over land allocation or water utilisation. The sub-headmen then reported matters to the village headman, who was empowered to take decisions after due consultation with the chief. The chieftaincy position was said to be inherited and highly respected.

The rights of individual smallholder farmers to land were protected through a traditional panel of leaders. They settled disputes resulting from land utilisation (or non-utilisation) and no individual was allowed to fraudulently claim ownership of land. The traditional institution worked with the EC DoA and the Department of Land affairs in ensuring that land was equitably distributed among the smallholder farmers. It was, however, acknowledged that some of the allocated lands were not being used for productive purposes because of factors such as lack of money, remote location of the land, lack of fencing, etc. The traditional leaders in both villages did not play any role in making decisions regarding how the group projects operated.

7.1.1.2 Government departments supporting smallholder farmers

The roles played by key spheres of government were as follows:

- Eastern Cape Department of Agriculture: The DoA was the main party responsible for the provision of technical support to smallholder farmers. The Department also had some funding available for infrastructure and inputs. The DoA should possibly have coordinated interactions between various government departments that were involved in supporting agricultural development. Although projects are supported by extension staff, only 22% of individual farmers indicated that they had received assistance from the DoA. The assistance was primarily in the form of advisory services and free seeds / seedlings.

- Department of Social Development: The DoSD was more involved with helping community projects than assisting individual farmers. Only 10% of the individual farmers had received assistance, which was in the form of advisory services. The DoSD funded the irrigation projects at Mbozi and Ciko, but also had strict requirements in terms of how available funds could be spent by the two projects. A key informant discussion indicated that the DoSD had recently released a sum of R375 000 to FCP. In addition, skills development training was being organised at Idutywa for some members of the FCP project group. It was considered important that the Department should adapt its funding model to address challenges that were limiting the functioning of the project. For example, the need for a trailer was identified by the FCP to transport produce to markets. This was necessary because access to the site was very poor and much wastage of vegetables had taken place during the rainy season. The DoSD had, however, not permitted the use of the funds to purchase a trailer as this was not the purpose for which the funds were intended.

- Department of Water Affairs: This department is responsible for ensuring that water use related legislation is adhered to. Given that there were no WUAs in place in the study site and the projects had not registered as water users, this is a key department to engage in terms of the current project. Irrigation projects are being established by both Eastern Cape DoA and DoSD, and there is clearly a need for co-ordination and communication between officials from the two departments. In addition, funding opportunities exist for emerging farmers involved in irrigation-related activities that could be explored further.

- Mbashe Local Municipality: The Municipality is responsible for coordinating development in the Municipality. FCP members, with support from INR, asked municipal councillors for assistance with maintenance of the access road to Foundation Community Project. Discussions that took place regarding access to land for agricultural production indicated that the process required involvement of both the DoA and the Local Municipality. More specifically, the Municipality supported individual farmers, and 30% indicated that they have at one time or the other received assistance in the form of seeds/seedlings.

It is essential that these different departments come together to ensure that service delivery takes place. The Intergovernmental Relations Framework Act, 2005 (Act No 13 of 2005) aims to *"establish a framework for the national government, provincial governments and local governments to promote and facilitate intergovernmental relations; to provide for mechanisms and procedures to facilitate the settlement of intergovernmental disputes; and to provide for matters connected therewith".* According to the Act, one of the outcomes of this should be effective provision of service. It makes provision for structures such as district intergovernmental forums to promote relations between district and local municipalities.

At the Willowvale project sites, the relationship between DoSD and DoA was not clear, nor was the split of responsibilities in terms of supporting the community projects. Since the DoSD initiated and funded the projects, they were seen to be the lead agent. However DoA was better suited to providing technical support. Though neither DoA nor DoSD acknowledged that there were conflicts between them over roles and responsibilities and decision-making processes, the farmers at both community projects, who are the direct recipients of their services, attested to the fact that there was some confusion in terms of whose duty it was to manage the projects. This could have been because the roles and responsibilities had not been clarified with the project members, However a key informant interview with the Manager from the Local Municipality confirmed the view that the two Departments needed to clarify their roles in managing the project in the study area. The lack of clarity regarding the responsibilities of the two Departments was not conducive to the provision of support to the project members. Similarly there were different views as to whether it was the responsibility of the Local Municipality or the EC Department of Transport or the Expanded Public Works Programme to maintain / upgrade the access road to FCP. A key informant discussion with the Strategic Manager from Mbashe Local Municipality confirmed that the project was facing challenges with respect to inadequate support structures and lack of coordination on the part of the government departments that were directly involved with the activities of the project. He stressed the need for a strategic meeting of the Local Municipality with both departments in order to clarify the challenges faced by the project with a view to providing immediate solutions. The Strategic Manager emphasised the need for strategic partnership with other government institutions. He cited the National Development Agency as a potential partner / funder of FCP and Ciko Santrini Project, but stressed that caution needed to be exercised while trying to form alliances or partnerships with other government organisations. He added that permission must be sought from the DoSD to clarify the viability and the possibility of such partnerships. He emphasised that with a good memorandum of understanding (MoU) in place, a good working relationship could be established.

The two projects had interactions with DoSD, which had funded them, Eastern Cape DoA, which supported them technically, and the Local Municipality, which provided some support, such as the tractor at FCP. The FGDs with members of the two community projects revealed that members could not take financial decisions on their own, but had to seek approval from the DoSD. Project leaders from both Ciko and Mbozi identified this as a major challenge because they had no power over how the money should be spent. They had identified certain needs (such as Mbozi members wishing to purchase a tractor-drawn trailer to assist with transport of produce from the fields), but these purchases had not been permitted by DoSD, which had its rules regarding what the grant funding should be used for. While it is perceived by project members that the rules are laid down by the DoSD, a key informant discussion with a senior staff member from DoSD revealed that rules governing the activities of the two project sites were in accordance with the constitution that established the projects. He indicated that adequate measures had been put in place to ensure that these rules were adhered to. He further stressed that a project steering committee was in place to give directives on what needed to be done and how the projects were to be funded.

The issue of stipends (or incentives for participation) was raised during FGDs. At Ciko, members cited the lack of labour as a challenge to production. They said that when the project was started in 2008 there were 25 members but that membership has been reduced to 6 members because of the lack of tangible benefits, and proposed that government should provide some form of incentives. A similar problem of reduced membership had been experienced at FCP. The discussions with DoSD revealed that the department was not in support of providing incentives to the farmers as a way of encouraging them. An official emphasised that the central aim of the project was to encourage entrepreneurship among the farmers, with a view to ensuring that the project was sustainable in the long run. The DoSD was to provide funding for the projects for a certain period of time before the overall activities of the project were transferred to the local office of DoA. The study also revealed that integrated support was needed from the Local Municipality and other relevant government organisations in order to ensure the sustainability of the projects.

The study showed that the FCP at Mbozi had not been able to contribute significantly to the improvement of the smallholders' livelihood because of a lack of adequate support structures. The project had a lot of potential but the existing support structures were not sufficient to guarantee the sustainability of the project. More still needed to be done to ensure a sustainable livelihood for the smallholder farmers in the study area.

In terms of local government, the ward committee represented the community at the level of the municipality and members were usually appointed by the people. The function of the ward committee was to mediate between the community and the municipality. The persons occupying the positions of the ward committee also worked closely with the chief, the headmen and the sub-headmen to disseminate information and to act as the mouthpiece of the people. The person occupying the position of ward councillor was politically appointed through electoral processes and represented the interest of the people politically at the Local Municipality.

7.1.2 Marina, Eastern Cape

An exploration of institutional arrangements affecting farmers at the Marina site focused on traditional leadership and also gave consideration to project governance.

7.1.2.1 <u>Traditional leadership</u>

At a local level the *Inkosi* (Local chief) and advisors were responsible for dealing with land administration and allocation. They resolved major disputes and censured transgressions of local laws and customs (e.g. cattle damage to crops). The *Inkosi* was assisted by a number of *Izibonda* (Izinduna or local headman), and was, traditionally at least, responsible for a defined geographical area. *Izibonda* dealt with minor problems and disputes, and represented the community to the *Inkosi*. One of the farmers interviewed was an *isibonda.* He noted that the role of *izibonda* was to ensure stability in the community and also enforce traditional rules when the need arose. He said there was a problem with how the *izibonda* operated. *Izibonda* were elected in a semi-democratic manner, with involvement of community members. As the authority of the traditional leadership had declined, community members had started choosing the *isibonda* to whom they belonged. As a result, individuals could choose to belong to an *isibonda* that was outside of their locality, or who was likely to be more sympathetic towards them. This made it impossible for an *isibonda* to enforce some rules because not everybody in the village was under his authority. An obvious example of such issues was the control of livestock in the fields after winter grazing. As a result, the local *isibonda* only acted if there was case of emergency (i.e. reactive as opposed to proactive management). Furthermore he said that, as local populations increased, more *izibonda* were selected, which further eroded the power of the Traditional Authority. He believed that the issues of land access and livestock control originated from lack of leadership by Traditional Authorities. There was no communication between *izibonda* from respective villages. Even if the issues were brought to the full board of the Traditional Council, the *Inkosi* was not showing leadership nor was he concerned about what was happening at the village level. The Traditional Authority was not strong when it came to enforcing regulations and making people aware of what was regarded as an unacceptable behaviour.

7.1.2.2 <u>Government departments</u>

7.1.2.2.1 Department of Social Development

The DoSD provided support to emerging farming enterprises, i.e. cooperatives and non-profit making enterprises. At the time of the study, the Department provided support through its three (3) programmes, namely Sustainable Livelihoods Programme; Women Development Programme and Youth Development Programme. Each of these is described in more detail below.

- Sustainable Livelihoods Programme: The Sustainable Livelihoods (SL) Programme focused on funding garden projects for food security and income generation. Projects had to have a minimum of 25 members, and access to 5 ha or more to qualify for funding. The Department assisted with registration (of legal entities), training, mentoring and monitoring of the projects. Funding available varied from one project to another, and projects could access up to R750 000 depending on their needs. Some projects required only a portion of R750 000. For example, a project that already had fencing and other equipment might require less funding. Officials from the Department conducted an assessment of the project needs to ensure that projects were funded according to their needs. The Department only funded existing projects, i.e. people had to be doing something before they could approach the Department. This apparently differed from the previous approach, where the Department used to search for possible projects. As a result of this approach, people frequently formed projects because there was funding available and not because they wanted to work together. Some people saw this as an easy route to self-enrichment.

- Women Development Programme: The Women Development (WD) Programme focused on providing support to women's groups. Projects had to consist of a minimum of 15 members. The most common projects in this programme were poultry projects (live chickens and eggs), and some vegetable garden projects. Funding available to these projects was a maximum of R500,000 and this varied from one project to another. Some projects already had structures, and only required assistance with chicks, feed and training. Money was allocated according to project needs.
- Youth Development Programme: The Youth Development (YD) Programme funded projects that were dominated by the youth. Various projects could be funded under this programme including agricultural projects, cleaning businesses, supply of building materials, car washes, etc. The maximum funding available for individual projects was R500,000.

The Department had various funding conditions in place to ensure the responsible use of the funds. These included the following:

- Funding did not cover salaries however projects were allowed to pay salaries from income generated from sales.
- Projects had to have a bank account and grant money was deposited into this account
- Before projects could spend their allocated budget, they had to attend a 'pre-implementation' workshop facilitated by Departmental officials. This workshop familiarised project members with purchasing processes, and allowed the Department to solicit information on training and capacity building needs.
- Project members were introduced to requisition forms as a means of regulating project spending and purchases.
- Other procedures related to procurement included:
    - Purchasing had to have been discussed in a project meeting and minutes had to reflect the decision to purchase. This was done to discourage misuse of funds by certain individuals (often those who had the signing powers).
    - Community Development Supervisor and Manager had to sign before any money could be spent by project members.
    - Audits of the project and budget spent were carried out after two months from the time of first transfer of funds from Department to project.
    - Projects were allowed to keep unspent money for future project needs, as long as those needs were included in the business plan.
    - *Department did not fund individuals* and only funded non-profit organisations.
    - Projects had to have confirmation of the right to use land, (i.e. PTO) before they could be granted funding.
    - There was a standard monitoring plan for different project types – developed at a provincial level.
    - Any capacity development given to projects was geared towards addressing capacity shortages outlined in the business plan.
    - Capacity building/training was outsourced to registered service providers.

The representatives of the DoSD acknowledged that the functioning and funding of projects was coupled with various challenges, including but not limited to the following:

- Poor cooperation (in-fighting) between project members caused many projects to fail/collapse.

- Projects frequently had insufficient members to qualify for funding and therefore brought in new members. This caused tensions between old and new members. In recognition of this problem, the Community Development Supervisor was allowed to motivate for projects that did not have enough members to qualify for funding as long as she/he was convinced that the project members were serious about what they were doing.
- Competition between members was also a major problem.
- Good intentions at a policy level but poor implementation on the ground.
- Poor communication between departments at provincial and national level. Sometimes local offices submitted applications to provincial / national departments, only to find that the number of projects that could be funded was limited. For example, the previous year the Bizana office submitted 7 projects to the Provincial Department but only four received funding.
- Lack of commitment from both levels (project members and Departmental officials). No steps were taken to deal with project members that were mismanaging their funds. The reports written by officials did not reflect the actual situation, and project finances were still open to misuse and mismanagement.

7.1.2.2.2 Eastern Cape Department of Agriculture

As with the DoSD, the focus of the Eastern Cape DoA was on providing support to groups. This reflected prevailing national policies that seek to maximise benefits of support to as many people as possible. The Departmental officials recognised that there were challenges associated with supporting groups and projects that relied on collective action. The key problems listed by representatives of the Department were as follows:

- Poorly established management structures and lack of accountability of office bearers
- Poor or non-existent financial management systems
- Variations and decline in membership of groups
- Project members deviated from the business plans developed
- Conflicts among group members, particularly about how money should be spent.

While the Department generally had a policy of no support to individuals, indigent households were supported to improve food security and nutrition. It was also acknowledged that some of the inputs for communal gardens, such as seedlings and fertilizers, were sometimes diverted to homestead gardens. The DoA supported and implemented a variety of programmes, most of which were focused on communal gardens and farming. These programmes included Siyazondla Household Food Security; Siyakhula Maize Programme; Bee keeping, Poultry, Livestock improvement and Potato production. The Siyakhula and Siyazondla Programmes are discussed in more detail below.

- <u>Siyakhula Maize Massification Project</u>: The DoA assisted individuals with land preparation and inputs through this programme. The idea was to commercialise (and extend) agricultural production by promoting mechanised production of agronomic crops, such as maize. The Department's plan was initially structured such that the Department would contribute 100% in terms of land preparation and inputs in year one. The idea was that after the first harvest, individual farmers would be in a position to contribute 25% towards the land preparation and inputs and the Department would contribute 75%. After the second harvest, the Department would contribute 50% and the farmer would contribute 50% and so on. The Department required a minimum of 6 ha for the farmer to participate, which meant that most of the participants were groups not individuals, as it was difficult for an individual to access such large areas of land. The programme anticipated that this sliding scale of contributions would encourage farmers to contribute more and more towards their inputs to a point where they would be financially independent and able to purchase all their own inputs after season four. However, no farmers had been willing or able to contribute 25% of costs towards their second planting season and this had led to farmers planting smaller fields using the 75%, reverting to hand planting, or not planting maize at all. The Department attributed the failure of this programme to the expectation of hand-outs from government.

- Siyazondla Programme: This was focused on household food security objectives and targeted the most poverty stricken households. Community members and the Municipality worked together to identify the neediest households. On-going support was provided by the Department through its extension services. The Department also provided inputs and technical support to projects or groups that produced food for food security purposes. Some of the experiences of officials involved with this programme included:

    - Project members often divided inputs among themselves as soon as inputs were handed over to them.
    - They were groups in the sense that they worked inside one garden but they allocated plots to individual members.
    - Individual plots simply meant that each person could work at their own pace but they generally still planted the same crops.
    - There were no stories of successful cooperation.
    - In many projects there was no uniformity.
    - Sometimes there was only one member who could read or write and other project members relied on him/her for direction.

7.1.2.2.3 Bizana Local Municipality

The Bizana Local Municipality, through its newly established Agricultural Development Office, endeavoured to support agricultural development within the municipality. The challenge was that there was no agricultural development plan/strategy. The municipality was in the process of developing this as it was to inform a way forward in agricultural development. At the time of the study, the ADO planned to identify high value crops such as fruit, sugarcane and macadamia nuts. The idea was to develop the full value chain for the majority of crops produced within the municipality. There were five programmes under the auspices of the Municipality that were geared towards providing both financial and technical support to agricultural initiatives in the Municipality. These funding programmes were:

- The SMME Programme which was aimed at developing selected enterprises.
- Entrepreneurial Development Fund, which was being developed as part of the SMME programme.
- Income Generating Projects (IGP), which funded projects (**individuals or cooperatives**) to a maximum of R10 000.
- Anchor Projects (APs) programme which funded projects with up to R300 000. Projects did not necessarily have to be in a group format. These projects had to be undertaken on land that was 45 ha or bigger and had to employ a certain number of people.
- Indigent Households Programme, which targeted participants with avocado and mango trees. The Municipality provided trees and compost. It was hoped that within 5-6 years the selected households would be able to harvest fruit from these trees (improving their food security and nutrition).

Some of the experiences of the Municipality in implementing its programmes are summarised below:

- The Municipality provided *ad hoc* support to farmers or entrepreneurs within the municipality.

- It was assumed that supporting or funding a cooperative will have a greater impact than supporting individuals.
- There were, however, issues and challenges associated with cooperatives. Participation in a cooperative did not guarantee success and in fact, the opposite was often true.
- Cooperatives hampered entrepreneurial spirit often discouraging individuals with great business ideas from implementing them.
- Other stakeholders (including other government departments) had to contribute towards the development of the Municipality's agricultural strategy.
- Agricultural projects were to form part of the Municipal Integrated Development Plan.
- Commercialization was a difficult concept for the majority of subsistence or emerging farmers.
- Groups were confronted by serious institutional capacity challenges.
- The Municipality had relied on other Government Departments in the past, but now needed to take the initiative whether in terms of funding or support.
- There was a need to eradicate and to destroy the culture of dependency that existed among people. As soon as one stopped giving projects hand-outs, they collapsed. People should have shown returns and used them to carry on with projects – projects could not be funded forever.
- Some government departments did not have a lot of funding, and as a result, they had to rely on other departments to be able to carry out their support. For example, DoSD in Bizana was viewed to be having strong financial support from government compared to other departments. Lack of funds was seen as a limiting factor to achieving agricultural development in the Municipality.

7.1.2.3 Governance of groups and its impact on social capital

The organizational aspects of project groups require attention, as this influences whether the production activities of the group will succeed or fail. The study revealed a number of cases where social capital had been eroded for several reasons (see text boxes below), but mainly as a result of people in power abusing the trust that was placed in them. There were two incidences of chairpersons stealing from the group, and in one of these the chair was still part of the group, which was astounding and extremely concerning. In another case, farmers indicated that the government official supporting them had been facilitating transactions between two projects under what appeared to be rather suspicious circumstances.

Working as a group was found to be problematic in terms of production. Most groups started out intending to work collectively, but ended up producing individually on separate, demarcated plots. This resulted from group dynamics and a general inability to cooperate. There also appeared to be a pattern of declining membership from project initiation to maturity, with a core group committed to the project and keeping it going. This may be the reason why underutilisation of land by groups in projects was also problematic. Nodaka comprised 2.5 ha of which only 1 ha was being used; Mpunzi was 10 ha of which only 2.5 ha was farmed; the Amahomba group had 4 ha but only 2 ha was being utilized. There is a limit to how much land an individual can farm alone and there appeared to be limited interest in employing people to assist with farming land in these projects. This may have been due to the perceived risks associated with employment and also because many producers appeared to be focusing mainly on production to meet their own needs and only selling what was surplus to their requirements.

Despite the considerable efforts and costs involved in establishing the gardens, with erection of fencing, provision of water and irrigation systems, most of the projects visited had failed. Groups such as Nodaka and Mpunzi had serious institutional challenges, and had appealed for external support in trying to resolve the underlying issues which had affected their working relationships. Groups need to be continuously supported with facilitation to strengthen their constitutions, define leadership roles and membership. The chairperson of the Banana Commodity Group noted that these groups were not members of the local farmers association and did not wish to meet with the association, who could potentially have assisted in resolving some of these matters.

Case study: A lack of trust and cooperation

Project A started in 2004 with 25 active members and ten hectares of arable land and infrastructure for irrigation, including a pump. The original plan was for the group to work collectively to produce vegetables for sale to generate income. Most of the members have low levels of literacy and financial knowledge. The most literate person was elected chairman and was charged with managing the finances as well. The chairman subsequently defrauded money from the group. The chairman was removed from his office-bearing position when this was discovered but, surprisingly, was allowed to remain as part of the group. This was attributed to the individual's power and standing in the community and it appeared that the group was afraid to expel him completely. As a result, significant tension remained within this group. During this period, active members in the group reduced from 25 to 10, with active members working in pairs instead of as a collective. The reason for working in pairs was attributed to individuals deciding to work with someone whom they trusted and who could 'move at the same pace' as them. From an organisational management perspective, there were no meetings held to discuss issues of common concern relating to the functioning of the group. Even though they claimed to have re-grouped and elected new leadership, it was apparent that the internal working relationships were problematic and mutual distrust was evident in their discussions. Interestingly, the former chairperson (the person who fraudulently took advantage of the group's low levels of literacy) pointed out that the group needed to resolve the issues, unite and function as a group again. The only thing that kept the group together was the fact that they farmed on a shared piece of land. The team felt that, for this group to progress, an independent person or organisation was required to facilitate discussions to resolve these issues, as otherwise it would remain a highly dysfunctional organisation.

These institutional challenges were not limited to the project described in the textbox above. Another project encountered similar issues but felt that they have grown as a group since removing the chairperson (who was alleged to have stolen tools and machinery), and electing new leadership. They indicated that since then, they had developed problem-solving skills, discussed issues and made decisions together. One of the banana farmers pointed out that people always have high expectations from projects, and when these are not met, they withdraw their participation. He felt that this was the most common cause of failure in projects. He also observed that the lack of attendance of meetings by community members meant that they did not get to grips with the issues affecting their livelihoods and their development.

Case study: Financial irregularities

Project B had been supported, amongst others, by the DoSD who provided poultry production infrastructure. Poultry production was initially successful and the group was generating income through the sale of poultry. After some time, the DoSD social worker who was assisting the group had requested group members to lend money to a youth group that intended establishing a computer training centre and was in need of financial support. The social worker negotiated with project members on behalf of the youth group and ultimately an agreement was reached that Project B would lend R5 000 to the youth group. A loan agreement was signed by the two projects, specifying the amount and the repayment terms, and R5 000 was transferred to the youth group's bank account. Later, the social worker approached Project B with another idea that they start a *stokvel* / savings club with the same youth group. The arrangement was that both parties would contribute monthly and each group would receive money on a rotational basis (as per the functionality of a *stokvel*). Project B contributed monthly at an amount of R100 per member, which amounted to a total of R600 from six members. At the time of this study, neither the loan made to the youth group nor the money paid into the *stokvel* had been repaid to the project. The members claimed that the poultry project collapsed as a result of this as they could no longer sustain the finances necessary for production. Project B members had made attempts to meet with the youth group but these were not successful. The group had also spoken with the social worker several times but had not received a positive response. This situation had resulted in the group being demoralised and members had been discouraged from continuing – there was no money in the bank account and members did not know if it was still active. Situations such this appear to require external facilitation if they are to be addressed effectively.

It was recognised by the research team that significant interventions were required with most of the dysfunctional groups, and that these should focus on identifying, through evaluation sessions, key components that should be addressed before there could be the shared trust and confidence necessary for consistent and improved production by the farmers. A key recommendation is that the service providers (NGOs rather than government), working with the communities should play a role in facilitating such discussions. These groups were not participating in the current study, but were interviewed to obtain a broader perspective of institutional and organisational issues in the area.

7.1.3 Mooi River Irrigation Scheme

The study explored the roles that different parties or actors played in the functioning of the MRIS. The SLF defines transformative structures as the institutional environment under which the smallholder farmers operate. These are composed of government, private sector, and local authorities that work together to institute policies and regulations that influence production and marketing of commodities (DFID, 1999). The impacts can either be positive or negative, and this determines the success or failure rate of the respective transforming agents**.** Focus group discussions and key informant interviews tried to explore the role of various institutions as possible support structures in the production and marketing of agricultural commodities in MRIS. Some of the detail pertaining to these stakeholders is provided below.

7.1.3.1 <u>Block committees</u>

The block committees were involved in the control of water use and also assisted the traditional leaders in identifying vacant plots for re-allocation to those in need of land. At times they coordinated members to procure inputs (cabbage seedlings) e.g. Block 13, 14 & 15 committees. In terms of their impact on MRIS farmers, the block committees were important structures for the smooth running of the scheme.

They were, however, perceived as weak in enforcing rules regulating water distribution and collective activities like canal cleaning. Most committees viewed procurement and marketing as individual and voluntary issues. However, Block 13, 14 & 15 committees at times assisted their members with ways to gain free delivery of seedlings by suppliers – by placing large orders. This was a potential cost-cutting measure for farmers. This role was taken on because these blocks had decided to register themselves as a cooperative.

7.1.3.2 <u>Traditional structures</u>

MRIS and the surrounding area were governed through the local traditional structures. At village level, the *Izinduna* (Village headmen) were responsible for all the consultations by local residents. There were five *Izinduna* in the area under study, each responsible for his or her own village. The *Izinduna* reported to the *Nduna Mkulu* (Head *Induna*) if they faced any challenges, before issues were raised with the *Inkosi. Izinduna* constituted the *Inkosi*'s council and held monthly meetings with him to report on the activities taking place in their respective communities. The *Inkosi* retained all decision-making powers in the area, especially regarding new policies and disciplinary matters.

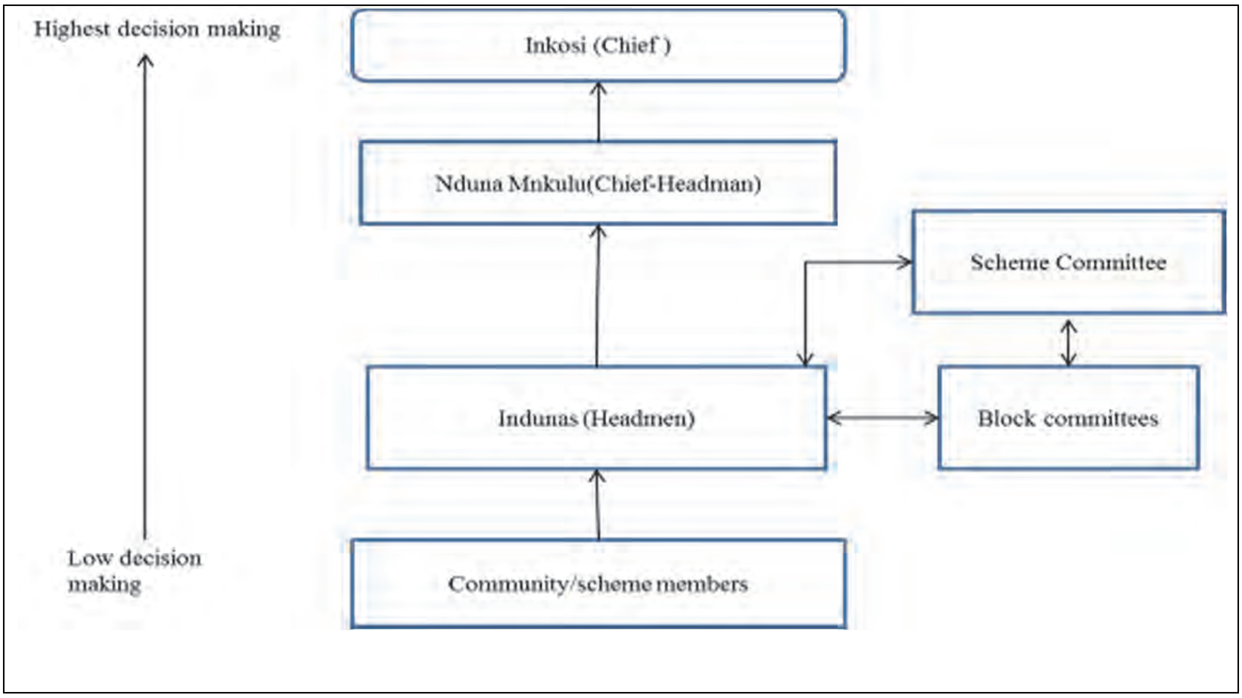

Figure 7.1 Local decision making structures at MRIS, KwaZulu-Natal, 2011.

The *Amakhosi* were custodians of the traditional court that resolved disputes among community members (both agricultural and non-agricultural). At MRIS, they were mainly involved in land allocation although in 2010, they intervened and raised the daily wage for hired labour from R25 to R30/day. There was room for traditional leaders to use their influence to enforce collective action among community members on activities such as canal cleaning and repairs. The reason for compliance with traditional courts' decisions was the fact that there were fines associated with non-compliance, unlike structures such as the block committees.

The traditional leaders played an active role in maintaining order at MRIS. They worked in conjunction with block and scheme committees. Their roles were mainly policing and ensuring compliance with rules. Traditional authorities ensured that:

- Plot holders used their allocated land productively
- Plot boundaries were maintained and no farmer encroached onto other peoples' plots
- Unused land was re-allocated to individuals on the waiting list – plot holders were not allowed to leave their plots fallow because this was said to lead to spread of pests and diseases that were harboured in the grasses
- Conflict among community and scheme members was resolved fairly and timeously.

Although traditional leaders were very active in resolving land-related cases, it appeared that water-related issues were not adequately addressed by the headmen. There was an issue surrounding unequal distribution of water between upstream users (Blocks 1 to 11) and downstream users (Blocks 12, 13, 14 and 15). During the September 2011 data collection period, irrigation water sources were visibly dry in Blocks 13 to 15 as shown in Figure 7.2. The canal feeding the balancing dam was dry and hence the dam was empty as well. No irrigation could therefore take place in any of the fields fed by the dam. A follow-up along the canal was made to check whether the shortage of water at the downstream blocks was as a result of closure of the water or low river discharge from the source. A picture was taken on a main delivery canal section in Block 4, and water was found to be flowing well along the canal.

Figure 7.2 Empty canals and dams in Blocks 14 and 15 at MRIS in Sept 2011.

Traditional leaders agreed that the problem existed, but felt that no clear solution was available. There were set guidelines to control water usage, but a lack of compliance was the major challenge mentioned by both scheme and non-scheme beneficiaries. The water shortages in MRIS encountered at the time of study were a clear sign of both institutional failures and a weak social cohesion among water users. This resulted in a high prevalence of unauthorised water diversions for irrigation and non-irrigation purposes.

7.1.3.3 Government

The Msinga Local Municipality played a role at MRIS. They provided tractors that were hired by farmers for land preparation and were also working towards resuscitating the fresh produce pack-house at Tugela Ferry.

The KZN Department of Agriculture had a main office at Tugela Ferry and a satellite office adjacent to MRIS. The Department's support role included the provision of tractors for land preparation (but farmers complained that availability was not consistent), and the provision of extension and training services (though farmers complained of limited contact time with the extension officers). They were also involved in water infrastructure maintenance through canal controllers / rangers. In 2009, they facilitated a supply contract between Ndlalifa Cooperative (Block 13, 14 & 15) and Dundee Hospital for the supply of cabbages. This subsequently collapsed because of production constraints at farm level. In 2011, the Department provided free potato seed and fertilizers to introduce the MRIS farmers to potato production. This could be viewed as a success, as most farmers in the scheme were growing potatoes for sale at the time of the current study.

A number of cases of institutional failure involving poor communication were identified during the study, and it was evident that these have impacted on agricultural production in the area. The first case relates to the government tractor scheme, which has already been discussed above. It had been almost 2 years since the tractors were distributed in the study area. The reasons behind the tractors not providing an effective service to farmers are diverse and included the following: the need for tyre repairs, the tractors running out of diesel and, in late 2012, the excessive rainfall that resulted in the ground being too wet for tractor-related activities. The miscommunication between the farmers and the agricultural advisor (extension officer) highlighted institutional failure. Attempts to resolve the tractor issue were futile. After talks with the extension officer collapsed*, Induna Nkulu* and other key community members approached the local manager of KZN DoA on two occasions at the agricultural offices in Tugela Ferry, but seemingly with no effect, and the farmers said that it is as though the tractors did not exist.

Another key institutional challenge relates to the operation of the canal at the irrigation scheme. The KZN DoA initially appointed four 'canal rangers' to facilitate everyday function and to guard the canal against vandalism. After the death of one and the retirement of another, only two rangers remained and both were located within the same ward. The Department informed the scheme committee that the scheme was now responsible for hiring and remunerating additional canal rangers, but at the time of the study this had not occurred.

The third case related to the support provided by the government to farmers at the irrigation scheme. Occasionally the government supplied seeds and fertilizer to support primary production but then did not assist the farmers with marketing their produce. Farmers highlighted in the FGD that finding a market for their produce was a big challenge and they had in the past approached the Department for assistance in this regard. They added that there were no institutions in place to assist farmers once the produce was ready for sale. On one occasion the Local Manager from DoA provided transport for potatoes to the social grant pay points for distribution, but according to the farmers, these types of intervention were infrequent and, without them, most farmers were left helpless. None of the people interviewed recalled government supplying dryland farmers with seeds or fertilizer.

DWA was involved in the registration of a WUA in the area (Muden Water User Association) and associated capacity development. Farmers were slowly becoming familiar with the concept of WUAs. However, more capacity building training was seen to be a requirement beyond the WUA committee to ensure understanding by individual farmers.

Another structure identified was the 'War-room'. This was established as part of the Sukuma Sakhe programme, an initiative of the KZN Premier's office. The 'War-room' was described by the Manager of the Msinga office of the KZN Department of Agriculture as the most effective committee for resolving community level issues. The 'War-room' encompasses all the stakeholders involved in an area, including various government departments, Traditional Authorities, Ward Councillors and NGOs implementing projects. 'War-rooms' were said to play a key role in addressing strategic problems. The 'War-rooms' also allowed stakeholders to give feedback on existing projects, propose new projects and raise problems they are experiencing with existing initiatives. If a resolution was not reached, then the issue was taken to the *Nduna Nkulu, Inkosi* or other senior government officials.

7.1.3.4 Non-governmental organisations

NGOs have also played a supportive role at MRIS. In 2007, AFRICARE established a pack-house at Tugela ferry. The pack-house was supposed to provide a fresh produce market for farmers around Tugela Ferry and in MRIS. The pack-house was still not operational at the time of the study. It was a positive concept with the potential to improve fresh produce marketing for the farmers. It collapsed because of the low supply capacity at farm level as well as poor institutional framework at the local level. Between 2007 and 2009, AFRICARE ran a number of agricultural training workshops to enhance productivity among farmers and to ensure adequate supply of fresh produce to the pack-house at Tugela Ferry.

Lima Rural Development Foundation is implementing a number of agricultural projects in the area. One project that they are involved with is their Homestead Food Garden Project, which has a strong water harvesting component. The beneficiaries of this project were identified through a profiling process by the Community Development Workers (CDWs), who are employed through another government funded / Lima-managed initiative. CDWs are part of the Comprehensive Rural Development Programme (CRDP) of the Department of Rural Development and Land Reform (DRDLR) and act as a direct link between government and communities in order to promote democracy as well as social and economic integration. The aim of the Lima project was to establish 25 food gardens per ward, each garden being 1000 m^2. The project made provision for fencing material, 2500 litre water tanks, pipes, taps and storage facilities (3 m x 2 m) for tools, inputs and produce. In addition the project provided tools (spades, hoes, wheelbarrows, watering cans, spray bottles) and inputs (agrochemicals, pesticides, fertiliser, fruit trees and seasonal vegetable seedling).
Facilitators were appointed per ward to provide farmers with training (theory and practical) in vegetable and fruit production. Farmers were also trained to make compost prior to planting to increase soil quality and fertility. According to the Lima project manager who was interviewed, a challenge encountered during the course of the project was the lack of commitment by a number of recipients. On a positive note, one farmer, not from our study area, maximised the opportunity and is currently supplying produce to the local school's feeding scheme.

7.1.4 Synthesis of findings across the research sites regarding institutional arrangements

A consideration of the social capital available to, or impacting on, smallholder value chains, showed that traditional leadership structures played a key role in land allocation procedures and conflict resolution, though the weakening of these local institutions was cited at Bizana Local Municipality in particular. Relationships with other roleplayers, such as provincial and local government, also influenced access to resources and support. In some cases, notably Willowvale, there appeared to be confusion over the division of roles and responsibilities. Strong relationships with all roleplayers, also known as 'transformative structures', increases the support available to farmers.

Many farmers operate in groups as this facilitates access to government support. Therefore the internal environment of these groups, in terms of the trust and commitment of the members, is an important aspect of social capital. Where trust had eroded, groups were generally not functional – this was explored in some detail at Bizana. At MRIS, the inequitable distribution of water to the lower blocks was seen as a result of lack of compliance with the scheduling roster. This illustrated a lack of strong social capital.

7.2 SOCIAL EMBEDDEDNESS

As mentioned earlier, social embeddedness is defined as the degree to which individuals or groups / companies / firms are enmeshed in a social network. Participating in local structures / organisations (formal and informal), networks and connections (including family / clan relationships) can help in accessing resources (e.g. land, funding and labour) and technical support.

7.2.1 Willowvale, Eastern Cape

According to Williamson (2000), social embeddedness encompasses norms, customs, morals, traditions, etc. The central objective of social capital theory is that social interactions in civic life, such as the day-to-day and face-to-face encounters in neighbourhoods and communities, are the basis for establishing common values and building trust. This report describes two key components of social embeddedness, namely (1) trust and (2) norms and values.

Although it was a challenge to evaluate the levels of trust that existed among the group members, and between them and the broader community, certain attributes of the project members revealed that a measure of trust existed among the members. The fact that the projects were not prepared to sell on credit to members of the local community indicated some lack of trust possibly resulting from past experiences. Trust, according to Slangen *et al.,* (2008), can be important and can increase credible commitment, but it also has another role. For example, trust lowers the cost of seeking information and monitoring projects, because trusting people are less secretive and more ready to supply information. Trust can therefore be an asset or a liability. It reduces the cost of contracting and control because it lowers the fears of opportunism.

The study revealed that relationships also existed between projects and private institutions and that these relationships facilitated access to agricultural inputs. The key informant discussion with the manager of Umtiza revealed that this private institution was assisting farmers in terms of input and equipment procurement. The company was making provision for payment in instalments and the farmers had been meeting expectations with regards to repayment. Umtiza was also working in partnership with the Eastern Cape DoA to provide training for these farmers, but findings revealed that these farmers sometimes did not seem interested in the training sessions.

Traditional norms, beliefs and values were found to be very significant in the study area. The key informant discussions with local chiefs and traditional leaders revealed some interesting belief systems in the study area which impacted on various agricultural enterprises. One of the traditional leaders confirmed that a part of their tradition forbids women from entering animal kraals. This might be one of the reasons why few people, especially women, embarked on raising cattle. Another traditional norm prevented people from engaging in farming activities in the village if any member of the village was recently deceased. In addition, the land of the deceased person could not be cultivated or given to anybody until such time as there was some sort of agreement from the family of the deceased in terms of what to do with the land (this being related to showing respect for the deceased). This meant that the land would remain uncultivated until the family of the deceased was ready to allow the land to be cultivated.

FGDs held with farmers of both the Ciko and Mbozi projects showed the extent to which farmers were part of a social network. The two community projects, Ciko and FCP were formal groups and yet within the communities in which they were situated, there were also other informal groupings operating. These additional informal groups could strengthen the cohesiveness of the projects, while also establishing networks linking the projects to the broader community. Informal groups formed around common interests such as religious beliefs (where group members and other community members attended the same churches), or local saving clubs termed '*stokvels*' (which helped their members to save money for funerals and other purposes). In the light of the findings in this study it was inferred that informal groups played very important roles in strengthening the formal group. Members of the two community projects were also members of the farmers' associations that were supported by Eastern Cape DoA, which provided linkages with other farming households. Project members in both villages usually attended meetings once a month. The FGD with the farmers revealed that they received seedlings, fertilizer, and sometimes insecticides for their crops through their participation. It was found that individual household farmers were also usually part of the monthly meetings. The study revealed that members of the farmers' association paid an annual fee of R20/person but they were not permitted to borrow money from the association. The farmers' association was coordinated by the EC DoA and the purpose of the monthly meeting was mainly to familiarise the farmers with current issues relating to crop improvement, disease outbreak and/or collective production input purchases. The association also ensured that members were made aware of information days, and always encouraged farmers to attend. Despite the existence of the farmers' association coordinated by EC DoA, Table 7.1 shows that a large percentage of the farmers (78% in Ciko and 74.6% in Mbozi) indicated that they did not receive support from extension staff.

Some respondents also mentioned participating in community groups, but a discussion with some members of the community revealed that participation in such groups was not attractive to people because they received no support from the group. Some of the community members were already discouraged and they had stopped attending group meetings.

Table 7.1 Participation in structures in the two villages at the Willowvale site, 2010

Variable Type	**Ciko (N=41)**		**Mbozi (N=59)**	
	N	**%**	**N**	**%**
Membership of a community group				
Yes	11	26.8	17	28.8
No	30	73.2	42	71.2
Membership of a farmers' association				
Yes	26	63.4	31	52.5
No	15	36.6	28	47.5
Access to support from extension officers				
Yes	9	22.0	15	25.4
No	32	78.0	44	74.6

The study revealed that there were existing networks with community members at both project sites. Members of the local community supported the group projects by purchasing fresh produce from them. Some community members were convinced that they would get good prices for whatever was being purchased compared with buying elsewhere. In terms of trust between members and non-members of the project, the FGD further revealed that non-project members sometimes bought produce from the project on credit with the promise to pay at a later date. When this was explored further during key informant interviews with the coordinators of each project, it was revealed that some members of the community defaulted on payment and such situations were then dealt with by refusing to sell on credit to anyone who had at one time or another defaulted on payment. In fact, members at both sites emphasised that because of past experiences, where some villagers refused to pay back, they had largely stopped selling on credit to community members. A FGD with project members revealed that more people were willing to become members of the project provided there was incentive in terms of monthly or weekly stipends. While DoSD had indicated that it was not willing to pay stipends (as it is thought that this would defeat one of the purposes of the project which was to encourage entrepreneurship among smallholder farmers), other mechanisms needed to be identified to encourage membership and increased production.

In respect of opportunities for networking between the two community projects, it was clear from the various discussions that there was no active relationship or exchange of knowledge or experience between the two projects. Despite being funded by a common agent and being in relatively close proximity with each other, they did not engage in any joint ventures such as joint sales or joint harvesting and each project was focused on its own activities. It was perceived by the research team that such linkages could have strengthened both projects by ensuring greater consistency of supply.

7.2.2 Marina, Eastern Cape

At the Marina site, the discussion focused on smallholder farmers but was not limited to banana growers. The extent to which farmers were part of a social network was explored through the study, as well as the benefits that such networks provided. Most farmers participated in, or were involved in, a group of some sort. For the community projects, being in a group was generally a requirement for funding. The banana growers participated in the Banana Commodity Group that met regularly to discuss matters related to banana production and marketing. One of the farmers, Mr Khandayo, pointed out that he learned from other farmers through exchange of information on different farming practices. He noted that their long-term vision was a communal production site.

Some farmers were members of Coastal Farmers, which was said to reward them with discounts, and others were members of the Banana Commodity Group which covered Ward 23 and included farmers from Seaview, Marina and Vulindlela. The Banana Commodity Group fell under the Vela Langa Farmers Association, which covered a range of different commodities. VLFA was the local farmers association that in turn fell under the Bizana Farmers Association (BFA). Individual VLFA members paid R150 annual fees of which R100 was passed on to the BFA and R50 remained with VLFA. Projects made an annual contribution of R250, of which R200 was passed on to BFA and R50 remained with VLFA. In addition, VLFA members paid a R20 monthly fee. Membership fees were used for meetings and for transport costs for the chairpersons of the different commodity groups. Members benefited from knowledge and information sharing by attending meetings. The farmers' associations were registered with Eastern Cape DoA. Lima also provided support to farmers within the framework of these local organisations.

The Amahomba group noted that participation in the commodity group and the local farmers' association encouraged the sharing of experiences and information that helped production. They also noted that it was important to have a good working relationship within the group, and to meet regularly to discuss issues pertaining to the group. The members said it was not ideal to meet only when conflict arises. Members of the group also mentioned that they had good relations with local traditional leaders (*Izibonda*). They said that these relationships had reinforced the legitimacy of the group and assisted in resolving problems. These are some examples of factors that lead to high levels of social embeddedness of projects as well as individual farmers.

7.2.3 Mooi River Irrigation Scheme, KwaZulu-Natal

The density of networks as important sources of social capital cannot be ignored. Social networks convey information, new knowledge and resources among community members. Based on their experiences, farmers were therefore asked to score how different networks enhance fresh produce marketing in MRIS. The results are shown in Table 7.2 and are consistent with other findings. Burt (1992) considered social capital as friends, colleagues, and more general contacts through whom one received opportunities to use financial and human capital. This was in line with FAO (2001) that noted that management of interpersonal relationships is an issue that must be addressed because cooperatives have collapsed because of the dynamics between individuals. As such, the study revealed the importance of groups, formed on the basis of friendship and trust, in enhancing marketing by smallholder farmers in MRIS. Personal networks with transport owners, and involvement in informal groups based on religious beliefs, were considered as the next most important networks.

Farmers' perceptions regarding the usefulness of various networking activities were explored. Table 7.2 shows that the three networking activities that were ranked highest were 'informal groups based on friendship and trust', 'personal networks with transport owners' (generally local community members) and 'involvement in informal groups based on religious beliefs', give a clear indication of the extent to which farmers valued their relationships with the local community.

Table 7.2 Ranking of farmers' perceptions on social networks at MRIS, KwaZulu-Natal, 2013

Nature of networks	Never been involved	Strongly disagree	Don't agree	Neutral	Agree	Total Score	Rank
Involvement in informal groups based on religious beliefs	125	27	36	43	76	**458**	**3**
Involvement in informal groups based on friendship and trust	54	73	31	13	136	**757**	**1**
Networking with members of water user association	200	3	42	50	12	190	8
Member of a registered agricultural cooperative	173	10	48	34	42	282	6
Personal networking with hawkers and traders	139	48	40	22	58	**450**	**4**
Personal networks with transport owners	128	32	38	22	87	**471**	**2**
Personal networks with government workers (e.g. extension officers)	182	7	46	40	32	250	7
Personal networks with shop owners	162	19	41	12	73	360	5

Note: Total score = (Never involved x 0) + (Don't agree x1) + (Neutral x 2) + (Agree x 3) + (Strongly disagree x 4)

Networks (and personal relationships) demonstrate the level of embeddedness within the local community, and are useful where farmers require transport to the market. Transport owners were usually not willing to hire out their vehicles for the whole day, but farmers wanting to sell their produce by the roadside in Greytown and Tugela Ferry needed to hire a bakkie for the whole day, so that they could transport the leftovers back to the village for home use or disposal. Those bakkie owners willing to hire out their vehicles gave preference to their close friends and relatives. This supports the contention that thin trust or weak social ties among community members can negatively affect the way farmers produce and market their commodities.

7.2.4 Synthesis of findings across the three sites regarding social embeddedness

Embeddedness within the local social environment was found to be at two levels – either it resulted from farmers participating in other formal and informal structures such as savings clubs or church groups, or it involved personal relationships between farmers and other members of the local community. These relationships generally gave the farmers an advantage. However, trust is earned and can be lost, for example when a community member at Bizana bought goods on credit and then did not pay for them.

Some farmers had strong relationships with traditional authority structures, which resulted in a high degree of social embeddedness. These relationships also gave them an advantage with matters such as land access.

7.3 MENTORSHIP AND SKILLS TRANSFER

Chapter 4 (Aspirations and needs of farmers) also recognised the importance of skills transfer and capacity development, and this is considered here in more detail. The study sought to understand how relationships with government departments, commercial farmers, NGOs and fellow farmers assisted in developing skills and capacity. In addition, information on the application of new and more efficient technologies is important (e.g. conservation agriculture, water harvesting, integrated pest management), and it is useful to understand what technologies farmers were aware of, how they had found out about them, and if they were using them.

7.3.1 Willowvale, Eastern Cape

The provision of training and mentorship support to the two projects was investigated. The study revealed that mentoring and skills transfer were generally lacking among the famers in the study area. The number of visits by extension officers to the study area had drastically reduced. The FGDs revealed that extension visits to the group projects also needed to be strengthened; the farmers needed regular visits that would keep them well informed. During interviews, community members indicated that government extension officers only offered support to cooperatives and not to individual farmers. Most farmers used their own knowledge (developed through experiential learning) to perform farm operations, but there were certain operations, such as crop spraying, that none of the respondents were implementing. This was because of a lack of knowledge as well as a lack of resources. This compromised farmers' yields and quality, and consequently their participation in markets. A key informant discussion with an extension officer for Ciko and Mbozi villages revealed that the problem resulted from non-availability of transport for the extension officers, coupled with the deplorable state of the road.

In terms of the mentorship relationship between the project members and the key funder, DoSD, a key informant discussion with the official coordinating the two projects revealed that similar types of support were given to both group projects (See Table 7.3 below for an example of support provided to FCP). The official said that periodic training sessions were organised for project members, especially when funds were released to the project, to ensure that project members had the necessary skills to fulfil the requirements associated with the latest funding tranche. Training sessions were provided on governance, project and financial management, as well as technical training on crop production. The study also revealed that Old Mutual had been involved with the training of project members.

Table 7.3 Training and mentorship programme of DoSD at FCP near Willowvale, Eastern Cape

Field of training or mentorship covered	Duration	Date started	Date completed
Training on project and financial management and governance	10 Days	10/08/2010	20/08/2010
Mentoring	2 days	11/10/2010	25/10/2010
Training on crop production	10 days	24/05/2011	In progress

Source: Department of Social Development

Apart from the two community projects initiated by DoSD, an unrelated, but formal government initiative encountered during the study was the *Siyazondla* initiative. This was a programme of the EC DoA. It was basically aimed at rural women with a view to teaching skills in vegetable gardening and supporting their engagement in household vegetable gardening. The focus group discussions revealed that some of the women in both community projects were once very active in *Siyazondla.*

A key informant discussion with an official from the DoSD revealed that structures had been put in place to ensure that the projects had all the support needed to improve the livelihood of the farmers. Yet it was clear from the study that these needs had not all been met. A FGD conducted at the project site with members of FCP at Mbozi revealed a range of issues affecting the project, some of these issues raised questions about the sustainability of the project and the extent to which it was able to support or contribute to the livelihoods of the farmers. Additional information was sourced from the officials in the DoSD who were directly in charge of monitoring the project (See Table 7.4 below). This revealed that there was inadequate project monitoring. The project was designed in such a way that regular visits and monitoring were meant to serve as avenues for regular project appraisal, but the trends at both project sites showed that the projects were not being well monitored, and challenges encountered were not being adequately addressed. The study identified the various offices and officials, such as the Community Development Practitioner (and Auxiliary Community Development Practitioner), that were mandated to undertake project monitoring. Another official from DoSD alluded to the need for proper project monitoring, but cited some challenges that may have prevented this, such as the poor road network to the project site, transportation problems and lack of clear priority on the part of some of the officers involved in monitoring the project.

Table 7.4 Project monitoring and visitation at FCP, Mbozi during the month under review

DOSD officials	**Date of visit**	**Items discussed or observed during visit**
District Manager , Area Manager, Manager	N/A	No visits
Assistant Manager	N/A	No visits
Community Development Supervisor	No visits	No visits
Community Development Practitioner	09/04/2011	Supervision for progress Monitoring project progress
Auxiliary Community Development Practitioner	08 March 2011	Supervision for progress
Provincial Office Staff	No visits	No visits

Source: Department of Social Development

It should, perhaps, be stressed that while government programmes and policies aim to improve smallholder production, their interventions are not always effective in achieving this. Participatory monitoring of projects and programmes to identify gaps in terms of social and physical capital, could be effective in improving the impact of these interventions.

7.3.2 Marina, Eastern Cape

Relationships with other parties were explored through discussions with farmers. There were few references made to government extension services. One of the successful smallholder banana farmers said that he had his own knowledge, but also made use of extension support provided by Lima, who were running a farmer support initiative (‘*Abalimi Phambili*’) in the area. The Thuthukani group had received training from the EC DoA and Lima. Farmers generally indicated that they learnt from each other and from NGOs such as Lima. Lima had been instrumental in providing farmers with training, and making individuals and groups aware of farming technologies, both traditional and conventional.

The successful smallholder banana farmer mentioned above noted that it was very useful for farmers to meet and share knowledge and experiences, rather than relying only on external people to provide knowledge. He also pointed out that farmers who did not want to associate with others were hindering their own development as farmers. A woman farmer indicated that she had learnt a lot from discussing farming with other farmers. It was mentioned that the shared learning initiatives of the current WRC funded project and the Lima farmer support programme had been valuable sources of knowledge and expertise.

Some groups (e.g. Mpunzi Drift) indicated that they relied on the extension officer to provide and deliver inputs for them. This was not a reliable system, as the inputs did not arrive in time, resulting in late planting. They did not make specific reference to supply of information by extension as the focus of the discussion was on the provision of inputs.

7.3.3 Mooi River Irrigation Scheme, KwaZulu-Natal

Many farmers and their families have adequate knowledge and skills for operating within the current level of technology, given their resource constraints. However, efforts to intensify or diversify production require investments in new knowledge and skills. Water in agriculture require important enhancements in human capital, including knowledge of methods for improving irrigation water management.

Farmers were asked whether they had received any training. As shown in Figure 7.3, most farmers indicated that they had had the opportunity to attend training sessions, workshops and meetings that imparted knowledge on the various production and marketing skills. The government extension officers had provided platforms for training through “Farmers’ days” that were organised for each area by the extension officers. Training sessions given to farmers seemed to have focused more on agronomic / production related skills, such as fertilizer application, herbicide application and general crop production principles. It is apparent that there is a need to intensify training in aspects of product pricing, processing, packaging and product marketing, where fewer people had had the opportunity to receive training.

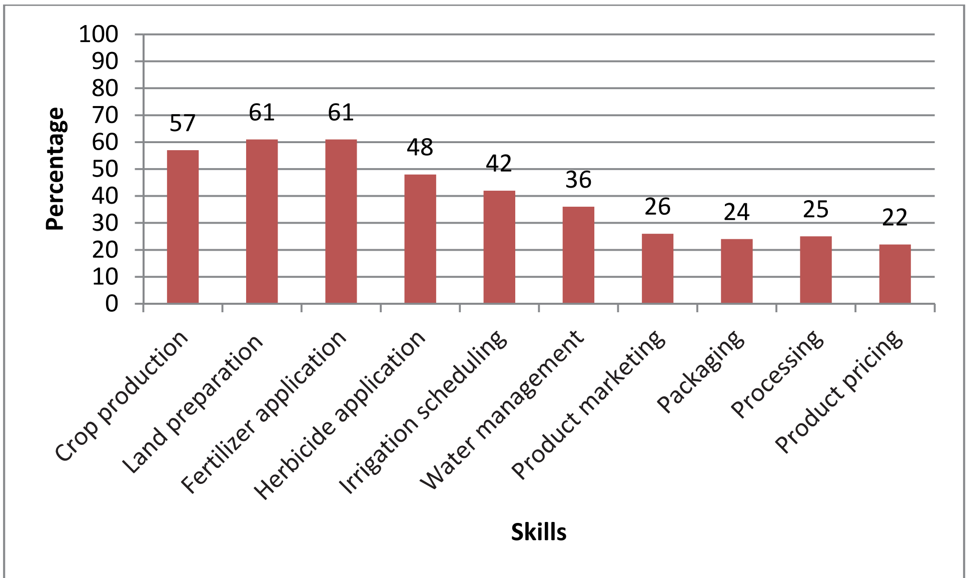

Figure 7.3 Skills development training received by farmers in MRIS, KwaZulu-Natal, 2011.

Follow up discussions to establish how farmers accessed critical skills revealed that most farmers used knowledge gained over years of farming. Some farmers revealed that they acquired most skills through seeking guidance from neighbours, friends or relatives who know specific tasks such as fertilizer application and disease control. Some farmers also gained critical information from input suppliers. Most of the shops highlighted that their sales staff got training from manufacturers of agrochemicals on how the chemicals could be applied. Furthermore, seed producers also trained the same sales staff on crop varieties. The information that was made available to farmers in most agricultural shops included disease-resistance, drought-tolerance, and yield potential of specific crop varieties. Farmers indicated that they took samples of diseased crops to the input suppliers in Greytown where they got a recommendation of the chemical they could buy and how they could control the pest or disease. This was very helpful for farmers given the limited contact time with government extension officers. Besides the control of specific diseases, Farmers Agri-Care (Pty) Ltd in Greytown gave farmers programmes that they could follow to control pest and diseases in cabbages, tomatoes and potatoes. Some government extension officers also used the same programme to advise farmers. The same applied to RTS Trading, which also offered over-the-counter advice to farmers on chemicals that could be used to combat problem pests and diseases.

Information about certain diseases and ways to control them was also shared among farmers in the field. If one farmer used a certain chemical to control a certain disease with success, s/he would recommend the chemical to others. All these strategies helped farmers cope with their daily challenges amid reports of limited contact time between farmers in MRIS and the local government extension officials.

7.3.4 Synthesis of findings across the three sites

Skills transfer and capacity building were found to take place either through experiential learning, knowledge sharing between farmers or through training and mentorship initiatives offered by various stakeholders. Most organisations working with farmers required that they form some sort of structure to facilitate training and support. In some cases support was only provided where farmers actually produced collectively (e.g. the projects at WIllowvale), while other support organisations only required that farmers participate in some sort of organisation or commodity group, such as the Banana Commodity Group supported by Lima. Strong relationships with organisations that provide training and mentorship would, in principle, be advantageous for smallholder farmers, but on the whole the study revealed challenges across sites in this regard – especially with regard to extension services provided by provincial departments of agriculture.

7.4 EQUIPMENT, TOOLS AND TECHNOLOGIES

The role of technology in smallholder production systems was investigated. Technology comprises two main elements: communication technology and farming technology. The latter can be subdivided into new and traditional technology. Questions about technology also sought to identify local innovative ideas and approaches being used by farmers (in Marina specifically) to overcome specific challenges. Key themes in technology that were investigated included:

- Tools, equipment and machinery for production – which includes hand tools, machinery and other equipment. It was felt to be important to also consider social factors related to the ownership, use and management of tools and equipment.
- New technologies – which refers to physical technologies, such as the use of hybrid seeds, improved fertilizers and pesticides that can improve levels of production.
- Traditional technologies – refers to old and more recent traditional practices used for land preparation, control of pests and diseases, transport, etc.
- Technology for communication, information and marketing – communication infrastructure refers to postal services, telephone and cell phone communication, radio, newspapers, email, fax etc.

7.4.1 Willowvale, Eastern Cape

Discussions regarding farm equipment were restricted to the community projects as individually owned equipment was found to be very limited and generally only involved manual tools. Households generally had few agricultural assets. Those most commonly mentioned were shovels and hoes (owned by 67.1% and 96.3% of households respectively). Thirty-nine (47.5%) said that they had access to wheelbarrows and 8 (9.8%) said that they had access to ploughs (with 6 having their own ploughs and 2 indicating that they borrowed ploughs).

The access to vehicles for transporting agricultural inputs and produce was investigated and the results are shown in Table 7.5. In Ciko village 65.9% of households did not have access to transport for procuring production inputs or for transporting their produce, while 61.0% had a similar problem in Mbozi. This could be one of the reasons why most of these individual household farmers limit production to meet household consumption needs only.

Table 7.5 Access to vehicles by farming households in the two villages at the Willowvale site, 2010

Variable Type	Ciko (N=41)		Mbozi (N=59)	
	N	%	N	%
Transport infrastructures* How are produce and inputs transported?				
Hired taxi	13	31.7	20	33.9
Vehicle from municipality	1	2.1	3	5.1
No access to transport	27	65.9	36	61.0

The existing physical assets, as well as associated challenges and other identified needs are summarised below in Table 7.6 and Table 7.7 for the two community projects at Willowvale.

Table 7.6 Existing physical capital at Foundation Community Project, Willowvale site, 2010

Physical capital	Existing Challenges
Irrigation pump and infrastructure (pipes and sprinklers)	Engine breakdown
Fencing	Fencing destroyed by wild pigs
Tractor	No money for repairs
Planters	Damaged completely
Disc plough	Good working condition
Mould board plough	Good working condition
Chisel plough	Good working condition

Source: FCP group project survey, 2011

At FCP, land preparation was done with a tractor that was donated to the project by the Amatole Municipality in 2008. In addition there were tractor-drawn implements at the site, which included mould board plough, disc harrow and a planter. It is clear that the project was provided with a fair amount of physical capital in terms of machinery, equipment and other forms of infrastructure.

Table 7.7 Existing physical capital at Ciko Santrini Project, Willowvale site, 2010

Existing Physical infrastructures	Existing Challenges
Irrigation engine	Engine breakdown
Sprinklers	Some are not functioning
Hoes	Not too efficient
Wheel barrows	Not too efficient
Fencing	Good working condition
Electricity	Stable
Communication facilities e.g. radio, cell phones, TV sets etc.	Almost all the project members had cell phones, information was ready available to them via TV and radio; but being able to access quality and relevant information was a major challenge due in part to the low literacy level among project members.

Physical capital needs, as perceived by the members of each of the projects at that time, are summarised below in Table 7.8.

Table 7.8 Summary of physical capital needs identified by project members, 2010

Foundation Community Project	Ciko Santrini Project
• Access road to the farm • Trailers (needed for transporting produce from the field to the village) • Boom sprayer • Potato planters • Transport (Note: the existing mode of transportation is by hiring a bakkie at R250/day) • Electricity.	• Tractor (currently one is hired for land preparation) • Planters • Mould board plough • Chisel plough • Access road • Transport • Storage facilities • Internet.

Much of the infrastructure and equipment at the two projects was similar, however, the lack of a tractor at Ciko was an obvious deficit, and they were hiring a tractor at the time of the study. At the same time, the tractor at FCP was not an effective asset as the project members did not have the resources to undertake necessary repairs.

Land is considered a form of natural capital, however lack of physical capital can reduce the effectiveness of this asset. For example, at the Ciko project, out of the 10 hectares that were allocated, only 2 ha was irrigated while 4 ha was used for planting dryland maize. This was because they did not have the equipment required to irrigate the entire fenced area.

7.4.2 Marina, Eastern Cape

The numbers of households with access to tools and equipment was discussed in Chapter 4, and the results for the Marina study area are given in Table 4.17. This shows that farming households had simple tools and equipment, mainly hand hoes and wheelbarrows. They did not own tractors, although they did have access to hired tractors and ploughs. None of the households interviewed had vehicles, although two respondents indicated that they had access to hired vehicles. Interestingly, none of the households had access to draught animals so there was no access to this form of land preparation. In terms of household assets, it is clear that ownership of televisions, fridges / freezers and radios was fairly common. Televisions and radios provide access to some forms of information, while telephones allow farmers to access market information. These assets therefore have implications for agricultural production. Later discussions revealed that cell phone technology was used extensively for communication and arranging meetings – less so for sharing of information. Access to electricity to charge cell phones was said to be problematic for some farmers who did not have electricity at home.

One of the larger smallholder banana producers hired labour to assist him with farming operations (mainly land preparation and planting) as most of the work was done manually. He owned hand tools for farming (wheelbarrow, hoe and spades) and also had an engine-driven water pump, which he did not use at the time of the study. When new lands or lands that had been fallow for some time were prepared, he hired a tractor for R300 to prepare the field, through a friendship / arrangement with a farmer who owned three tractors. The commodity group chairperson had a tractor but it was no longer working, so he hired a tractor when he needed land preparation done.

Case study: Owner driven development – Lungisani vegetable project

Lungisani Vegetable Project was a small vegetable production project. It was developed and driven by twelve members who saw a need to use farming to generate income and support their families. Production was initiated without any funding or state support to start with. The project focused on vegetable production as they believed that vegetables had a quick turnaround time and could generate good income. It was soon realised that watering by hand would not be sufficient for production, so the members saved up by putting money together on a monthly basis until they had enough to buy a water pump to pump water from a nearby stream. Members decided where the pump was to be located and they shared the fuel and maintenance costs. The engine was still operating at the time of the study because it was looked after. This highlights how strong social capital can improve livelihoods – by working together and trusting each other (joint savings) these members were feeding themselves and generating income. It is also probable that the pump was still in working order because the group had paid for it themselves, and therefore took responsibility for it. This is in contrast to much of the machinery that has been provided to communities at no cost through projects funded by government departments and other organisations.

Despite efforts to identify examples of traditional technologies contributing to agricultural value chains, only two respondents mentioned the use of any traditional technology. One farmer indicated that he used to plough using oxen, but as bananas do not require annual land preparation, he no longer needed the oxen. Most farmers made use of tractors and manual land preparation. In terms of indigenous knowledge / local knowledge, a farmer mentioned that he hung dried maize cobs in the smoke from the kitchen fire to prevent infestation by weevils and other insects however he also made use of Phostoxin to control weevils and insects in stored grains. Very little information on alternative farming practices was obtained. One farmer indicated that he had experimented with the no-till farming system in a part of his banana production area and had obtained good yields. He also noted that there was less lodging of bananas in the no-till plot. In response to questions about the use of current technologies with the potential to improve agricultural production, there appeared to be limited use of hybrid seed stocks for agricultural production. One of the banana farmers purchased hybrid maize grain, but this was used only for household consumption as the inputs were costly (fertilizer and labour) and there was low return on the investment. Open pollinated variety (OPV) beans were used (known locally as *Ngalibani*) and seed was saved from the previous harvest for replanting. He also sold seed to other farmers at R20 per cup or R300 for 20 kg. This variety was preferred by farmers as it had a high resistance to drought. Similarly, sweet potatoes and *amadumbe* were obtained from local stocks and areas under bananas were also expanded using existing stock (making use of suckers from existing parent plants). Similarly, another farmer used hybrid seeds for maize and OPV for beans and other staple crops. Saved seed was stored in containers and treated with Phostoxin. The Amahomba and Thuthukani projects both made use of hybrid maize and vegetable varieties, but also made use of OPV bean varieties in production.

In terms of pesticides, most farmers used chemicals to control insects, with the proprietary insecticide 'Blue death' being commonly used, mainly for pests on vegetables. It was preferred because it is readily available through many supermarkets rather than only from a specialist agricultural input supplier. As mentioned above, two of the farmers interviewed used Phostoxin for controlling weevils and other insects in seeds that were in storage. This raises concerns about the extent to which smallholder farmers understand the danger of using / storing toxic chemicals. Herbicides were used by most banana farmers for weed control because of the heavy demands of controlling weeds manually. Glyphosate was the most commonly used herbicide and is usually used in conjunction with manual weed control and mulching.

Case study: Chemical versus traditional ripening

Some farmers in Seaview ripened their bananas naturally, allowing them to mature in a darkened room or box. Others made use of Ethephon, a chemical ripening agent, which they were introduced to through the Farmers' Co-op in Bizana. One of the farmers interviewed ripened his bananas naturally. He argued that bananas ripened with Ethephon lost taste and were not as sweet as the traditionally ripened bananas. The chairperson of the commodity group, however, said that there was no difference in the taste if the chemicals were used as instructed. He pointed out that most farmers did not follow the instructions and that the loss of taste was because the chemical concentration was too strong. He argued that chemical ripeners could assist in the production of high quality bananas for the market. In contrast, the farmer who was against the chemicals strongly felt that, if farmers wanted to produce high quality bananas for the market, the use of this chemical should be discouraged.

7.4.3 Mooi River Irrigation Scheme, KwaZulu-Natal

In terms of technology use, farmers in MRIS hired tractors for ploughing their land and hand hoes were used for planting and weeding. However, the low level of mechanization cannot be used to define farmers as being completely subsistence oriented. The fact that 34% of households interviewed owned cattle could explain why draught power was still being used for land preparation, Mean herd size was small, which would suggest that there were limited households with full ploughing teams. The household assets owned by farmers in MRIS are shown in Table 7.9.

Table 7.9 Household agricultural assets owned by farmers in MRIS, KwaZulu-Natal (N=300), 2013

Household Asset	Number of people			Number of assets owned		
	N	Scheme	Non-scheme	Observed scores (min-max)	Total owned	Mean per household
Hoes	272	222	50	0-10	506	1.86
Shovels	190	157	33	0-5	257	1.35
Ploughs	19	15	4	0-2	21	1.10
Wheelbarrow	131	105	26	0-2	140	1.07
Cattle	105	88	16	0-40	800	7.62
Goats	197	160	37	0-53	2195	11.1

Farmers in MRIS mainly used hired tractors to carry out land preparation on their beds. Main activities included ploughing, discing and ridging, while planting was done by hand. Farmers cited cost and tractor availability as the major challenges affecting land preparation at MRIS. The two privately owned tractors in the area were sometimes hired out to fellow farmers subject to condition of the tractors and availability. Tractors were hired from fellow farmers and the cost ranged from R150-R190 to prepare a single bed (0.1 ha). The minimum fee of R150/bed was charged for ploughing and ridging (combined) and the maximum fee of R190/bed was charged where discing was also involved. Discing was optional for most famers and hence it attracted an extra cost if it was done.

Farmers highlighted that government tractors were supposed to be available for use from the KZN DoA offices at Tugela Ferry, but because of the large number of scheme participants, farmers resorted to private hire instead of waiting for government tractors to ensure that their planting operations were done timeously. As mentioned earlier, some farmers also utilised draught power for tilling their land. There was no cost-saving incentive for using animal power over tractors, other than convenience in cases where the latter was not easily available, or where the plot holder had his/her own livestock for use without hiring.

The tractors from the Msinga Local Municipality were available for hire at a flat fee of R150/bed. However, farmers could only hire them in groups of 10s. Unlike privately owned tractors, municipal tractors did not charge an extra fee for discing, hence it remained the cheapest option for the farmers in MRIS. Members of Blocks 13, 14 and 15, who constituted the Ndlalifa Farmers' Cooperative, owned a tractor that could be used by members at a fee of R150/bed. The fee was payable to the block committee, after which the member was put on a waiting list until his/her turn to use the tractor. Currently, access to the tractor seemed to be satisfactory for the members. Part of the money paid by the farmers was used to pay the driver on a monthly basis. There was however, a need to consider maintenance costs of the tractor in the long term. These were low at the time of the study as the tractor was still new.

7.4.4 Synthesis of findings across the three sites regarding access to equipment and tools

The investigation of household assets provided a fairly clear indication of the level of resources characterising the smallholder farmers at the three sites. At all three sites, households mainly had simple tools such as hand hoes and shovels. Wheelbarrows were also common, although at Willowvale, only 47.5% of people interviewed actually owned wheelbarrows. Ownership of mobile phones was very common across all households interviewed and should have facilitated communication and access to information.

There was very limited ownership of vehicles or tractors. At Willowvale, the level of assets was relatively higher within the projects – especially FCP, which owned a tractor and implements that had been provided by the local municipality. The FCP members stressed their need for a trailer to transport their produce from the site to a more accessible point from where hawkers could collect produce. This expenditure was never authorised by DoSD, despite the funds being available. During the course of the study, the tractor was damaged when the driver filled it with water instead of diesel. This highlights how important human capital is in terms of people having the necessary skills to use and maintain equipment properly, as well as the financial resources to pay for repairs and servicing when necessary. The pump at FCP, for example, had not been serviced since it had been installed approximately three years earlier.

Although ownership of tractors was scarce at all sites, tractors were generally available for hire. Often this opportunity was compromised by the need for farmers to group themselves before the tractor would be issued. This was problematic as farmers did not always have the necessary funds available, or a need for the tractor, at the same time. The reliance on draught power was variable, with farmers at Willowvale citing a shortage thereof. At MRIS, draught power was available but was charged at the same rate as land preparation by tractors. The advantage was that it sometimes allowed farmers to continue with land preparation rather than waiting for departmental or municipal tractors.

The use of agro-chemicals was explored at each of the sites to identify technologies being adopted by farmers. At Bizana, farmers made use of a range of hybrids, open pollinated varieties and suckers. Chemical use across the sites included some pesticides (often only accessible products such as Blue Death), herbicides, Phostoxin to prevent weevils in grain and some use of herbicides to overcome the labour demands of weeding. The use of chemicals was not widespread and on some occasions was attributed to a lack of knowledge about their usage. Some traditional farming practices were encountered such as the use of smoke to prevent damage to stored maize cobs. There was variation even at a particular site – for example some farmers at Bizana were using chemicals to ripen their bananas while others felt strongly that they impacted negatively on the taste and marketability of the bananas.

Again, the exploration of physical capital highlighted the linkages with both human and social capital: not just skills for operating and maintaining equipment, but solid institutional arrangements and networks to ensure access to, and effective sharing of, equipment.

7.5 TRANSPORT AND MARKETING INFRASTRUCTURE

In this study, transport and marketing infrastructure was considered to include all physical infrastructure involved in the conveyance of inputs and produce, as well as other infrastructure required for the effective marketing of produce (such as facilities for processing, packaging, storing or selling produce so that it can be marketed more effectively). In addition, access to a potable water supply, communication infrastructure and basic electricity, all contribute to marketing infrastructure. This section of the report not only considers electricity, but also other energy-related infrastructure. This includes sources of energy that are relevant to primary production, value adding and sales. Although this is primarily electricity, it can include other sources of energy such as fuel, wood and alternative sources of energy (e.g. solar). Energy is used for pumping water, running cold rooms, transport, charging cell phones and computers, powering cell phone towers, etc. The extent to which farmers at the three sites had access to such infrastructure is explored below.

7.5.1 Willowvale, Eastern Cape

At Willowvale, the general road infrastructure servicing the villages of Ciko and Mbozi was poor, but the situation was substantially worse for FCP. The project was serviced by a poor gravel road, which became impassable after even light rain showers. This seriously affected farmers' market opportunities during the summer season, as buyers could not access the site, and project members were unable to transport their produce up the steep slopes to the market. The end result was rotting produce in the field and financial losses being incurred.

At the time of the study there was much discussion about the urgent need to improve the accessibility of the project, as well as to identify alternative forms of transport to move produce to accessible pick-up points. This arrangement would, however, have increased transactions costs to be borne by the farmers, though it was also necessary to avoid the complete loss of the crop by the farmers.

At the time of the study, there was very little produce being sold by FCP, as is shown in Table 7.10. Given the small volumes, it was clear that all produce was being sold locally. Due to the challenges of road access and lack of adequate support, the farmers at FCP had reduced their level of production to cater for the needs of the local community only. This is in contrast to the situation that previously existed, where shop owners in Willowvale sent vehicles to the project site to collect fresh produce, as is shown in Figure 7.4.

Table 7.10 Produce prices and marketing outlets in Mbozi, FCP, 2010

List of products sold	**Quantity**	**Cost per item**	**List of places where products are sold**
Cabbage (heads)	560	R2.80	Local community
Butternuts (bags)	53	R24.00	Local community
Potatoes (bags)	20	R30.00	Local businesses
Green Mealies (cobs)	71	R4.00	Local community

Source: DoSD, 2011

Figure 7.4 Collection of cabbages from FCP site during the initial phase of the project.

Source: FCP Project coordinator (date of photograph 26/01/2008)

The two community project sites were seen to be losing substantial income specifically because of the issue of road access. The transportation problem mainly affected marketing as it was difficult to move produce timeously from the project to the village or to Willowvale. The fresh produce from the project site could not be marketed as efficiently as it was previously, mainly because of these problems. A discussion with the Municipal Manager from Mbashe Local Municipality at the time of the study revealed that plans were in place to begin the reconstruction of the road, and efforts were being made to ensure that a good road network was created to link the farm sites. A follow up visit undertaken in 2013 showed that no maintenance had taken place and the project had subsequently stopped functioning as the road had deteriorated further and the problem of accessibility had been exacerbated[18]. It should, however, be highlighted, that FCP members could perhaps have taken some responsibility for maintaining the road, as it only serviced their project. In addition to the lack of adequate road infrastructure, the projects did not have adequate packaging facilities with a potable water supply. This also limited the range of market outlets that they could supply[19]. They supplied fresh produce to the local communities but did not have any form of infrastructure such as a farm stall to facilitate this.

In terms of basic infrastructure, there was an electricity supply at Ciko, but not at Mbozi and very few households had radios or television. This has implications in terms of having access to information that might be of relevance to these farmers. In addition, the low level of literacy found during the study is a challenge which often prevents farmers from being able to access the right type of information.

7.5.2 Marina, Eastern Cape

Transport and marketing infrastructure at the Marina site was also investigated through the study. Discussions and interviews took place with both individual farmers and members of agricultural projects in the vicinity. In terms of physical infrastructure, access roads were highlighted as one of two key elements that influenced farming operations negatively (the other being lack of access to irrigation infrastructure). A tar road linking Port Edward and Bizana towns passed through the area. From the tar road to individual fields, accessibility varied considerably with some fields being reached by very bad dirt roads. The implications of this were serious, as bruising is likely to take place when bananas are transported. A farmer who had one of these inaccessible fields indicated that he carried bunches on the back of his bicycle to sell within the local community. Roads were particularly problematic when it rained, meaning that farmers could not get their produce to the market as hawkers could not access the gardens. In some cases it meant that farmers could not expand their production as they could not access markets further afield. Roads are particularly important for reducing the cost of doing business. From the discussions it emerged that poor roads mean more wear and tear on vehicles and resultant higher costs (either for maintenance or the cost of hiring a vehicle) and a longer time being taken to get products to the market. Roads in poor condition often could not be used when wet, which was also problematic. In addition, fewer vehicles travelled on poor roads, meaning that in some cases there was a monopoly on vehicles, resulting in vehicle owners charging excessively high prices for the use of a vehicle. Of all the farmers and groups interviewed, only one individual owned a vehicle. Thus there was a high reliance on either renting vehicles or using local taxis to transport inputs. Lack of ownership of vehicles also meant that producers were often reliant on “bakkie traders” who collected

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[18]A letter was sent to the Municipal Manager in October 2013 at the request of local residents as previous correspondence from the project had not yielded any results

[19] Members at FCP had tried washing with plain water and had encountered problems with reduced shelf life, so in 2010, as part of the capacity building activities, chemicals for washing potatoes were sourced from an outlet in East London. The purpose of the capacity building was to make the members aware of the correct procedures, find a local supplier and test the chemicals at the project site.

produce from the farm. The poor condition of roads was highlighted as a major problem by most producers and it was stressed that securing access to transport was difficult and often costly.

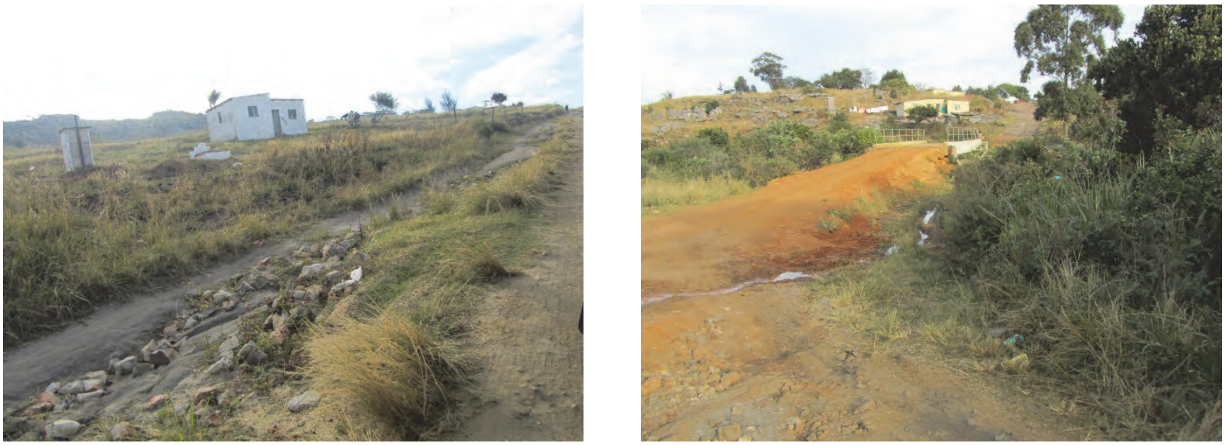

Figure 7.5 The poor condition of roads can be problematic and hinder marketing of produce at Marina, Eastern Cape.

Alternative forms of transport

An interview with a smallholder banana producer revealed that he used his bicycle to transport his bananas and other fresh produce to the main road where he sold it. The poor condition of the roads meant that he often had to repair punctures and fix or replace broken tyre rims. However, from a marketing perspective, this system worked very well for him as he could get his produce to the main road at a low cost. He also claimed that often he sold all his produce before he reached the main road. This is the advantage of using cheap and low-technology transport – it allows for social interaction and marketing opportunities.

Figure 7.6 An alternative transportation option encountered at Marina, Eastern Cape.

The Amahomba project had problems with bad roads, which made it difficult to access inputs and market products. When bakkies were hired to purchase inputs, bakkie owners charged more because of the condition of the road. Furthermore, when hawkers arrived to purchase vegetables, they pushed the prices down by complaining that the roads were bad. The hawkers also knew that the Amahomba group could not transport their own produce and used this to keep prices down. Vehicles were not able to access the garden when it was raining. The Thuthukani project suffered from very poor roads, but this did not impact significantly on their operations as they only sold locally to fellow villagers.

They had been promised that the road would be upgraded in 2012, but this was unlikely to affect their marketing as the major constraint to production and marketing were group dynamics, distrust and conflict. For Mpunzi Irrigation Scheme, the access roads were also in poor condition, and the area was inaccessible by vehicles when it rained. Hawkers were not able to reach the garden to collect produce. Hawkers who were interviewed highlighted access roads as a problem, although they did acknowledge that it was more profitable for them to obtain produce from local suppliers and put up with the bad roads than it was for them to travel further on good roads to get produce from commercial farmers in KwaZulu-Natal.

Case Study: Bad roads

One of the more successful female banana farmers in Seaview had a good healthy stand of bananas and was also a single mother of four. Her homestead was located quite far from the main road. The access road from her homestead to the main road was really bad. Only bakkies could travel on the road and when it rained, one could not get there by vehicle at all. Even the taxis refused to go down the road and she had to use a wheelbarrow to get her purchases from the main road to home, which took two hours. As a result, she experienced great difficulty in selling her bananas. It was very difficult and time-consuming to get her bananas to the main road to sell. Hawkers were not prepared to visit her to buy her bananas even though they acknowledged that they were good quality. This meant that she could only sell her bananas to neighbours and people nearby, by going from house to house. Often she could not sell all her bananas locally and many of them became spoiled. There had been a series of meetings with the Councillor to address the road issue, but nothing had happened. Poor transport infrastructure was limiting her income and impacting negatively on her livelihood and ability to support her children.

An investigation was made of the existence of any buildings and storage facilities used by banana farmers from Seaview. Buildings for storage and processing were generally non-existent but this was not a constraint, as levels of production were quite low and farmers harvested on order. Only banana farmers seemed to see the need for storage facilities to ripen and package their bananas for the market. Most farmers made use of existing rooms for storage and little, if any, processing took place. This highlights that the farmers were focused almost exclusively on primary production, with little consideration of value adding opportunities.

It was found that storage and ripening of bananas was entirely an individual activity, and that most banana farmers made use of some sort of building or storage facility for this purpose. One of the more successful banana farmers had his own storage room where he ripened his bananas and stored other produce. He also used a separate room, in the main house, for grading of bananas and other produce. Another farmer used a metal box (trunk) to store his bananas for about a week, while the commodity group chairperson stored his produce and seeds in his garage. Another example of a ripening was that of a woman farmer who covered her banana bunches with a maize meal sack and hung them in a room for a week to ripen. Banana farmers reported that storage and ripening of bananas was not a constraint as there were a limited number of bunches being produced at a given time. They did note that suitable storage facilities would be needed in future to cater for production by farmers who expected to expand their operations. They also highlighted that storage facilities and increased volumes would ensure that they were able to supply the market consistently.

The Amahomba group, which engaged in vegetable production, did not have any storage or processing facilities and their produce was sold directly out of the ground. The Nodaka Poultry and Vegetable Project had a store room, but it was empty as the tools provided to the group are managed individually and stored at member’s homes.

Access to electricity was found to be problematic in some areas. It was observed that all the households that did have electricity were close to the main tar road running through the area, and those located some distance from the main road did not have electricity. This highlights how different forms of infrastructure are interlinked: with easier access by road, it is easier and more cost effective to provide other services, for example electricity. Being closer to the main road opened up many more economic opportunities, which is why settlements in rural areas are densest closer to the main road. For one of the more successful banana farmers, the main source of energy for household use was electricity. Prior to electrification, the homestead relied mainly on firewood for cooking. Although firewood was no longer used, he pointed out that there were fewer sources of wood available as many of the trees / forests had been cut down and wood could only now be obtained from some distance away. One of the woman farmers interviewed, on the other hand, had no electricity. She used candles, paraffin and wood for light and cooking. Wood was harvested from a woodlot some distance away – the whole process of getting there, harvesting and returning was said to take five hours. Another farmer interviewed also did not have electricity and used wood for fuel. He charged his cell phone in the neighbouring village closer to the main road, where there was electricity. This sometimes affected his communication with other farmers as his battery often ran flat. He said that in some cases, people would not assist him with charging his phone. The Mpunzi Irrigation Scheme used petrol to run the pump. There was no electricity in village or surrounding area and the members had to rely on homesteads further afield for charging their phones. Consequently phones were switched off a lot of the time to save battery power, making communication with members difficult.

7.5.3 Mooi River irrigation Scheme, KwaZulu-Natal

Farmers were asked their opinions regarding the effects of transport infrastructure on marketing of produce from MRIS. The results are shown in Table 7.11. The MRIS was serviced by a gravel road that ran along the scheme. This was an important feature as it facilitated the movement of agricultural inputs to the scheme as well as the produce from the scheme to the market. The district road leading to the MRIS was both accessible and well maintained, but farmers and bakkie traders highlighted the bad state of infield roads.

Table 7.11 Ranking of transport infrastructure at MRIS in terms of influence on marketing, 2013

Factors	**No effect**	**Don't know**	**Significant influence**	**Great influence**	**Very serious influence**	**Total score**	**Ranking**
Road condition leading to the scheme	63	58	85	64	37	568	**3**
Road condition leading to the fields (infield roads)	52	23	71	84	77	725	**1**
Availability of vehicles that can be hired to ferry produce	65	43	58	75	66	648	**2**
Cost of transport hire	76	65	50	63	53	566	**4**

Note: Total score = (No effect x 0) + (Don't know x 1) + (Significant influence x2) + (Great influence x3) + (Very serious influence x 4)

Difficulties were exacerbated by the lack of storage facilities to meet both short term (fresh produce) and long term (grain) storage requirements, see Table 7.12.

Table 7.12 Access to agricultural storage facilities at MRIS, KwaZulu-Natal, 2013

Respondents (N=307)	Short-term storage facilities for fresh produce		Long-term storage facilities e.g. for grain	
	Frequency	**Percentage**	**Frequency**	**Percentage**
No access	270	87.9	244	79.5
Have access	37	12.1	63	20.3
Total	**307**	**100**	**307**	**100**

There were no proper commodity storage facilities at MRIS. Although farmers did not store fresh produce for more than a day, they indicated the need for sheds that could be used for the short term storage of produce that was harvested for clients in advance. If farmers could harvest their produce before the trader arrived, this would save the trader's time and might improve the trading relationships between the buyer and the farmers. In terms of the need for long-term storage, farmers stored harvested grain in spare rooms at their homesteads. This was used for home consumption or for supplementary feeding of chickens.

7.5.4 Synthesis of findings across the three sites regarding transport and marketing infrastructure

In the context of the current study, transport and marketing infrastructure mainly considered roads and the infrastructure necessary for marketing, namely market stalls, processing and storage facilities. Road infrastructure at all three sites was problematic, even at MRIS where the gravel road running along the scheme was in reasonably good condition but the infield roads were badly in need of maintenance. Poor road access meant that it was sometimes impossible for traders to access gardens to collect produce – especially during wet weather. The wear and tear on vehicles meant that people hiring bakkies charged more for their services and bakkie traders also built the wear and tear into the prices they were willing to pay. Some projects were restricted to selling to the local community because of the poor road conditions.

The lack of storage facilities was highlighted at MRIS, but also affected Willowvale. At Bizana, banana production was on an individual basis, so farmers had their own storage facilities within their homesteads but group projects had same problem of lack of facilities. At WIllowvale, FCP did not have an electricity supply or a potable water supply. This limited the types of processing that could have been undertaken and also limited them to an engine running on fuel. Neither of the Willowvale projects had a market stall, which could have facilitated local sales. At MRIS, farmers complained about the lack of storage facilities both for grain and for perishables. Some farmers stored fresh produce under bushes along the road while they waited for traders to come and purchase their goods in an effort to reduce spoilage. Farmers could also not harvest more than they were sure of selling within a relatively short time-frame.

Farmers all faced challenges during the production of their crops. Those that did manage to grow high quality produce, then faced the bigger challenge of being able to market it effectively. Collective behaviour was sometimes a means of overcoming this, highlighting the linkages between social and physical capital.

7.6 AGRICULTURAL INFRASTRUCTURE

The main types of agricultural infrastructure investigated through the study were irrigation and fencing. Fencing, or the lack thereof, was frequently cited by farmers as a challenge to crop production due to the damage caused by livestock which were generally not herded. Sometimes this resulted in farmers not being willing to expand their production. While much of the focus of the study was on irrigation infrastructure, the supply of water for washing and processing fresh produce was also given consideration. It is clear that water plays a role at different points along the value chain.

7.6.1 Willowvale, Eastern Cape

Most of the agricultural infrastructure at the two projects near Willowvale was supplied by the DoSD. DoSD has played a key role in establishing food security projects in rural communities and Ciko Santrini and Foundation Community Project are two such initiatives. In terms of physical infrastructure, FCP was serviced by DoSD with sprinkler irrigation infrastructure that was powered by a 10HP diesel pump. At the time of the study it was found that water was pumped directly from the perennial Shixini River without the construction of a weir or any other such infrastructure. The scheme operated with a maximum of twenty sprinklers that were fed by a 4 inch delivery pipe. At the time of the study, the project was only using the 7 ha area that had been fenced by DoSD but anticipated that at some point in the future the irrigation infrastructure would be upgraded to allow the project to expand to cover the allocated 66 hectares. The 7 ha area was fenced with barbed wire to protect crops against animal damage. A guard room was also built on site to accommodate the security personnel employed by the project to guard against produce and property theft. Subsequently a seedling nursery was constructed.

Similarly, the Ciko Santrini project site (5 ha of the available land) was fenced to protect crops from animal damage, and provided with three storage rooms. Funding for infrastructure development, which included fencing, hoes, storage rooms, knapsack sprayers and irrigation equipment (pump, pipes, and sprinklers) came from the DoSD. The project had a sprinkler irrigation system powered by a diesel pump that drew irrigation water directly from the perennial Shixini River.

7.6.2 Marina, Eastern Cape

The focus of the study at Marina was banana production, and the availability of irrigation infrastructure was investigated. In the initial household survey it was found that 8 of the 33 respondents (24%) applied water to their bananas. Seven of these farmers that said they were applying water had less than 100 plants in total, which were thus small areas that could be irrigated manually. In terms of those households irrigating their bananas, 4 said that they used grey water, 1 said that they fetched water and 2 said that they either purchased water or hired someone to fetch water. It was clear that these options would not be suitable for larger scale production. There was generally very limited irrigation of bananas taking place, with application of water mainly taking place at plant establishment.

In terms of irrigation infrastructure of individual banana farmers, it was found that they generally did not have infrastructure to deliver raw water for irrigation, or potable water for cleaning and processing of produce. Many still relied on nearby standpipes (often cited as unreliable) or springs and streams for water that was used in the household and for irrigation. A water tank that was provided to one of the more advanced farmers through a previous initiative as a prize for being a top farmer was used for rooftop rainwater harvesting, but this was used to irrigate vegetables and for household use. This water was supplemented by water that was gathered from a nearby spring. These two sources of water were also used for washing produce (mainly bananas) before selling it. The farmer said that water supply was a problem in winter as the spring dried out and there was limited rainfall for the water tanks. Another farmer faced a similar situation – she also collected water from a nearby spring, but said that it dried up in winter. She also had a storage tank to collect rooftop rainwater. One woman farmer had dug a pit which served as a catchment during rainy seasons, and which was used for crop watering. When this dried out in winter, she fetched water by hand from a stream in a nearby wetland, using a wheel barrow. For household water use she collected water from a spring which was shared with neighbours. She was not allowed to use the spring for irrigation purposes as it was a communal drinking water source. She indicated that she did not wash her produce, and the local buyers did not mind if it was not cleaned. Another farmer farmed on the edge of a wetland and water scarcity was not a constraint for him as the soils were moist for most of the year. The chairperson of the banana commodity group did not have access to water so all his production was dryland and he noted that access to water was his biggest production constraint.

Within the broader Bizana Local Municipality, the situation with groups was found to be quite different from that of individuals. However, as there were no collective banana producers, information was obtained from vegetable producers. The Amahomba group had irrigation infrastructure and a pump which was used for vegetable production. This had allowed them to be good and fairly regular suppliers of vegetables to hawkers. The Thuthukani group had some irrigation infrastructure and had previously had a pump, which had been stolen by the former chairperson of the group, along with the tools. As a result, they had resorted to fetching water by hand from the nearby stream with buckets to irrigate their crops. On occasion, they rented a pump from a local farmer at a cost of R150. Mpunzi Irrigation Scheme had access to water from a nearby stream and some irrigation infrastructure, however the engine-driven water pump was no longer working and consequently they fetched water by hand from a stream. The engine had been sent in for repairs, but there was no cash to pay for the repairs. The Nodaka Poultry and Vegetable Project had two pumps and irrigation infrastructure. Neither of the pumps was operational and water was sourced from a nearby stream by hand. From these examples, it seems that serious challenges are experienced when groups are provided with pumps as there is apparently insufficient income to cover the costs of repairs and maintenance. It is not always clear whether this is an economic or social problem. Despite the lack of pumps, all farmers had a system for getting water to their crops. In most cases, it was by hand, even for projects that were funded and had had irrigation infrastructure installed. When the interviewees were asked what could be done to improve access to water, it was suggested that the project team provide infrastructure, or provide assistance in terms of unlocking this support from the Municipality.

7.6.3 Mooi River irrigation Scheme, KwaZulu-Natal

Research at MRIS considered in some detail the irrigation infrastructure and social aspects that impact on the equitable allocation of available water.

7.6.3.1 Irrigation infrastructure at MRIS

Water is diverted from a weir constructed across the Mooi River into a parabolic canal which runs for about 20 km from the diversion point to the end of the scheme, as shown in Figure 7.7.

The initial 4 km of the canal carried water for both MRIS farmers and commercial farmers and had no concrete lining. From where the canal split to feed the MRIS farmers, it was lined with concrete. The concrete-lined canal had a top width of 2 m and a depth of 1 m and was designed to convey approximately 0.36 $m^3.s^{-1}$ of water (KZN DoA, 2001; Gomo, 2012. The canal gradually reduced in size and capacity from the head section (Block 1) to the tail-end section (Block 15). The main canal fed water into four overnight storage dams or directly to the field through infield canals. The four storage dams were in blocks 6, 13, 14 and 15. Farmers in these blocks irrigated from the dams, and the bulk of the farmers got water at diversion points along the main canal. Once water was released from either the main canal or the dams, it was channelled along the smaller infield canals that fed individual plots. Infield canals varied in length and size depending on the proximity of the plots to the main canal, and ranged between approximately 100 m and 300 m in length. Although some infield canals were concrete lined, more than 90% were either earth built or needed complete revamping due to extensive collapse and breakages.

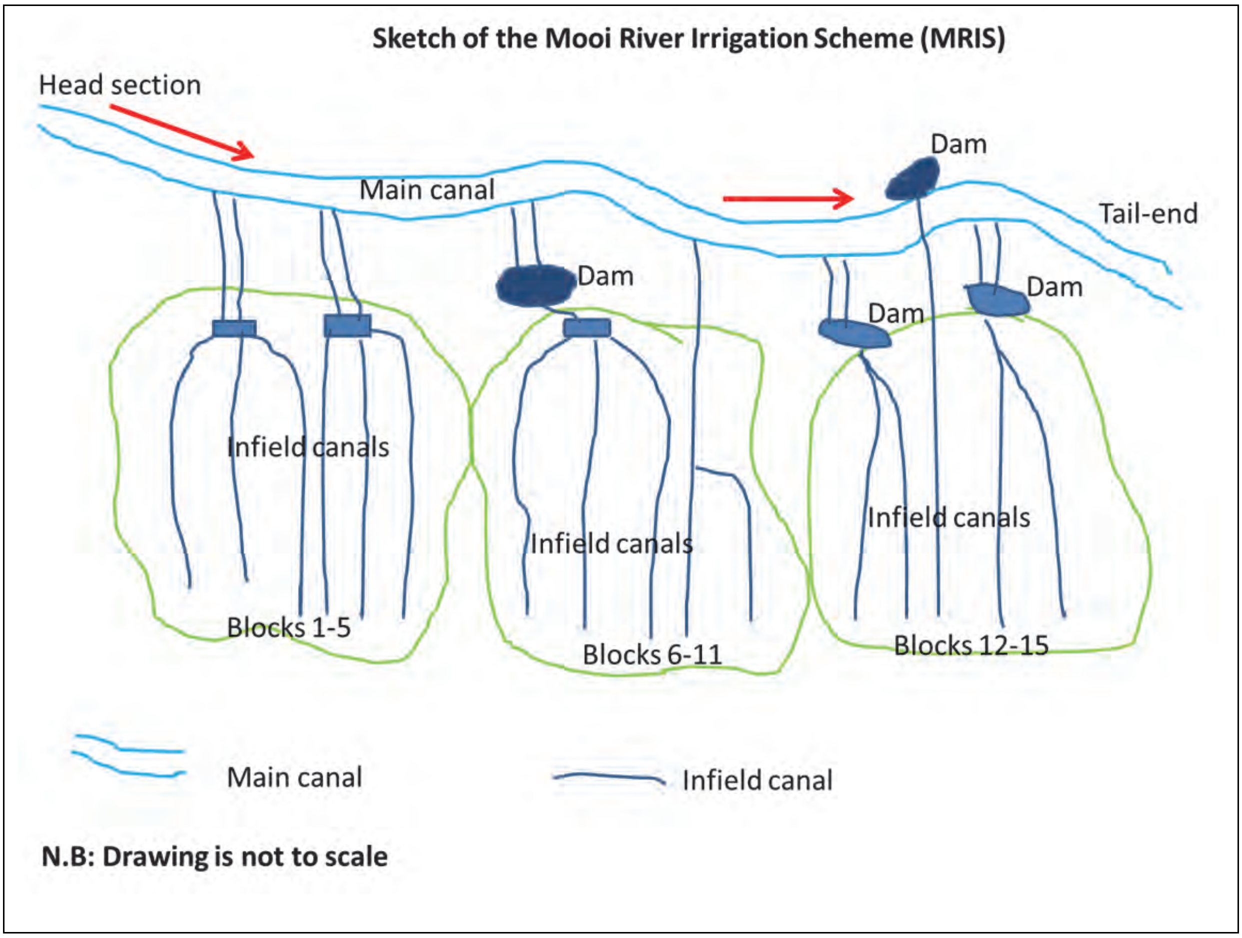

Figure 7.7 Diagrammatic representation of the system of canals and dams at MRIS, KwaZulu-Natal, 2013.

Farmers in specific blocks accessed water at specific diversion points (irrigation off-takes) along the main canal. The number of irrigation off-takes varied depending on area (hectares) and number of farmers per block. Water allocation within the scheme was done according to a weekly schedule, which was known to all farmers and controlled by the canal attendants commonly known as canal rangers. Canal rangers were government employees, under the KZN DoA. They were responsible for opening and closing water from the main source to the fields and storage dams. Canal rangers were also responsible for monitoring illegal water abstractions by community members and scheme members. The major challenges of controlling the amount of water allocated to blocks and individual farmers were:

- Lack of calibration of the diversion metal gates, hence a reliance on estimates based on number of farmers irrigating per off-take point.
- Broken or missing diversion gates both along the main canal and infield canals, resulting in farmers using empty bags and rubble to close and open water flow. This practice resulted in continuous leakage of water along the conveyance structures.
- Loss of water through seepage and spillages over the infield canals.
- Lack of keys on diversion gates to control unauthorised water access to users.

At the time of the study, the project relied on government support for major irrigation repairs. In terms of minor repairs, there was no financial budget for infrastructure maintenance. Financial requirements were met through individual contributions which were usually coordinated by block committees. The existing block committees were also involved in the coordination of irrigators to carry out activities such as canal cleaning, canal repairs and fence maintenance. This again illustrates the importance of community social cohesion in the provision of financial capital and in the maintenance of physical capital.

The erratic supply of water to the lower blocks led to KZN DoA installing a pump in critically water stressed Blocks 13, 14 and 15. During the data collection period, the pump was not yet in operation. It was, however, expected to pump water from the Mooi River into the main canal at a given point in Block 13. The water was then to be channelled into storage dams in Blocks 13, 14 and 15 to alleviate water stress in the area. Farmers believed that this initiative would go a long way to improving crop production in the area.

7.6.3.2 Adequacy of water supply to meet crop demands

FGDs with block committee members obtained an understanding of farmers' perceptions regarding factors affecting water access. Ranking of factors was done using a scale of 1 (no effect), 2 (moderate effect) and 3 (critical effect) and the findings are graphically presented in Figure 7.8.

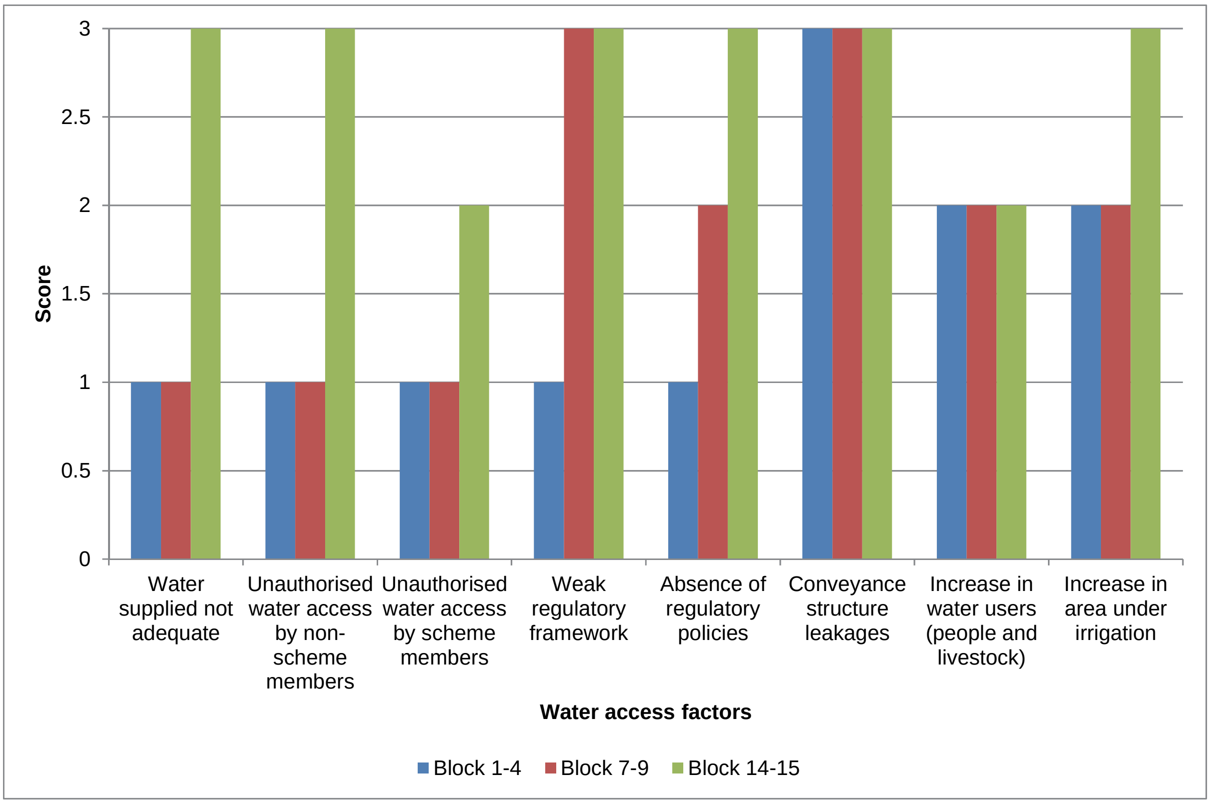

Figure 7.8 Perceived effects of water-related factors on irrigated agriculture at MRIS, 2011.

Results of the study indicated that leakages along conveyance structures greatly affected all water users in MRIS (Figure 7.8). This was the single variable identified by farmers in all blocks as a factor affecting water availability for crop production. Block committee members cited cracked canals and debris in the canal as the major causes of leakages. Leakages were visible along the entire canal from Block 1 to 15, but tail-end blocks (14 and 15) were the worst affected by this problem. Block 14 and 15 farmers were the only ones who indicated that the water being supplied along the canal was insufficient for their irrigation requirements. These farmers also believed that the existing irrigation programme was not adhered to, and that rampant illegal diversions of water negatively affected tail-end blocks. Of concern was the problem of farmers irrigating plots outside the scheme. These farmers were not members of MRIS, but were benefiting from canal water without approval from the authorities. Furthermore, there were also scheme members who accessed water for irrigation purposes in the scheme without permission from canal rangers or block committees. This was cited as a common problem in Block 1, 2, 3 and 4, where farmers irrigated continuously without following the irrigation roster for the scheme. These blocks were supposed to irrigate their fields on Mondays, but some members were said to be irrigating any day of the week, thereby depriving other blocks of irrigation water.

The unavailability of the original design documents for MRIS and the current shortages of irrigation water in the scheme, meant that it was not possible to ascertain the supply capacity of the canal. An effort was made to estimate the supply capacity of the main canal between June and December 2013, as the farmers had indicated that these were the critical months of irrigation water shortage. Rainfall is erratic during the winter period (June-August) and September, October and November experience high temperatures, making irrigation the key to successful crop farming activities. A Global Flow Probe was used to measure irrigation water flow and the results indicated a fluctuation of supply between June and December 2013. The average flow rate was 0.39 m^3/s, ranging between 0.24 m^3/s and 0.45 m^3/s. The fluctuations in supply in the main canal were due to silt accumulation, debris accumulation and low discharge of the Mooi River feeding the main canal. The low discharge was particularly evident in winter. Assuming a constant flow rate, the average volume of water supplied by the main canal is 1,404 m^3/hr, which translates into 16,848 m^3/day.

Based on SAPWAT estimates of crop water requirements for seven main crops grown in MRIS (cabbages, potato, tomatoes, maize, dry beans, spinach and sweet potato) the average water requirement per irrigation cycle is 28 mm (280 m^3/ha). Therefore, by matching the supply capacity and average crop water requirements per irrigation cycle, an estimated average of 60 ha can be irrigated directly from the main canal on a 12hour day. The estimate excludes the area that can be irrigated from the overnight storage dams, which also depend on the amount of water stored in the reservoirs each day. During the data collection period, none of the overnight storage dams were ever full, except after heavy storms, when all farmers stopped irrigation. Possible causes of current water challenges among irrigators in MRIS were therefore explored basing on the supply capacity of the canal and access conditions of the users. Some of these were identified as unequal distribution based on area, unregulated abstraction of canal water, night irrigation and weak management structures in the scheme as described in the following sections. Figure 7.9 shows the uneven water distribution across the scheme. The figures are based on average number of irrigation cycles[20] attained by potato farmers sampled across the scheme (Block 1-15). The cycles were recorded from planting to harvesting (June to December 2013).

[20]An irrigation cycle in this study is defined as the application of water to a particular unit of land, which happens once at a given time interval (days, weeks, months), within the growing period of the crop. The interval varies depending on irrigation schedule, water availability, farmer preference and crop water requirement. Irrigation cycles can also be regarded as the number of times water is applied to a given crop during its growing period.

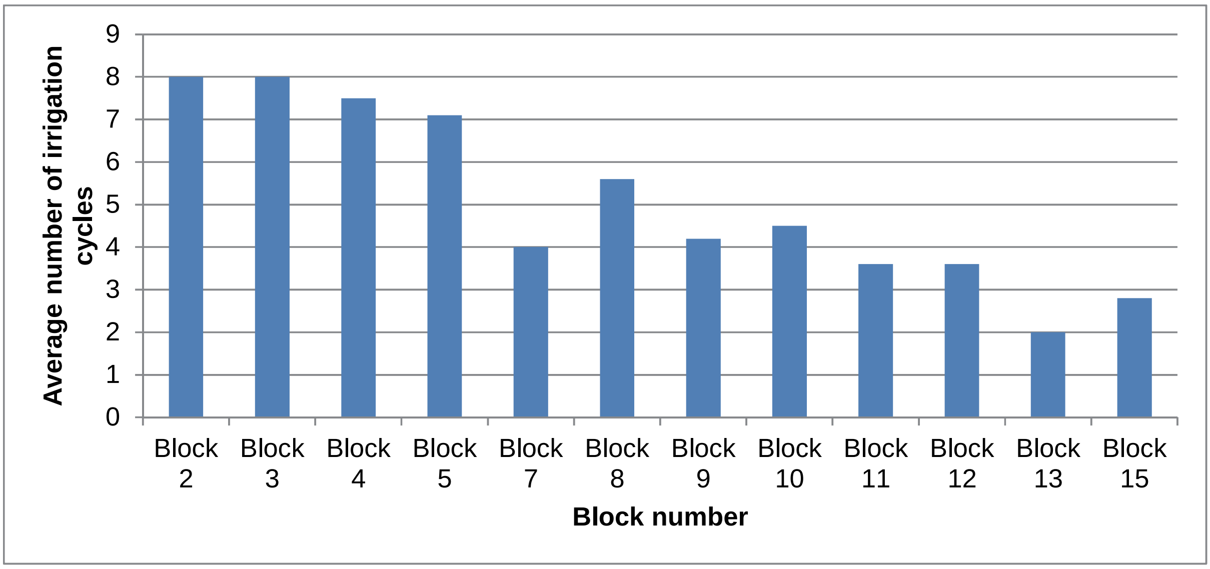

Figure 7.9 Average number of irrigation cycles per block at MRIS for the period June to December 2013.

Source: Muchara *et al*. (2014)

Water is in short supply, and one day of irrigation per week was insufficient for farmers in the MRIS. Most farmers grew more than one crop in each season, with an average of two crops per farmer. During the single day of irrigation per week, a farmer had to make a decision on which crop to irrigate depending on the amount of water available and the condition of the crop. Some crops ended up being water-stressed due to water inadequacy, and some farmers utilised night-time hours to irrigate the second or third crop. While night irrigation is a possible strategy, it negatively affected water availability for dam-fed sections of the scheme, which were supposed to fill up at night when nobody was supposed to be irrigating. Redesigning water allocation systems might be necessary in the MRIS, including a detailed evaluation of whether the scheme infrastructure can meet peak crop water demand. The actual supply capacity of the conveyance structures in MRIS was determined between June and December 2013.

Table 7.13 Comparison of supply capacity against estimated crop water requirements at MRIS, KwaZulu-Natal, 2013

Block	Area (ha)	Day of irrigation and area	Average demand (based on 280 m^3/ha/day)	Actual supply capacity (m^3)	Actual as a percentage of volume demanded	Over-night storage dams
1	5	Monday (122.8 ha)	34 384 m^3	16 848 m^3	50%	One dam in Block 6
2	15					
3	9					
4	26					
5	2.5					
6	64.8					
7	4.4	Tuesday (52 ha)	14 560 m^3	16 848 m^3	116%	None
8	33.6					
9	14					
10	50.4	Wednesday (89.6 ha)	25 088 m^3	16 848 m^3	67%	None
11	39.2					
12	62	Thursday (133 ha)	37 240 m^3	16 848 m^3	45%	One in Block 13
13	71					
14	58	Friday (204 ha)	57 120 m^3	16 848 m^3	29%	Two in Blocks 14 and 15
15	146					
Total	601		**168 392 m^3**	**84 240 m^3**	**50%**	**4**

Note: Irrigation after 5pm and on Saturdays and Sundays was not controlled hence farmers used water based on availability.

Given the limited supply capacity of the canal, strict management of water is required in the scheme. Based on the supply capacity, it was estimated that the irrigation turnaround time to irrigate the whole scheme (601 ha) is 10 working days at a rate of 60 ha/day. In other words, to ensure that all irrigable hectares have equal access to water, a given hectare can only be irrigated once in two weeks (10 working days). However, this is not considered by farmers, most of whom expect to have access to water at least one day per week. Gomo (2012) undertook an engineering study of the performance of MRIS, and highlighted that water supply was sufficient to meet crop water requirements, but that there was a need to strengthen water management in the area.

Based on the current distribution of irrigation area per given irrigation day, Table 7.13 depicts a scenario of unequal sharing of water, assuming a fixed and constant supply of water per day. Blocks that irrigate on Tuesdays and Wednesdays have an advantage because there are fewer irrigable hectares in the respective blocks. For instance, 52 ha and 89.6 ha were supposed to be irrigated on Tuesdays and Wednesday respectively. These areas are considerably less than the areas being irrigated on the other days. There is a need to revise the current irrigation schedules and redistribute the areas under irrigation per given day more equitably. The current system is based on blocks and seems to disadvantage those farmers whose plots are located in bigger blocks such as Blocks 6, 12, 13, 14 and 15. Although the block system is important for management of water and coordination of farmers, there is also a need to develop new boundaries based on irrigation area per day. This is likely to require moving some areas to different days of the week. Furthermore, since polygamous households were allocated more land through the traditional leadership system than monogamous families, it is suggested that consideration must be given to accommodate farmers with peculiar needs as this was not being considered in water allocation at MRIS. It is vital to ensure that farmers are part of any design and realignment process to ensure the long term sustainability of the system.

Another source of inequity was the unregulated / unauthorised abstraction of water, which was a common phenomenon for both irrigators and non-irrigators. Some farmers had pumps that pumped directly from the canal into their private fields, and others used syphon pipes that sucked water by gravity from the canal to the fields. The general community members (irrigators and non-irrigators) also used canal water for non-irrigation purposes including brick making, watering livestock, laundry and house construction. This shows a case of multiple uses of canal water, the impact of which might be negative in terms of the amount of water available for irrigation purposes.

Some measures that could be put in place to address the water-related challenges include:

- Rotational management of the water among all users, instead of relying on a few block committee members, might help to ensure compliance on irrigation roster, as it would involve all irrigation beneficiaries in the management process.
- Regrouping of the scheme into five equal irrigation segments and ensuring that each unit of land is irrigated once in two weeks would resolve the current problem of unequal allocation of water per hectare.
- Mechanisms needs to be put in place to ensure that all members take part in cleaning the head section of the canal especially after rains in areas within the Mooi River catchment.
- Night irrigation should be stopped to allow storage dams located on the tail end section to fill-up, and penalties for offenders should be implemented. This would ensure that adequate water is available to reward compliant members of the scheme.

7.6.4 Synthesis of findings across the three sites regarding agricultural infrastructure

The discussion about agricultural infrastructure focused mainly on fencing and irrigation, though some attention was also given to storage and processing facilities. Projects generally had access to irrigation infrastructure that had been provided initially by various government departments. Individual farmers, such as those at Ciko and Mbozi, were mostly unable to make use of the irrigation opportunities provided by the Shixini River. The irrigation infrastructure varied from fairly small-scale sprinkler systems at Willowvale (servicing 5-7 hectares), to the canal system at MRIS which had been planned to irrigate an area in excess of 500 ha.

At Marina, the original banana farmers did not have access to irrigation infrastructure and those who watered their plants did so manually and mainly at the establishment stage. This is a very different production system from that of commercial producers in southern KZN. The only farmers encountered who had irrigation infrastructure were members of projects but generally the infrastructure was no longer functional and they had reverted to hand watering. The one project that did have a functional pump was one where the members had collectively purchased their own pump rather than receiving one from a government department. At Marina there were some examples of water harvesting and conservation encountered, as farmers had recognised the benefit of leaving material on the soil surface and one farmer even made use of planting basins at establishment.

The importance of fencing to prevent livestock damage was frequently cited at the different sites. At Willowvale, portions of both sites had been fenced to exclude livestock. At Bizana, farmers were responsible for fencing their own fields and some cited the cost of fencing more of their land as the reason for not being able to expand their production. At MRIS, the government fenced the perimeter of the scheme, but some farmers had also fenced their individual beds to prevent livestock damage at times when livestock are grazed within the scheme or break into the scheme.

The issues of infrastructure / equipment owned by groups were discussed above, but maintenance of agricultural infrastructure is a more widely experienced challenge. At MRIS, leaks in the canals were frequently cited as a challenge. The members were responsible for minor repairs and cleaning of the canals but government was responsible for major repairs and upgrades. In addition to wear and tear, some community members also made holes in the canals to draw water to gardens lying outside the scheme perimeter. Beyond the need for maintenance of the canals and dams at MRIS, the general lack of compliance with the irrigation scheduling roster and the weak regulatory framework resulted in inequitable water supply, impacting especially on farmers at the tail end of the scheme. This led to KZN DoA actually providing a pump for Blocks 14 and 15 in an effort to address the problem of inadequate water supply.

The discussion about agricultural infrastructure highlighted the need to consider social and human capital. Maintenance of equipment requires some level of skills and availability of labour (human capital), but the effective operation of the infrastructure relies on strong social capital and institutions.

7.7 ACCESS TO MARKET INFORMATION

Market access is another aspect that relies on a combination of both social and physical capital. Farmers need to be part of a network that shares market information (social capital) and yet they generally need some form of physical capital to facilitate the transfer of produce (e.g. roads) and the dissemination of information (e.g. cell phones). These aspects are both explored in this section of the report.

The role of technology for gathering and using information is important. Existing networks, relationships and social capital play an important role in the sharing of information, such as interaction between individuals and groups, producers and markets, producers and extension services. Improved access to communication technology should enhance these networks, thereby facilitating the flow of information. Therefore the role of cell phones, but also possibly internet and email, in enhancing networking and information sharing should be explored.

7.7.1 Willowvale, Eastern Cape

The extent to which agricultural produce was marketed varied substantially between individual producers and production by Ciko and FCP. There were also differences between these two projects. The table below shows the number of individual household farmers making use of the various marketing outlets for their crops. It is clear from this table that the majority of produce was grown for household use rather than for marketing.

Table 7.14 Marketing outlets for various crops grown by individual households at Willowvale, Eastern Cape (N=100), 2010

Selected crops	No of farmers	Hawkers (%)	Whole-salers (%)	Individual consumers (%)	Others (%)	Growing but not marketing (%)
Potatoes	75	5.3	1.3	14.7	1.3	77.4
Spinach	73	4.1	0	15.1	0	80.8
Butternuts	36	5.6	0	33.3	2.8	58.3
Cabbage	79	5.1	0	15.1	1.3	78.5
Tomatoes	35	5.7	0	17.1	0	77.2
Maize	86	2.3	0	8.2	0	89.5

The study revealed that most of these individual farmers would have sold their produce if they had had the opportunity. However, although there is a market for their produce, the problem is low productivity, and support, in terms of access to credit facilities and free inputs from the government, would be needed to meet the market demand. Marketing activities were still mostly limited to supplying hawkers and individual consumers (generally members of the local community). The study shows that only some 25% of potato farmers sold their crop. In the case of butternuts the bulk of farmers who sold them, sold to individual consumers. None of the farmers interviewed marketed any of their crop to retailers.

The projects were more focused on marketing than the individual households engaging in crop and vegetable production. According to interviews, the major aspiration of FCP was to increase production and marketing of crops, as a stepping stone towards full commercialisation of their operations. At the time of the study, produce from FCP was going (or had been going) to outlets beyond the local community. The project coordinator played an active role in approaching potential markets and negotiating prices on behalf of the project – this was the key reason that they were able to access markets, but in reality even these markets were difficult for them to access effectively. Despite the intention to produce for the market at FCP, the study revealed that many local market outlets did not support the project because it could not always meet the market demand. In addition, the farmers in both villages indicated that they had no access to market information and therefore rely on common knowledge. In addition, yield levels at Ciko community project were low, so the local market provided sufficient demand for all their produce. Details of crops grown at Ciko, and the markets for these crops, are shown in Table 7.15.

Table 7.15 Crops grown at Ciko Project during 2009 and respective markets

Crop	Quantity x Units	R/Unit	Total	Major markets
Potatoes	17x10 kg pocket	R35/10 kg	R595	Local community
Spinach	No records	R5/bunch	-	Local community
Onions	No records	R6/bunch	-	Local community
Tomatoes	No records	R5 for 6 to 8 tomatoes	-	Local community
Cabbage	No records	R5	-	Local community
Carrots	No records	R4	-	Local community

FGDs also provided additional information on the challenge of marketing. For example, one of the key challenges mentioned by project members was the lack of contracts with established buyers and fresh produce markets. Respondents also identified the need for farmer training to re-orient their goal towards commodity marketing as a stepping stone for developing agriculture in both communities. In addition, they recognised that their proximity to the towns of Willowvale and Idutywa offered a good market for the produce, and hence saw a need to improve the road transport system in the area.

In respect of access to market information, the study revealed that the majority of the individual smallholder farmers did not belong to community groups or farmers' associations; which made it difficult for them to get access to market information. The group projects had a measure of access to market information through the involvement of the Department of Social Development and Eastern Cape DoA.

7.7.2 Marina, Eastern Cape

The extent to which farmers in the Bizana study area were marketing their produce was explored, as well as the nature of the markets that they supply. This was investigated for both crop and livestock production. This forms a base for some discussion regarding access to market information.

7.7.2.1 <u>Livestock marketing</u>

Table 7.16 below indicates that none of the people who owned cattle were selling them. Some of the households with chickens indicated that they sold them, but only to their neighbours (i.e. the local community). Similarly there was some indication that goat owners sold their goats. Given that these households had relatively small herd sizes, this is likely to have impacted on their ability to / interest in marketing.

Table 7.16 Markets for three common livestock types at Marina, Eastern Cape (n=33)

	Cattle		Goats		Chickens	
Markets	**H.hold No**	**%**	**H.hold No**	**%**	**H.hold No**	**%**
No. of households keeping livestock	*7*		*5*		*27*	
Do not sell	7	100.00	2	40.00	20	74.07
Neighbours	0	0.00	2	40.00	6	22.22
No answer	0		1		1	

7.7.2.2 <u>Crop marketing</u>

The results of the survey are given in Table 7.17, and show that a large proportion of farmers within the study site were not marketing their produce. In terms of bananas, maize and spinach, the percentage of households not selling any produce were 51.52%, 58.62% and 61.11% respectively. This illustrated the subsistence nature of their production systems. The extent to which these households were contributing to their household dietary needs was also of interest. When dietary diversity was explored, the interviewees were also asked what produce was being grown, but not what percentage of the annual household demand was met by household production.

Table 7.17 Markets for three common crops at Marina, Eastern Cape (n=33)

Markets	Bananas		Maize		Spinach	
	H.hold No	**%**	**H.hold No**	**%**	**H.hold No**	**%**
No. of households growing the crop	*33*		*29*		*18*	
Do not sell	17	51.52	17	58.62	11	61.11
Hawkers	9	27.27	3	10.34	5	27.78
Neighbours	14	42.42	5	17.24	5	27.78

Those selling a proportion of their crop sold mainly to the local markets (neighbours), and, to a lesser extent, to hawkers. No other markets were mentioned by the respondents. This clearly illustrates that farmers were not engaging in formal markets and were relying on local demand. During the initial field trip held to introduce the project and obtain some understanding of the study site, there was mention made of some farmers taking taro (*amadumbe)* to Durban to sell as they received a higher price (R80 versus R50 locally for a 20 litre container).

7.7.2.3 Banana marketing

Only 16 of the farmers (48.48%) marketed any of their crop. In terms of markets, nine of the respondents sold to hawkers, while 14 said that they sold bananas locally. The prices obtained for bananas were discussed, in order to understand how they compared with prices obtained at the formal market. The prices of bananas at the Durban FPM are shown in Table 7.18 while Table 7.19 gives the per case price obtained locally by producers at this time. (One farmer provided a price per single fruit (30 cents each), which gave an indication of the nature of the local market). Durban FPM prices ranged from R25-R55 per case, compared to the local prices per case of R35 to R60 / case.

Table 7.18 Banana prices at the Durban Fresh Produce Market in January 2011

	Ripe bananas	**Green bananas**
Medium	R25 to R35	R30 to R35
Large	R30 to R35	R35 to R40
Premium	R40 to R50	R45 to R55

Source: Delta Market Agent – Durban Fresh Produce Market (28/01/11)

Table 7.19 Prices (Rands/case) indicated by respondents

Price/case (Rands)	No. of respondents
R35	1
R40	3
R45	2
R50	1
R60	3

It is clear that a price of R40-R50 obtained locally and without incurring any transport, agent or market fees, was better than prices being paid by the market agents at the Durban Fresh Produce Market[21]. This conflicted with farmers' perceptions as, when asked what their best market would be for

[21] In addition, a field trip was arranged for the smallholder farmers to a commercial farmer at Southbroom as well as the Ugu Fresh Produce Market at Port Shepstone. Both the survey and the field trip have already helped to identify a number of opportunities to be pursued to address a number of challenges faced by the banana farmers in the area

bananas, 5 indicated the Municipal Market, while 6 mentioned supermarkets/shopping centres and 2 mentioned hawkers. It is likely that the challenge of selling locally is that of having insufficient demand for their produce rather than being a problem with prices being paid.

Due to the localised nature of the market, most of the banana farmers indicated that they only made use of wheelbarrows to transport their produce although one made mention of use of a car and another of public transport. Transport was mentioned as one of the factors that would need to be addressed to support their participation in the formal market.

7.7.2.4 Methods of accessing market information

The use of technology to facilitate communication and sharing of information was investigated amongst the farmers at Marina. There was discussion about marketing and the methods used to obtain information about market prices. It emerged that pricing for bananas was determined by farmers as a collective. Local banana farmers met and agreed on the price and then sold at that price. Farmers used prices that commercial farmers used for farm gate sales as a guide. The local market was apparently quite different from formal markets and the Seaview banana farmers' selling prices were lower. Lima also assisted farmers by providing marketing information to farmers, and also linked them to potential markets. In terms of pricing, another farmer said that she did not consult with others in setting prices but set her own prices as she was not in competition with other farmers within the village.

Farmers were asked whether they communicated with markets regarding when their bananas would be ready for marketing and they responded that they generally did not communicate with potential markets, which were mainly limited to hawkers and the local community.

Case study: Marketing of fresh produce by the Amahomba group

The Amahomba group had an arrangement with a hawker who had a bakkie, and who sold produce in Bizana. There were no official sales agreements and an informal system was used. She paid them in cash each time she came to collect produce. Farmers contacted the hawker when produce was ready and sometimes she called them when she was looking for produce. The produce, mainly cabbage, was packed in net bags and loaded onto the vehicle for transport. From an organisational perspective, the volume of produce requested was divided among all the members, with each member harvesting from his or her plot. In this way the benefits were shared equally. This also meant that the people who produced more on their plot could generate more income when others were not able to supply their full quota. The initial price was set by the members, however, the agreed prices was often negotiated down in discussion with the hawker. The Amahomba farmers also sold produce on the roadside through their relatives in the nearby village of Mangweni. Relatives were paid in kind for selling the produce, and the size of their portion was negotiated up front. An attempt was apparently made at one stage by the chairperson of the group to link them up with fresh produce market in Mthatha, but this was not successful. According to the group, their major problem was that they did not get enough market information. Further probing revealed that the group expected the market to provide detailed information on selling prices, transport costs and related information to encourage small scale farmers to supply. However, markets are not equipped to provide the support that small-scale farmers require to enter formal markets. The farmers noted that the cost of getting the produce to Mthatha was too high. In addition, they felt it was risky as they would have to wait for their money and could not be guaranteed a certain price. They preferred hawkers with whom they were able to negotiate face to face. The group said that there was potential to supply formal markets as there was a lot of production in the garden, but mainstream markets were difficult to access and the local roads were very problematic.

Regarding the use of cell phones, one of the banana farmers, who was in his 60s, indicated that he made use of a cell phone and used MTN as it had the best signal. He said that he struggled with technology and his grandchildren assisted him in sending SMSs, mainly to the hawker that he supplied to let him know that produce was ready. Communication was found to be mainly through making calls as a result of the challenge of not being able to send SMSs. He also pointed out that the cell phone had become a very useful tool as it made communication with other farmers and potential buyers a lot easier. One example of this was that he often phoned people whom he knew were in Port Edward buying supplies, to ask them to buy inputs he needed for the farm. He would reimburse them for these purchases on their return. He added that it was also an important tool for arranging meetings. Another farmer with a cell phone did not have electricity, and charged her cell phone at a neighbouring village at a cost of R5 per occasion. She found that the cell phone was useful in communicating with other farmers, but did not use it for marketing, which she did mainly by word of mouth.

Case study: Transport, communication and marketing

One of the more successful banana farmers had an arrangement with a hawker, who came to collect bananas from him. This was an informal market arrangement, but it was reliable. They communicated by cell phone when the bananas are ready for selling. The hawker purchased the bananas at an agreed price, usually R30-R40 per box. The farmer also sold bananas (and other produce that he grew) locally to neighbours and to the nearby school. Depending on the volume of produce that was harvested from the cropping fields, a car was hired for transportation at a cost of R100 per load for transport over distances ranging from less than two and up to ten kilometres. If there was not much produce, family members (grandchildren) fetched it and delivered the produce by hand to nearby clients.

All members of the groups interviewed had cell phones. The ready availability of access to cell phone technology highlights that it could be used as a key marketing and extension-support tool.

7.7.3 Mooi River Irrigation Scheme, KwaZulu-Natal

7.7.3.1 Marketing of irrigated production

As more than 70% of the respondents from MRIS marketed some portion of their produce, access to market price information was explored. Table 7.20 provides an indication of the ease with which scheme members and NSMs (i.e. farmers irrigating outside of the scheme boundaries) accessed market information.

Table 7.20 Access to market price information in MRIS, KwaZulu-Natal in 2013

Scheme-membership	No access	Difficult access	Easy access	Total
Non-scheme member	36 (59.0%)	20 (32.8%)	5 (8.2%)	61
Scheme member	85 (34.6%)	71 (28,9%)	90 (36.6%)	246
Total	**121 (39.4%)**	**91 (29.6%)**	**95 (30.9%)**	**307**

The results revealed that access to market information was not easy for most smallholder producers. About 70% of the farmers indicated that they either had no access or difficult access to market price information. Undoubtedly, where market price information was lacking, information regarding standards and grade requirements was also limited among farmers, since prices are closely linked to quality, grade and standards.

The channels used in accessing market information were investigated, and the results are shown in Table 7.21.

Table 7.21 Importance of various sources of price information to farmers at MRIS, KwaZulu-Natal, 2013

Source	**Never used the source**	**Not important**	**Neutral**	**Important**	**Very important**	**Total score**	**Rank**
Extension officers	228	15	21	37	6	111	5
Print media	279	6	10	10	2	46	9
Electronic media and phones	292	3	7	4	1	102	6
Broadcasting media	263	4	7	27	5	263	**3**
Fellow farmers	76	3	2	75	151	740	**1**
Agricultural traders	206	21	9	43	28	280	**2**
Committee meetings	198	13	15	43	38	210	**4**
Traditional leaders	259	21	19	5	3	80	7
NGOs	276	9	18	3	1	70	8
Private organisations	281	0	18	7	1	40	10

Total score = (Never used x 0) + (Not important x1) + (Neutral x 2) + (Important x3) + (Very important x 4)

Social networks were found to be critical among smallholder farmers at MRIS for accessing price information. This was revealed by the dominance of farmer-farmer sharing of market price information (Table 7.21). Farmers travelled to the neighbouring communities for groceries and for trading their produce. Such visits enabled farmers to gather market information especially pertaining to prices for specific commodities of interest. This information was shared with fellow farmers who might have produced the same commodity and were looking for a market. Again, personal relations and groups help to spread such vital information to other farmers. Information was also spread during block committee meetings that were usually held once a month. It is also interesting to note that broadcasting media was rated as the third most important source of market information.

The opportunity to utilise mobile phones to disseminate market information remains a viable option in MRIS where more than 70% of the farmers either owned or had access to mobile phones, but was very limited at the time of the study. The possibility of using phone messages (SMS) to communicate vital market information (such as prices per unit and/or grade of produce, and possible buyers and their location) has the potential to enhance smallholder fresh value chains.

Weak market support structures (from government and related organisations) affect farmers' production and marketing capabilities. As such, there is a need to improve market information access in MRIS. Given that the majority of farmers indicated that they either had no access or had difficulties in accessing commodity price information, this situation could be addressed by tapping into the mobile network facilities.

7.7.3.2 Marketing of livestock

This study of livestock production systems in the area adjacent to the MRIS showed that livestock play a range of different roles in these households. While some 34% and 38% of cattle and goat farmers had sold animals within the 18 month period prior to the household survey, these were all sold locally, with buyers coming to the homestead to make the purchase. This highlights that, as with the other value chains explored through the current study, the rural livestock sector is characterised by very short value chains.

7.7.4 Synthesis of findings across the three sites regarding access to market information

Access to market information – specifically price information – was found to be a challenge at all the study sites. At Willowvale, individual farmers, who were generally not part of strong commodity associations nor well supported by government departments, specifically highlighted the lack of access to market information. Individual farmers who sold their produce generally sold it locally though some did supply hawkers. The FCP had originally supplied to retail outlets in nearby towns. This was made possible by the presence of a strong project coordinator who approached potential markets and negotiated prices on behalf of the project – even taking samples of produce with him to facilitate these negotiations.

At Marina, the study mainly focused on individual banana producers, but they were members of a commodity group which facilitated sharing of information, and were also supported by Lima. Those farmers who marketed a portion of their crop, sold it within the local community or supplied hawkers. They generally did not communicate with markets. They indicated that they met and collectively decided on prices, basing their prices on the commercial farmers' farm gate prices, with which they were familiar. Some farmers were beginning to use their mobile phones to communicate with hawkers and potential buyers as well as with fellow farmers. This was similar for the farmers at MRIS. Mobile phones were common assets at MRIS and had the potential to facilitate access to market information, but this was still fairly limited although examples were encountered during the study. It was interesting that fellow farmers were perceived to be the most important source of information about market information, highlighting the importance of personal relationships and participation in groups. Travel to neighbouring communities was also cited as a mechanism for gathering price information. It was evident that price negotiations take place with hawkers who are purchasing produce and sometimes result in farmers selling at prices lower than those agreed to collectively.

The investigation of access to price information clearly demonstrated that while physical support structures such as mobile phones and road infrastructure play a role in accessing market prices, it is social capital that has the greatest impact – not only the relationships with support organisations, but also the social networks that exist locally.

7.8 APPLICATION OF THE NIE FRAMEWORK

Jordaan and Grové (2012) applied Williamson's framework for NIE to a number of case studies involving smallholder enterprises. They used this framework in combination with the Structure-Conduct-Performance method of analysis. The NIE framework developed by Williamson (2000), which talks to social embeddedness, institutional environment and governance, was seen to be relevant to the addressing the objectives of the current study. Thus, although the primary framework for analysis of the findings was the SLF, an overall analysis of the findings from the three study sites was undertaken in terms of the NIE framework. While the analysis undertaken by Jordaan and Grové (2012) was of a quantitative nature, the application within the current study is qualitative.

As a start it is worth clarifying that the framework is used as a mechanism for investigating the factors that affect transactions between farmers and market actors.

Level 1: Social embeddedness

Social embeddedness involves the overlap between social and economic ties within and between groups, organizations and communities, etc. (Granovetter, 1985). In the current study, social embeddedness was considered to be the customs, traditions and societal norms within which farmers are operating. Social embeddedness reflects the existence of social capital, which includes both structural (participation in formal networks and organisations) and cognitive (the levels of trust and the relationships with others in the community) elements.

Level 2: Institutional environment

The institutional environment comprises the “rules” that govern farmers’ activities. The institutional environment consists of formal institutions (land tenure arrangements, standards and market requirements) and informal institutions such as traditions and customs.

Level 3: Governance structures

The term ‘governance structures’ in the context of the current study, refers to the organisation of transactions, such as market transactions between farmers and market players. Transactional environments can vary along a continuum from spot / cash markets to vertical integration. A spot / cash market is characterised by short-term relationships, opportunism and limited sharing of information, while vertical integration is characterised by long-term relationships, open information sharing and shared benefits. Between these two extremes are specifications contracts, which involve slightly stronger relationships between market players (Peterson *et al*., 2001). Although there is more cost associated with establishing contracts than engaging in spot markets, this is offset by the benefits of greater stability and longer-term relationships.

Level 4: Resource and labour allocation

Resource allocation can be assessed separately for the production aspects and the marketing aspects of the enterprise. The assessment of the enterprise considers the efficiency with which resources are used (production efficiency) and the efficiency with which income is generated from a given quantity of produce (marketing efficiency).

The key findings of the research at the three sites that relates to these four levels are summarised in Table 7.10 below. The purpose of this analysis is to consider the way in which the NIE framework draws attention to socio-institutional factors that can impact on a farming enterprise.

Figure 7.10 Application of NIE to the current research findings, with a particular focus on transactions between farmers from Willowvale, Marina and MRIS sites and various market players

NIE Level	**Application of the framework to the research findings**
Social embeddedness	This is closely linked to social capital. In some instances, farmers at both Marina and MRIS saw each other as competitors rather than identifying opportunities for cooperative action that would address challenges related to transport costs, small volumes of produce, etc. The breakdown in trust between the FCP project and the local community over purchases on credit also impacted on their ability to move produce locally. The lack of networking between the two projects at Willowvale was another gap identified. The relationships that farmers at MRIS have with input suppliers have been strengthened through the willingness of input suppliers to assist the farmers to solve the problems of pests and diseases. The commercial banana farmers from southern KZN have established a strong and functional structure that assists with marketing but also allows for sharing of knowledge and experiences. This is another case of strong social capital.
Institutional environment	The rules affecting farming operations include rules imposed by projects (i.e. their constitution), rules imposed by the organisations that support them (e.g. DoSD deciding for what purposes funding can be used), rules imposed by traditional authorities, legislation that impacts on marketing, standards that must be met when marketing (e.g. GLOBALGAP). For example, smallholder banana farmers at Marina must meet certain standards for their bananas to be accepted by KNBC.
Governance structures	The governance structures related to transactions involving smallholders at the three sites were generally weak. At both Willowvale and MRIS, there had been past experiences of contractual arrangements being established with markets (retail outlets and government institutions respectively), which could have provided market stability, and yet these arrangements had failed for various reasons. Although some farmers had informal relationships with specific hawkers, these were largely cash markets with very little scope for farmers to negotiate for higher prices for their produce. At MRIS and Marina, there were examples of farmers collectively setting prices for their produce even though they were not selling collectively. Some spot markets were particularly unattractive to farmers. For example: neither prices, nor certainty of selling, are guaranteed when produce is sold through a MFPM. In addition, market suppliers are only paid after some time. As a result, farmers preferred dealing with hawkers / bakkie traders who effected an immediate transaction.
Resource and labour allocation	A number of situations impacting on both physical and marketing efficiency were identified through the study.

NIE Level	Application of the framework to the research findings
	The quality of the produce was sometimes compromised because of production practices, so this provided an opportunity for farmers to improve their production efficiency. At Marina, trials with banana farmer demonstrated that the effect of using fertilizer could be enhanced by mulching. There was low marketing efficiency at FCP in Willowvale as the poor road infrastructure hindered transportation of produce, which in turn sometimes resulted in produce spoiling in the field and generating no revenue. At MRIS, hawkers complained that farmers did not sort their produce properly. The hawkers saw this as the farmers attempting to force them to take all their produce, and the result was that the farmers were paid less for low quality produce.

7.9 SUMMARY AND RECOMMENDATIONS REGARDING SUPPORT SERVICES AND INFRASTRUCTURE

The discussions with farmers and other stakeholders at the three sites revealed the importance of considering the existing or lacking social and physical support structures when seeking to strengthen agricultural production and bring smallholder farmers into the mainstream economy. Social capital includes relationships between farmers and other actors, as well as the relationships that farmers have with each other, and with the broader community and local structures.

Training and mentorship also rely on strong social capital. This includes not only the relationships that exist with support organisations (known as transformative structures as they can transform the levels of capital available to farmers), but also relationships between farmers, which allow for transfer of knowledge and experiences. The establishment and support of commodity groups undertaken by Lima was an example of an intervention that had improved interaction and exchange of information between farmers.

The study showed the importance of strong and functional committees as well as other structures such as traditional authorities. Such structures provide a strong regulatory framework which can address issues such as uncontrolled movement of livestock, equitable distribution of water within an irrigation scheme and the like.

The spectrum of physical capital was explored. It ranged from farm assets owned by households (e.g. hand hoes), communication-related assets that could provide access to information (e.g. mobile phones) and equipment and machinery (ownership was often limited to projects or farmers hired machinery such as tractors and implements from support organisations such as municipalities or department of agriculture). Consideration was also given to transport infrastructure (vehicles and roads), marketing infrastructure (e.g. electricity, potable water, storage facilities, market stalls or processing facilities) and agricultural infrastructure such as irrigation infrastructure (e.g. canals) and fencing.

One of the biggest challenges in terms of physical support structures was the poor condition of road infrastructure – access as well as infield roads. This was highlighted as a challenge by farmers as well

as traders. Bad roads increased transport costs for conveying inputs and produce, and in some cases actually destroyed potential market relationships.
The linkages between social and physical capital were also highlighted. For example, there is little value in providing a group of farmers with physical infrastructure if they are not able / willing to reach consensus on operating and maintaining it. Such joint decision making requires social capital. Another example of a linkage involved the hiring of bakkies to transport goods to town for selling on the roadside. It was found that bakkie owners favoured their friends. Many such relationships impact on agricultural production.

Lack of access to market information was cited as a problem by the farmers at all three sites. To some extent this can be addressed by physical support structures (e.g. mobile phones), but it also requires relationships to be established with organisations or individuals that are able to provide such information. It was interesting that fellow farmers were recognised by MRIS farmers as the most important source of market information.

Some recommendations have emerged from the study as mechanisms for bringing smallholders into the mainstream economy, or at least allowing them to increase production beyond subsistence levels:

- Development agents need to recognise the interplay between different forms of capital – physical and social capital in particular, but also interplay between physical capital and human capital (i.e. do people have the necessary skills to maintain the pump) as well as financial capital (i.e. do they have the resources to repair the pump if it breaks). Government supports the establishment of cooperatives as a vehicle for achieving development. However, attention must be given to strengthening the institutional arrangements and the relationships between cooperative members so that they function effectively.
- Key challenges have to be addressed by support agents otherwise all other investments are fruitless (for example, the lack of maintenance of the access road to FCP ultimately negated the benefit of any of the other support provided).
- Support agents should recognise the importance for assisting farmers to establish and nurture relationships with different actors such as input suppliers and markets.
- Infrastructure upgrades of projects should be accompanied by interventions to address institutional challenges (i.e. build social capital).
- Where different actors are supporting the same group of farmers, clear division of roles and responsibilities is essential.
- Given the challenges that most smallholders face in terms of access to resources including household assets as well as general infrastructure, it is unlikely that they will be able to duplicate the systems used by large-scale commercial farmers and alternative approaches need to be identified. Alternative approaches are needed to address gaps in social and physical support structures. Some examples include, but are not limited to:
    - Encouraging the use of draught power where appropriate (e.g. when there are delays in accessing tractors).
    - Encouraging water harvesting and conservation practices as alternatives to capital intensive irrigation systems which are not viable for individual smallholders.
    - Pilot systems where mobile phones are used to disseminate market information.
    - Coordinate farmers and subsidise local vehicle owners to facilitate marketing and reduce production costs.
- Support organisations should consider making use of existing platforms or establishing new structures that allow for interaction of different stakeholders. This could be an effective mechanism for addressing a range of challenges that are impacting negatively on smallholder production. It can also ensure clarification of the roles and responsibilities of the different actors.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

The current study aimed "to analyse the economical beneficial water use in rain-fed and irrigated agricultural food value chains towards integrating subsistence and emerging farmers in the mainstream of the economy". The study had six specific objectives, namely (1) to assess water allocation reform, land reform and water for economic growth and development strategies and to expand the existing literature study on the role of water in the food value chain; (2) to identify, motivate for and select study sites in rain-fed and irrigated farming areas; (3) to empirically investigate the aspirations and needs of human capital; (4) to identify, map and empirically investigate appropriate food value chains in relation to water as a production input; (5) to analyse and describe collective and individual use of water resources for crop and animal production in relation to collective and individual marketing and (6) to analyse and describe the existing support structures of physical and social capital within food value chains. Within each of the specific objectives, there were a number of sub-objectives that the study undertook to address.

Overall the sites selected, and the methodology followed, ensured that the specific objectives were met. Sub-objective 2.2 was the only one not fully addressed, as none of the selected sites were land reform initiatives. However, the choice of sites did provide a microcosm of the settlement patterns within communal tenure areas (i.e. areas where betterment planning was implemented versus more scattered settlements), and associated access to infrastructure.

In addition to achieving the project objectives, some additional activities were undertaken, mainly at Marina. This included facilitation of linkages between smallholder farmers and commercial banana farmers, implementation of on-farm trials to investigate interventions with the potential to improve banana production (especially improving water use productivity), and collaborative exploration of the commercial banana value chain as facilitated by the Ugu Fresh Produce Market. The detailed work on evaluating the productivity of water use across the MRIS was also not originally anticipated, but was seen to complement the exploration of social and institutional factors impacting on the functioning of the irrigation scheme.

A consideration of the different forms of capital available to smallholders showed that their participation in the mainstream economy is limited by a range of different factors. These include a lack of physical capital (infrastructure as well as machinery), a lack of human capital (skills and ability to do work) and a lack of social capital (especially in the case of activities such as irrigation schemes that require coordination and compliance if they are to be successful). In many cases, there are strong linkages between different forms of capital. For example, linkages with markets constitute a form of social capital, but without good roads to allow for the transportation of produce (physical capital), these linkages soon break down. Furthermore, the ability to engage with markets and negotiate prices requires human capital. Underlying all this is the need for access to natural capital – especially water and land. However, even with land and water, the success of farmers is undermined if the access to the water is affected by a lack of social capital.

Human capital deficits related to skills and knowledge as well as the ability to do work should be addressed. Specific skills gaps such as irrigation water management and business skills should be addressed appropriately. In general, agricultural development programmes need to recognise the value of existing human capital as well as its limitations. Interventions should be varied to suit people's objectives, available resources and aspirations, with the understanding that in communal areas, households adopt diverse livelihood strategies and have multiple objectives with regard to their farming activities. While farmers may strive to be more market oriented, the importance of also meeting household food needs should not be underestimated. Classifying farmers and their activities according to typologies allows organisations working with farmers to develop programmes that are suited to their objectives and resources. Marketing of produce within local communities should also be seen as an effective first step, as it overcomes the challenge of transporting produce to outlets further away. Steps should be taken to consider how farmers can meet local needs (e.g. through diversifying production) until the local market is no longer able to absorb production.

For all commodities, the value chains were very short and often involved selling produce directly to members of the local community, or to hawkers who then sold it on to the final consumer. Overall, very little use was made of formal markets, such as fresh produce markets or auctions, for a range of reasons. Generally they were not accessible and the farmers could not compete with large-scale producers. Sometimes farmers' products are not of a standard that allows them to supply higher paying markets and thus they resort to what appear to be sub-optimal decisions, such as selling to hawkers. This may, in fact, be the best decision possible and for this reason it is necessary to have a thorough understanding of what markets require and what smallholder farmers are able to produce (Jordaan and Grové, 2012). There was almost no value adding or processing encountered except for a limited amount of banana ripening by smallholders at Marina and very limited cooking of green mealies at WIllowvale. The lack of value adding (for example the washing of potatoes at Willowvale as a requirement for selling potatoes to retail outlets) was the result of a lack of knowledge as well as the lack of suitable processing infrastructure – including potable water.

Water was a key input in all the value chains encountered. In livestock, water use was largely restricted to drinking water, but was also used in dipping facilities. Drinking water for livestock was frequently highlighted as a limiting factor, especially in the Msinga area. Here the irrigation canal not only supported vegetable and crop production but also provided a water source for livestock. For the Willowvale and MRIS sites, irrigation water was a key input for the production of the various crops. The farmers were very aware of the role of water – and the challenges associated with the equitable provision of water. At Marina, where bananas were generally grown under dryland condition, a number of small-scale producers highlighted the limitations of dryland production and some use of mulching was already being practiced as a mechanism for retaining soil moisture. The commercial farmers in southern KZN highlighted that dryland production of bananas was too risky and were largely in the process of converting to irrigated production.

The study clearly demonstrated a range of opportunities and constraints that small-scale farmers face when accessing various markets. As a result of a general shortage of resources for purchasing inputs coupled with a lack of technical skills and business acumen, many farmers are not able to participate in mainstream markets that have stringent standards (e.g. hygiene, traceability of produce, etc.). The lack of packing facilities, limited scale of production and the lack of access to transport are some factors that constrain the participation of small-scale farmers in mainstream value chains. Despite this, there are some value chains that small-scale farmers have effectively claimed, such as green mealie production. These are value chains where farmers have the skills necessary to produce a good quality product and where systems have developed that have allowed them to market their produce effectively. Furthermore, these are value chains that have developed spontaneously without being artificially facilitated by outside parties. They demonstrate that small-scale farmers can effectively engage in market-oriented production. Perhaps it is important for small-scale farmers to find opportunities that are not in direct competition with large-scale commercial farmers. Given the challenges that most smallholders face in terms of access to resources including household assets and general infrastructure, it is unlikely that they will be able to duplicate the systems used by large-scale commercial farmers, so alternative approaches need to be identified.

The extent to which small-scale farmers engage in collective or individual action to access or utilise land and water resources, acquire inputs (including access to machinery and labour) and market their produce, was found to be highly variable. Some informal groupings of people were identified. These were generally formed between small groups of people who had relationships of trust and the common aim of reducing costs – for example by pooling produce to reduce transport costs. A number of groups had formed because they recognised that it was a requirement for accessing funding through government. The extent to which the members of these groups engaged in collective and individual action was also variable. Some small-scale farmers who were interviewed highlighted that the costs of collective action outweighed the benefits and therefore they preferred to operate individually. The best example of collective action was displayed by the commercial banana producers, but this highlighted the supportive environment and capacity necessary to ensure that the collective action yields the anticipated benefits. Their behaviour might, in fact, result from the negative impacts of not being part of this collective action, which could severely hinder their production and marketing, putting their enterprises at great risk. There is a possibility that if smallholders were faced with greater risks (for example having to pay back credit), they might be forced to consider collective action. Some of the challenges that limited effective collective action among communal smallholder farmers included the erosion of traditional institutions, loss of social capital and lack of organisational capacity. It is possible that the lack of collective action resulted from a lack of perceived incentives for collective action, as the opportunity to access state funds was often the overriding reason for establishing cooperatives. Together, these factors resulted in poor cooperation between producers. Policy and implementation of agricultural support and development projects were not taking adequate cognizance of these challenges and the existing policy was not achieving the objectives of smallholder farmer development, namely commercialization and entrepreneurial development.

One key aspect affecting the functioning of groups was the level of governance and leadership of the decision-making body, often a committee. With the MRIS, the lack of governance was largely responsible for the poor distribution of water between the upper and lower blocks. The effective management of an irrigation scheme of this nature requires compliance with rules imposed by the scheme and block committees – not only for operating the scheme but also for cleaning and maintaining it. This same issue was found to affect the functioning of many of the smaller groups encountered throughout the study. The groups that had engaged effectively in collective action had generally been successful with limited support from government and were characterised by good organisational development and a common purpose with mutual benefits. The lessons learned from these successes should be shared with support agencies as well as farmers, to build capacity to support farmer development.

Strengthening smallholder production and integrating producers into the mainstream economy also calls for collective action involving multiple stakeholders. Multi-stakeholder innovation platforms have recently been recognized as effective mechanisms to facilitate the engagement of different stakeholders in solving the challenges of small-scale farmers. Such a platform would also address the need for improved coordination of stakeholders and clarification of roles and responsibilities.

In general, development agents need to recognise the interplay between all the different forms of capital, not only physical and social capital, but also human capital (i.e. do people have the necessary skills to maintain the pump) and financial capital (i.e. do they have the resources to repair the pump if it breaks). Support agents should recognize the importance for assisting farmers to establish and nurture relationships with different actors such as input suppliers and markets. Lastly, the diversity of subsistence and smallholder farmers needs to be understood and appreciated when developing support programmes or drawing up policies. Different categories of farmers have different aspirations and face different challenges (consider the typology developed through this study which differentiates between “non-market oriented” and “market-oriented” smallholder farmers). Not all smallholder farmers are market-oriented and formal food value chains are not always the most feasible options for smallholders, even when they are market-oriented. Careful evaluation of the economic viability of different options, together with an understanding of the requirements of a particular food value chain, is essential if farmers are to be effectively supported.

8.2 POLICY AND MANAGEMENT RECOMMENDATIONS

In order for smallholder farmers to play a larger role in commercial, market-oriented value chains and benefit from additional markets as well as a part of the returns resulting from value addition, some possible recommendations have been made based on this study. The recommendations that have emerged from the study require consideration by policy makers as well as decision makers.

Effective monitoring and evaluation (M&E) of government programmes is essential. This should include critical assessment of whether the intended benefits are being achieved. Where this is not occurring, steps should be taken to ensure that challenges are addressed. For example at Willowvale, substantial investment in projects was made by DoSD but in the long term the impact was much lower than originally envisaged. M&E should be the role of the organisations directly supporting particular projects, but the involvement of the local municipality, as well as a local project steering committee representing the community and other key stakeholders, is also recommended.

Provincial Department of Agriculture extension officials need to have a less technical, more socio-institutional approach to dealing with agricultural projects. Both aspects are important but the latter does not receive adequate attention. For example, at MRIS, insufficient attention has been given to the non-technical factors impacting on the distribution of water to scheme members. Overall, there is a need to strengthen extension services in terms of both technical and non-technical capabilities. For example, smallholder producers need more effective support regarding their production aspects as well as marketing and financial management. Where the capacity does not exist within Extension, steps need to be taken to establish links with organisations that can provide this support. It is also necessary to develop the capacity of smallholder farmers (skills and knowledge) to access and adopt improved farming practices and to be able to respond to opportunities to increase their returns. The low levels of literacy amongst many smallholder farmers need to be considered when designing capacity building programmes.

Provincial DoA, and other organisations proving technical support to farmers, must consider the use of alternative extension methods, such as farmer-to-farmer sharing, to reduce reliance on government extension and NGOs. Farmer experimentation is another means of building the capacity of smallholders to develop and test interventions instead of always waiting for assistance from outside.

Given that government supports the establishment of cooperatives, there is a need to support collective action outside of primary production. For example, farmers should engage in collective marketing and input acquisition and this may require some support from Extension officials. Alternative models for cooperatives should be sought as the current model is not having the anticipated impacts (e.g. the cooperatives established at MRIS are not engaging effectively in collective action as the main reason for forming the cooperative was so that the KZN DoA could provide them with fencing and a pump).

Programmes must consider the heterogeneity of smallholders in their design and implementation. Importantly, it must be recognized that most smallholder farmers rely on multiple income sources and often have multiple goals, as they produce both for own consumption and to generate revenue.

In order to improve water use productivity, rainwater harvesting and conservation techniques should be promoted as alternatives to the conventional production practices that are currently supported. At MRIS, rainwater conservation through activities such as mulching might be a way of ensuring better use of available water given the current challenges. At irrigation schemes, members require training in irrigation scheduling, as well as access to the necessary equipment, to improve crop production efficiency.

Since the data from smallholder communal irrigation schemes are particularly unreliable in terms of quantity of water used and the cost of capital, water metering should be introduced during the current revitalisation and rehabilitation programmes to address the concern of suboptimal use of water. Improved information on how much water farmers are using will help farmers, WUAs and DWA to have a better and more accurate monthly usage and be able to effectively manage the water resources in the long-run.

Value-adding and marketing must be supported rather than retaining a focus on primary production. Again this may require the development of a new set of skills for extension staff. For example, at FCP, farmers did not have the knowledge about washing potatoes in order to sell a better product, and did not know where they could source the necessary chemicals.

Poorly maintained road infrastructure (such as at FCP, and for homesteads at Marina not located along the main road) has a strong negative impact on smallholder production, making it costly to acquire inputs as well as to market produce. Infrastructural development and maintenance should also include cell phone infrastructure, potable water for processing needs and the supply of electricity.

Marketing ventures between farmers in the same area (e.g. the projects at MRIS, or the scheme members at MRIS) need to be coordinated to enable effective planning and cooperation in meeting their market's requirement for a consistent supply of produce.

The provision of agro-processing infrastructure (such as equipment for grading produce and storage facilities) could make a significant impact on smallholder production (especially for vegetable production where not of the value adding benefit accrues to the smallholders). Besides the supply of equipment and infrastructure, attention to regular maintenance and servicing, especially of irrigation equipment, is also essential.

Some challenges can be seen as composites, comprising both technical and socio-institutional aspects. For example the inequitable distribution of irrigation water across the scheme is one of the key factors constraining production at MRIS. To a large extent, this is a socio-institutional challenge rather than a technical one. However the social aspects cannot be addressed until the available volumes have been determined more accurately and an understanding reached of what sort of crops / cropping systems can be grown successfully.

Systems that involve tractors owned and managed by government departments and municipalities are notoriously ineffective and result in delays in land preparation. Therefore consideration should be given to alternative solutions, such as supporting private tractor owners so as to improve their service (e.g. through access to improved equipment) or provision of support to households with draught power. Such systems are likely to be more effective and would build local capacity within the target communities.

Cooperatives established through various government departments should be supported to ensure that the benefits to farmers are not limited to the provision of funds and equipment such as pumps. The cooperatives need institutional strengthening as well as assistance with procuring inputs collectively and marketing their produce.

Sometimes one factor (such as the poor access road at FCP in WIllowvale) results in the collapse of a project that had the potential to create employment and income generation opportunities. The Local Municipality needs to play a more active role in coordinating the services of the different line departments to ensure that such challenges are effectively addressed.

In many cases there are different government departments supporting a particular project (at WIllowvale these were Eastern Cape DoA and DoSD, while at MRIS these were DWA and KZN DoA). There is often a lack of clarity regarding the roles and responsibilities of these different government departments, for example, should DWA be establishing cooperatives or is this a role of the Provincial DoA? Suitable forums should be established to facilitate interaction and communication between government departments and other key stakeholders.

Farmers at all sites in the current study lacked record keeping capabilities. Good record keeping is essential to monitor progress and evaluate the impact that development programmes are having on the livelihoods of the beneficiaries. It is also necessary for farmers to be able to determine whether specific enterprises that they engage in are actually profitable – or whether they should pursue other options.

Smallholder farmers need to decide whether to continue within their current value chains and rely on selling to hawkers, traders and the local community, or whether to participate in the formal value chain. This applies particularly to the banana farmers from Marina, Eastern Cape. While the smallholder banana value chain is able to absorb their produce and little wastage is encountered, this is probably the best route. However, it appears that the smallholder system does not allow for much expansion of production, which limits the entrance of new growers as well as the expansion of current growers. Critical decisions require the assistance of support agents who can compare the costs and benefits of making such changes. Similarly both government extension staff and NGO field staff need to work with farmers to determine the viability of different enterprises so that farmers have the necessary information to make meaningful decisions regarding crop mixes.

Smallholder farmers could still benefit from a low external input system that yields less but has lower costs, as long as it can be tweaked to provide a product of adequate quality. Such systems pose less risk for the farmers than high input systems which require farmers to obtain credit to purchase inputs and cover other operating costs. Even with low risk systems, support in terms of technical expertise and access to inputs would enhance the profitability of smallholder producers, even if they continue to supply their current markets.

Effective linkages between smallholders and commercial farmers should be facilitated wherever possible by extension staff or other organisations supporting farmers, for example in the case of the banana farmers at Marina. Although commercial farmers are often perceived to provide unfair competition to smallholder producers, the commercial sector can, in some instances, provide access to technical expertise as well as access to markets and such arrangements should be sought. The introduction by government of incentives / disincentives to encourage agents at MFPMs to provide appropriate support and service to smallholders could facilitate their participation in formal value chains.

The successful future of smallholder or emerging farmers lies in holistic and broad-based developmental approaches encompassing the whole cycle of production, storage and marketing of produce.

8.3 ISSUES FOR FURTHER RESEARCH

The outcomes of this research project have led to the identification of a number of research needs / gaps, which are presented below:

- Participatory action research to address some of the socio-institutional constraints faced by smallholder farmers would be useful. Pilot studies of possible solutions might be necessary. One such example is investigating different mechanisms for managing the distribution of water at MRIS. This could include testing the introduction of a water levy, which has potential to incentivise farmers to use water more productively. It might also encourage equitable allocation across the scheme as farmers paying for water would expect to receive it. Another intervention could be to promote institutional development through more effective participation in decision making structures and engagement at meetings.

- The physical capacity of the MRIS (and other such schemes) to meet farmers' needs should be investigated, so that the findings can be used to inform future planning for the scheme. It may be necessary to consider alternative crop mixes, or possibly the introduction of infield water harvesting and conservation measures to improve water use and crop production.

- The use of mobile phones to distribute information to farmers and facilitate collective action between farmers should be explored.

- The current policy environment appears to be supportive of smallholders. However, an assessment of government programmes aimed at supporting smallholders should be undertaken to determine the real impact of these interventions and the factors constraining them. This could feed back into policy development and planning. Opportunities to test the outcomes of policy implementation (such as DWA's support to small-scale irrigation farmers) should be identified through engagement with government officials.

- The process of registering smallholder irrigation projects / schemes as water users is a challenge, especially where it requires the integration of smallholders and commercial farmers. An investigation of successful cases should be undertaken so that lessons should be drawn from them to inform the process in other areas.

- Cooperatives are the structures chosen by government to develop smallholder farmers. A study of successful models from southern Africa should be undertaken to inform current programmes as most collective action is only undertaken to access funding and most cooperatives are not functioning optimally. Research should also consider alternative models for developmental activities in communal tenure areas.

- Water use in both rainfed and irrigated farming systems should be explored in more detail to gain a better understanding of the volumes of water currently used and the possibilities of improving water use productivity. In addition, simple methods for measuring the efficiency of water use within irrigated farming systems should be developed.

- The use of principal component analysis to generate farmer typologies should be explored, as this methodology enables the aggregation of farmers with similar characteristics. A more detailed typology would allow for a clearer picture of the types of challenges faced by different categories of farmers. It might also be possible to identify the types of farmers most likely to engage in collective action.

- A better understanding of water use productivity is necessary in South Africa. One way of addressing this is to develop and test economic models for evaluating water use productivity in different production systems in South Africa, considering specifically food and nutrition security, labour requirements and broader landscape benefits (.e.g. water regulation, reducing pollution from agrochemicals and reduced erosion / sedimentation).

- The values of agricultural water vary significantly due to various factors. In order to achieve both social and economic efficiency there is need to generate better data and knowledge of demand behaviour by season, region, climatic and technological conditions under which water is used. The data can then be used in economic models for evaluating water use productivity in different systems.

- It would be useful to obtain a better understanding of dietary diversity of rural communities and the costs of feeding households as well as the direct contribution of current farming production to meeting household needs. This would allow for the quantification of potential household savings that could be achieved by substituting purchased foods with home-grown foods.

- Another aspect that requires additional research is the issue of security of tenure and the effect that lack of security is having on farmers' interest in participating in formal food value chains. This includes the situation where unfenced crop lands are allocated to a household and yet in winter become an open access resource that can be used by all livestock owners.

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APPENDIX 1: AGRICULTURAL COMMODITY TRADERS

Name of Business	Ownership	Location	Nature of Business	Agriculture Commodities being traded	Contact person	Contact numbers
Ndubs	Private (CC)	Willowvale	Fruit & Vegetable Shop	All product ranges	Mr Marios	0836869733
Kwamadyasi	Family	Willowvale Dutywa Butterworth	Retail	All product ranges	Enock	0474991238 0730804064
Boxer Super Stores	Private Limited	Dutywa	Retail	All	Mr Sangqu (Manager)	0474891005 0835135124
Foodtown	Family	Dutywa	Retail	All products	Manager	0474892149
Ngumbela			Fruit & Veg Shop			
Spar	Pvt Limited	Dutywa	Retail	All products	Manager	0474891173
Super-Spar	Franchise	Dutywa	Retail	All products	Mr Zola	0733561532
KK Supermarket	Family	Willowvale	Retail	All products	Nomtha	08339929638
Super-Spar	Franchise	Butterworth	Retail	All products	Mr Mlenga	0720757138
Willowvale Hotel/Mega Save/Frozen	Family	Willowvale	Retail, Butchery, Hotel	All products	Steven Andre	0731151134 0832848988 04774991031
East London Municipal Market	Municipality	East London	Fresh Produce market	All products	Market Master – Mr Mfunyunyu	0437059506
Martin & Scheepers	Agency	East London	Market Agency	All products		0437451652
Border Farmers	Agency	East London	Market Agency	All products		0437451936
Subtropico	Agency	East London	Market Agency	All products		0437451227
AA Market Agency	Agency	East London	Market Agency	All products		0437451467
Georges	Family	Dutywa Butterworth	Fruit & Vegetable Shop	All products		
Spargs	Pvt Limited	Butterworth	Supermarket	All products		
Emsengeni	Family	Willowvale	Wholesale	All products	Mr Cousins	0474991305
Butterworth Fresh Produce Market	Family	Butterworth	Fresh produce market	All products	Robert Mike	0474914294
Fruit and Veg Shop	Family	Willowvale	Fruit & Veg	All products		
PicknBuy	Family	Willowvale	Supermarket	All products	V. Mbonjeni	0739662865
Meat Centre	Private	Dutywa	Supermarket	Meat products	V. Msweli	0760231300

APPENDIX 2: FARM GROSS MARGIN FOR GREEN COBS

Activity	**Units**	**Quantity**	**Price/unit**	**Total /0.1 ha**	**Total /Ha**
Total Irrigation Area (ha)	Ha	0.1			1
Yield	Cobs	5000			
Marketable Yield (approx 50%)	Cobs	2500			
Gross Income (R) (@R10 for 5 cobs)	**Rands**	**2500**	**2**	**5000**	**50000**
Labour and Machinery Usage					
Ploughing (@R150/ha)	Tractor	0.1	150	150	1500
Gap Filling	labourdays	0.3	30	9	90
Removing Suckers	labourdays	0.3	30	9	90
Harvesting	labourdays	14	30	420	4200
Planting	labourdays	0.3	30	9	90
Irrigation labour	labourdays	15	30	450	4500
Irrigation Repairs	labourdays	2	30	60	600
Weeding	labourdays	4	30	120	1200
Basal Fertiliser(2.3.4)	labourdays	0.3	30	9	90
Top dressing fertiliser(Urea/LAN 28)	labourdays	0.3	30	9	90
Herbicides (Sulton)	labourdays	0.3	30	9	90
Pesticides	labourdays	0.3	30	9	90
Insecticides	labourdays	0.3	30	9	90
Total				1272	12720
Input Costs				0	0
Seed(@2 kg/0.1 ha)	2 kg	1	150	150	1500
Basal Fertiliser(2.3.4)	50 kg	0.5	366	183	915
Top dressing fertiliser(Urea/LAN 28)	50 kg	0.5	301	150.5	752.5
Water	Litres		0	0	0
Total				483.5	3167.5
Marketing					0
Market information and taking samples to market	Trips	2	50	100	1000
Product transportation	Trips	3	300	900	9000
Packaging		0	0.2	0	0
Commission				0	0
Sub-Total				**1000**	**10000**
Total Variable Costs (TVC)				2756	25888
Gross Margin above TVC				**2245**	**24113**

APPENDIX 3: FARM GROSS MARGIN FOR CABBAGES

Cabbage Gross Margin Budget (Irrigated):					
Activity	**Units**	**Quantity(0.1 ha)**	**Price/Cost per Unit**	**Total Values (0.1 ha)**	**Total Values/Ha**
Total Irrigation Area (ha)	ha	0.1			1
Yield (Heads)	Heads	1500			
Gross Income (R)	**Rands**	**1500**	**5**	**7500**	**75000**
Labour and Machinery Usage					
Ploughing (@R150/0.1 ha)	tractor	0.1	150	150	1500
Ridging (@R100/0.1 ha)	R	0.1	100	100	1000
Harvesting	labourdays	14	30	420	4200
Planting	labourdays	3	30	90	900
Irrigation	labourdays	15	30	450	4500
Irrigation maintenance (Labour)	labourdays	2	30	60	600
Weeding	labourdays	4	30	120	1200
Basal fertiliser (2:3:4)	labourdays	0.3	30	90	90
Top-dressing fertiliser (LAN 28)	labourdays	0.3	30	90	90
Herbicides (Salton)	labourdays	0.3	30	90	450
Pesticides	labourdays	0.3	30	90	450
Insecticides	labourdays	0.3	30	90	450
Total				**1840**	**15430**
Input Costs				0	0
Seedlings (1500/0.1 ha)	seedlings	1	415	415	4150
Seedling transportation (From Greytown)	hire	1	300	300	300
Basal Fertiliser(2.3.4)	bags	0.5	366	183	1830
Top dressing fertiliser (LAN 28)	bags	0.5	301	150.5	1505
Herbicides (Salton)	litres	0.1	210	210	2100
Pesticides (Decis Forte)	litres	0.04	500	500	1000
Aquastick	mls	0.05	200	200	2000
Agrochemical transport		1	100	100	100
Water			0	0	0
Irrigation Fuel (26days @8 litres/day)		0	0	0	0
Total				**2058.5**	**12985**
Market information and taking samples to market	trips	4	100	400	400
Product transportation	trips	3	300	900	9000
Packaging		0	0	0	0
Total				**1300**	**9400**
Total Variable Costs (TVC)				**5198.5**	**37815**
Gross Margin above TVC				**2301.5**	**23015**

APPENDIX 4: FARM GROSS MARGIN FOR TOMATOES

Activity	Units	Quantity (0.1 ha)	Price/Cost per Unit	Total Values (0.1 ha)	Total Values/Ha
Total Irrigation Area (ha)	Ha	0.1			1
Yield (Heads)	Crates	80			
Gross Income (R)	**Rands**	**100**	**120**	**12000**	**120000**
Labour and Machinery Usage					
Ploughing (@R150/0.1 ha)	R	0.1	150	150	1500
Discing (R150/0.1 ha)	R	0.1	150	150	1500
Ridging (@R100/0.1 ha)	R	0.1	100	100	1000
Harvesting	labourdays	30	30	900	9000
Planting	labourdays	3	30	90	900
Irrigation	labourdays	15	30	450	4500
Irrigation maintenance (labour)		2	30	60	600
Weeding	labourdays	4	30	120	1200
Basal Fertiliser (2:3:4)	labourdays	0.3	30	9	90
Top dressing fertiliser (LAN 28)	labourdays	0.3	30	9	90
Herbicides (Salton)	labourdays	0.3	30	9	90
Pesticides	labourdays	0.2	30	6	60
Insecticides	labourdays	0.3	30	9	90
Total				**2062**	**20620**
Input Costs					
Seedlings (1500/0.1 ha)	seedlings	1	415	415	4150
Seedling transportation (From Greytown)	hire	1	300	300	3000
Basal Fertiliser (2:3:4)	bags	0.5	366	183	1830
Top dressing fertiliser (LAN 28)	bags	0.5	301	150.5	1505
Herbicides (Salton)	litres	0.1	210	210	2100
Pesticides (Decis Forte)	litres	0.04	500	500	1000
Aquastick	mls	0.05	200	200	2000
Agrochemical transport		1	100	100	100
Water			0	0	0
Irrigation Fuel		0	0	0	0
Total				**2058.5**	**15685**
Market info & samples to market	trips	2	50	150	1500
Product transportation	trips	3	300	900	9000
Packaging	pockets	1700	0.2	340	3400
Total				**1390**	**12400**
Total Variable Costs (TVC)				**5510.5**	**48705**
Gross Margin above TVC				**6489.5**	**71295**

APPENDIX 5: CASE STUDY – THE MSINGA GOAT AUCTION

By: Adetoyese ‘Jide Adeyemo
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REPORT ON THE FIRST GOAT AUCTION AT MSINGA

Introduction

The Department of Land Affairs (DLA) was restructured to become the Department of Rural Development and Land Reform (DRDLR). Thereafter, the department began to focus and strategize on improving rural areas. A consideration of the rural communities of Kwazulu-Natal Province led to the identification of Msinga as an isolated part characterized by high numbers of indigenous goats. This led to the idea of creating a livestock enterprise to boost the social economic activities in the area.

It was accepted that the majority of the farmers kept livestock for prestige and cultural purposes. The concept of a livestock enterprise was therefore seen as an opportunity to influence the environment by changing the farmers’ mind-set to an appreciation of goats as a source of income. The Department therefore undertook to create market platforms for these famers.

Roles of key stakeholders

The following stakeholders were informed about the proposed auction programme, and they all participated in one way or the other according to their respective offices: KZN Department of Agriculture and Environmental Affairs, Department of Rural Development and Land Reform, AAM livestock auctioneers and Mdukatshani Rural Development Project (MRDT).

<u>KZN Department of Agriculture and Environmental Affairs:</u> Auctions were not well understood in the area because it is an isolated rural environment. The area is well known for political wars. The first initiative of the KZN Department of Agriculture and Environmental Affairs was selling the idea to staff members working in the area. These workers were familiar with the area and trusted by the community. Their role was then to sell the idea to the farmers in the community. This was done by disseminating information and educating the farmers during their outings into the community. They also created awareness and publicity in the community about what was required of those wishing to participate in the goat auction programme. This included the following information: the type of goat, gender of goat, age of livestock to bring to the auction, preferred colour of goats, date of the auction, etc.

In the process, KZN DoA officials were able to make farmers realise the gain and benefits of the auction, thereby changing the general mind-set about livestock. Furthermore, an agricultural extension officer was assigned the role of secretary to the Auction Organizing Committee. The Department also assisted with transportation for farmers who had no means of transport, and transported interested farmers with their goats to the auction venue.

<u>Livestock Agent Auctioneers: AAM</u>: This is a modern livestock agent and auctioneering company, designed to meet the needs of farmers and those of the livestock industry. In other to make the auction a reality, the first thing was to advertise Msinga Goat Auction. As this was the first of its kind in the area, it was necessary to bring together both sides (buyers and sellers) to achieve the goal. The auction was advertised in newspapers and farmers’ magazines. Regular major buyers were personally invited by telephone. The auctioneers arranged the necessary infrastructure and facilities,

including portable metal kraals, a public address system (sound system), etc. All these facilities were paid for as part of the contract given to them by the DRDLR.
The first Msinga auction was held on 7 March 2013 at KwaMbaso, Mbondweni area, Msinga and it was a success. Immediately the farmers arrived with their goats, the goats were tagged and placed in pens allocated to individual owners. Each goat was auctioned individually. Some factors such as colour, gender, age were of interest to buyers. Bidders preferred young female and male goats. Most of the bidders were buying for breeding purposes.

One buyer said: "I am interested in buying Boer goats especially brown colour and prefer young or mature females and males", while another said "I bought young goats because I want to used them for breeding purposes and sell later."

According to one KZN DoA official only about 300 goats and small numbers of farmers were expected, as this was the first auction. However, over five hundred goats were auctioned, and the prices were much higher than anticipated. The sales report received from the AAM showed that 272 goats were sold at prices less than R1000, and 277 goats was sold at prices between R1100 and R1500. The highest price was R2300. The prices obtained were amazing to all parties including the farmers, auctioneers and officials. These are some of the comments from participants:

One farmer said "Yes, I got higher prices for my goats than what I expected. I really benefitted from the auction because my income was so much that I could afford to buy a new set of four tyres for my car and send my kids to school". Other farmers said: "Yes, I gained a lot of money because my goats were bought for high prices" and "I gained more in the price than what I expected, though I don't have all the colour demanded", while the Organizing Committee Secretary said "The prices was encouraging and far more than what we were expecting, it went higher".

Challenges experienced
As this was the first auction in the area, the auctioneers had difficulties in logistics planning and the cost of transport and setting up facilities was very expensive. It was found that cultural beliefs were not easily changed and it took a lot of time for the Traditional Authority, Farmers' Association and community members to accept the auction idea. Some of the community's farmers believed that this goat auction thing was a means of exploiting their livestock. This perception was reinforced when they heard that buyers were interested in young female goats, as this meant that they would not have enough female goats left to maintain their own herds.

Recommendation for Improving Goat Auctions in Rural Areas
The following suggestions were made by different parties regarding ways to improve the auction:

The KZN DoA proposed that publicity could be improved by making sure that all sellers (farmers) are contacted and informed about the next auction both in and around Msinga. This would allow officials to estimate the number of goats to be sold. KZN DoA officials planned to inform the farmers and check the quality of goats before farmers would be permitted to bring them to the auction. The officials recommended continuity of the auction in the area. This was seen as important because it would penetrate and change farmer's mind-sets easily and develop the profit-making idea.

KZN DoA received some suggestions from farmers. For example, one of the farmers suggested that all goats should be viewed. "It will encourage us all to come for the next auction, if all goats are viewed from front to the back of the kraal first" said one seller. During the auction, the goats that were auctioned were randomly picked from some kraals because of the particularity of the buyer's interest. This meant that some farmer's pens were not even looked at which discouraged him/her. Therefore the seller advised that all available animals should be put up for auctioning whether they were sold or not.

“I will advise that next time individual goats should be registered either with markers or tags, so as to avoid mixing up of goats. I ended up taking home goats I didn’t buy because they became mixed up while they were trying to soft them out” said one buyer. Most farmers complained that their goats became mixed up because the same tag was used for different farmers which made it difficult to separate them after the auction.

Plans for the forthcoming auction

Although the goat auction was initially supposed to be a yearly event in Msinga, DRDLR came under pressure from community members and buyers to organize another goat auction. Therefore an auction was planned for November 2013, at which double attendance of buyers and sellers was expected. “The November 2013 Auction will be more properly organized – we require Msinga farmers to be more mobilised and we want to extend it to neighbouring towns and villages,” said one of the officials from DRDLR.

REPORT ON THE SECOND GOAT AUCTION AT MSINGA

Introduction

As a result of the pressure from farmers following their experience of the first auction in the area, the stakeholders involved organized the second goat auction in Msinga. The stakeholders involved were again KZN DoA, DRDLR, AAM, MRDT and associations representing livestock farmers in the area.

The Second Msinga goat auction was held on 14 November, 2013 at KwaMbaso, Mbondweni, Galaferi Msinga. Farmers started arriving at the auction site from as early 7:00am that morning. KZN DoA officials (Extension workers, Animal Health Workers, etc.) had all moved out into the communities to mobilise and assist stranded famers to get to the goat auction site with their goats. It was observed that famers came out with large numbers of their goats which showed that they were really impressed by the first auction in the area and were prepared for the second auction. The Extension workers reported that 241 farmers were in attendance, proving that the first auction had had a positive impact. Up until the afternoon at around 4:00pm on the day of the auction, farmers were still arriving with large numbers of goats until the extension workers commented that they had had enough for the day.

Goat breeders (buyers) turned out in their numbers as well. This indicated that they were pleased with the quality of goats presented at the first auction. They were still interested in certain colours, sex and age of the animals.

A comment was heard from the auctioneers that this was one of the largest goat auctions experienced, and that there were not enough pens for all the farmers in attendance. The auctioneers commented that one of the highest prices obtained in their goat auction record was obtained when a goat went for R7500. The average price obtained was R712. The KZN DoA staff reported that 911 goats were sold. This was more than the 574 goats sold at the first auction. Of the goats at the auction, 379 were not presented for sale, while 158 were presented but not sold. The total amount paid for goats at the auction was R849 290.

F

Figure 1: The goat that received the highest bid.

One of the buyers (breeders) interviewed said he came for this auction because he had been looking for these breeds for a long time and he was really satisfied with what he had bought at the first auction.

In a discussion between some famers and an official from the DRDLR, farmers lamented that the bidding prices were too low (R250) compared to the first auction and that they were not happy with the prices. The official answered by explaining that the goats were not looking good (i.e. they had rough coats, some were sick while others were lame). These factors contributed to the bidding prices of buyers (breeders). He further explained that it was not the farmers' fault but rather seasonality and the shortage of water in the winter season that affected the animals. He later encouraged the farmers to sell their goats rather than to watch them die if they do not have what it takes to sustain them.

In general, there appeared to be dissatisfaction with the prices received at the second auction which was perhaps a result of unrealistic prices received by goat owners at the first auction.

Figure 2: The biggest goat at the auction

Figure 3: View of the sale pens

Figure 4: View of goats in the holding pens.

Figure 5: Tagging system used.

APPENDIX 6: ABSTRACTS OF DISSERTATIONS

Analysis of food value chains in smallholder crop and livestock enterprises in Eastern Cape Province of South Africa.

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The study was conducted in Mbozi and Ciko villages in Mbhashe Local Municipality of the Eastern Cape Province of South Africa. Two irrigation projects in the area were studied. Consumers and agricultural commodity traders in Willowvale Town, Dutywa, Butterworth and East London were also interviewed. The major objective of the study is to profile and map cabbage, maize and cattle food value chains broadly, and to understand their nature, constraints and opportunities in smallholder agriculture.

A multi-stage random sampling procedure was used in which the first stage involved selecting the local government areas. This was followed by the selection of the district and then the respondents. A total of 168 participants were sampled in the proportion of 82 smallholder farmers, 41 consumers, 26 hawkers and 20 agricultural commodity traders. Focus group discussions and key informant interviews were also used during the data collection process. Value Chain mapping was done using the commodity based approach. All value chains under study indicated that they are short and commodities were transacted in unprocessed form. As cabbages and maize move from the farm to retail outlets, value addition start to take place through transportation to the market and processing in supermarkets. The cattle value chain however does not have a forward linkage beyond the two administrative boundaries of the two communities. Less than 3% of the farmers traded livestock, and this was mostly through private sales to neighbours. The farmers' major goal in agricultural production is assumed to be an important aspect in lengthening the value chain. As such, results of a Pearson‘s correlation exercise indicated that there is a significant relationship at 0.05% level between goals of the farmers and the village of origin. Some factors that showed significance ($p=0.05$) in influencing farmers' goals are membership of an irrigation project and household sources of income.

An analysis of determinants of technical efficiency at farm level was performed using the stochastic frontier model for cabbage, maize and cattle enterprises. The results showed that rainfall adequacy, input costs, market channels and quantity sold are important determinants of cabbage production efficiency. On the other hand, maize production efficiency is positively determined by market price, area under production and rainfall adequacy. Market related variables are major drivers of the cattle value chain efficiency and these include cattle prices, market satisfaction, market channel and farm labour.

Key Words: *Food Value Chain, Commodity Based Approach, Stochastic Frontier Analysis, Technical Efficiency, Smallholder Farmer*

Implications of food value chain support structures for water resources management by smallholder farmers in the Eastern Cape Province

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Smallholder agriculture is faced with so many challenges despite all the policies and programmes that have been channelled towards ensuring improvement in this sector. Improving smallholder agricultural productivity requires that smallholder farmers gain access to reliable and adequate farmer support services such as physical infrastructures like good road network, functional irrigation facilities, extension services, finance and efficient marketing system. However, these support services are lacking in a vast majority of the rural communities in which the smallholder farmers live and work. This study is centred on governance within the food value chains, with specific focus on butternuts and chicken value chains; with a view to identifying those factors preventing smallholder farmers from accessing the mainstream market.

Ciko and Mbozi villages in Mbashe local municipality were used as the research sites for the study. Data were collected across the two villages through sampling of 100 individual farming households based on random selection; questionnaires and checklist of questions were used as tools to access information from farmers through focus group discussions, personal interviews and key informants. In addition, Ciko Santrini project and foundation community project, which are the two agricultural community projects located within the study area were also investigated. Conceptual and analytical frameworks were employed in the research analysis. Williamson's 4-level of social analysis and the sustainable livelihood frameworks were used to conceptualize the analysis.

Inferential analysis was carried out using binary logistic regression and discriminant analysis with focus on butternuts and chicken production among the smallholder farmers in the study area to determine factors that could encourage farmers 'access markets. The results showed that factors such as; assistance from government agency, partnerships with private and public institutions and farmers' decision due to access to information were significant at 1% level for both butternuts and chicken production. On the other hand, factors such as provision of input subsidy and farmers' membership of agricultural development projects are significant at 5% level. The findings suggest that adoption of any or combination of the significant factors could serve as good support structures for farmers and they could directly help them market their produce efficiently.

***Key words**: support structures, governance, food value chain; Williamsons' 4-level of social analysis, smallholder farmers, sustainable livelihood framework, market access*

APPENDIX 7: SELECTION OF TOOLS USED FOR DATA COLLECTION

WILLOWVALE

UNIVERSITY OF FORT HARE: HOUSEHOLD QUESTIONAIRE FOR CROP AND LIVESTOCK FARMERS:
****_Research: Smallholder Food value chains in Eastern Cape Province:_******
Interview No............... Interviewer's Name..
Date..........................Village Name...
Local Municipality................................... Province..

HOUSEHOLD INFORMATION

A. **Gender of Household head** 1: Male 2: Female	**B.** **Marital Status** 1: Single 2: Married 3: Divorced 4: Widowed 5: N/A (child < 16yrs)	**C.** **Age (yrs)**	**D.** **Household Size**	**E.** **Number of Members who work in the field/ rear livestock (write actual number)**	**F.** **Relationship to Household Head** 1:Household Head 2: Husband 3: Wife 4: Child 5: Parents 6: Siblings 8: Other Relative (Specify)....	**G.** **Level of Education** 1: Primary 2: Secondary 3: Tertiary 4: None 5:	**H.** **Occupation (What the household head does for a living)** 1: Farming 2: Carpentry 3: Brick making 4: Knitting & sewing 5: Teaching 6: Other (Specify)

NB: Household member is considered to be anyone who stays with the family for 3 consecutive months and eats within the same pot with other family members

K. What other training/skills do you have?
....

Indicate the number of household members who fall in the following categories, as an indication of their health status?

Employment Status 1: Employed 2: Not Employed 3: Self Employed 4: Full time farmer 5: Farm Labourer 6: Student 7: Other	**What is your source of water for drinking?** 1. Tap 2: Protected well 3: Unprotected well	**L.** **Fit for agricultural work**	**M.** **Chronically sick**	**N.** **Too old to work in agriculture (above 65yrs)**	**O.** **Too young to work in agriculture (0-12yrs)**	**P.** **Staying Out (Away but rely on this household e.g. school children in boarding schools)**

Indicate labour usage per operation.

Q. Operation	R. What is the source of labour for these farm operations? 1. Family labour 2. Hired labour 3. N/A	S. Who perform the different farm operations? 1. Men 2. Women 3. Girls 4. Boys 5. Anyone in the family 6. N/A	T. Did any of the members receive training of the operations before? 1.Yes 2. No 3.N/A
Livestock herding			
Livestock Dipping			
Milking			
Other livestock tasks (specify)			
Weeding			
Planting			
Ploughing			
Harvesting			
Irrigation			
Domestic Water provision			
Crop Spraying			

LAND HOLDINGS: **(**How many plots do you have to access your farming activities (cropping and livestock) within the farm, homestead, dry-land and irrigation scheme and Grazing area? Indicate the total area for each and the area under operation for each of these plots, and the reasons for under-operation or non-Utilisation)

U. **Location**	**V.** **Type of land ownership:** 1: Leasehold 2: Freehold 3: Private 4: Communal 5. Traditional allocation by chief 6. Other (specify) …………………… …………………… ……………………	**W.** **Total Area (Ha)**	**X.** **Which of the following best describe your farming Operations** 1: Member of Cooperative/ Association 2: Operate a private company 3 : Operate a registered public company 4: Operate a non-registered individual/family enterprise 5:Other (Specify) ………………. ………………. ……………….	**Y.** **Operational Area: (1=0%, 2=25%, 3=50%, 4=75%, 5=100%)**	**Z.** **State the condition of the field/ garden** **1.Fenced** **2.Not fenced** **3.Partly fenced**	**Z.2.** **Reasons for Under-utilisation**
1: Homestead garden						
2: Dry-land						
3: Irrigation						
4:Grazing						

HOUSEHOLD INCOME

AC. **What was your average gross monthly income, last year?** 1: No income 2: R1-R400 3: R401-R800 4:R801-R1600 5: R1601-R3200 6:R3201-R6400 7:R6401-R12800 8:R12801-R25600 9: >R25601	AD. **What is/are your Sources of Income?** 1: None 2: Local trader/hawkers buying products from farmers: R.. 3: family remittances: R.................... 4: Payment for casual labour: R.. 5: Loans from bank: R........................ 6: Government Program/Grants: R.. 7: NGO Donations: R... 8: Association/ Club/Cooperative: R.. 9: Private firm that buys agricultural products from farmers: R.. 10: Personal Savings: R.. 11. Local neighbour for produce sold. R………………………………………… 12. Income from spaza shop: R..	AE. **What is your household expenditure pattern per month?** 1: Groceries: R......................... 2: Transport: R.......................... 3: School fees: R..................... 4: Input purchase: R.................. 5: Clothes: R............................ 6. House rental. R.................... 7. Maintenance costs, R............ 8. Entertainment, R................... 9. Church contributions, R... 10. Burial levies, R...................... 11. Other (Specify)	AF. **Do you use credit to finance household activity ?** **1.Yes** **2.No**	AG. **If you used credit what are the sources of the credit (specify, all)**
		Total:	***Total:***	

PHYSICAL HOUSEHOLD/FARM ASSETS

AH. **Indicate production Assets you have access to.**	AH.1. **Of the accessed assets, indicate actual number used. (use numerical values: 0 = None 0,1, 2, 3, 4, etc.**	AI. **Indicate the source of all accessed assets.** 1.Household 2. Borrowed 3. Hired 4.Leased 5. Other	AJ. **If Owned, how were the assets acquired?** 1: Purchased 2: Donated 3: Inherited 4: Other …………… ………………	AK. **Year Acquired (Specify e.g. 2002, 2007 etc.)**	AL. **Do you consider the production assets to be adequate for Agric Activities** 1: Yes 2: No	AM. **State the value of the househol d assets using recent prices**
1: Hand Hoes						
2: Shovels						
3: Plough						
4: Harrow						
5: Wheelbarrow						
6: Sledge						
7:Trailer						
8: Scotch cart						
9:Tractor						
10: Vehicle						

11:Homestead/field fence						
12.Draught Animals						

AO. What factors affect your asset ownership?

....

AP. What are the reasons for limited access to assets?

....

AH.2. Why are you not using all the available assets?

....

RAIN FED CROP FARMING

AQ. **Which Crops did you grow last season?**	**AR.** **What season was crop grown** 1: Rainy 2 : Dry 3 :Both	**AS.** **Area of production (Ha)**	**AT.** **How much did you harvest?** (write quantity and units e.g. 20 x 50 kg bags)	**AU.** **How much was sold?** (write quantity and units e.g. 20 x 50 kg bags)	**AV.** **How much was stored for consumption?** (write quantity and units e.g. 20 x 50 kg bags)	**AW.** **Do you have enough rain water for your crops?** 1: Yes 2 :No
Maize						
Cabbage						
Tomatoes						
Carrots						
Cucumber						
Butternuts						

AX.1. **Do you use any water harvesting /conservation technique?** 1: Yes 2 :No *If yes, answer question “**AX2**” on next page*	**AY.** **What is your major market for your surplus?** 1 :Hawkers 2 :Neighbours 3: Local Shops 4: Fresh produce market 5: Agro-processors 6. Don’t sell	**AZ.** **What form do you sell your product? (Indicate for each product)** 1:Unprocessed 2 :Processed 3 Both 4. N/A	**BB.** **What price did you get for each crop Product per unit?** (R/Unit)	**BC.** **Which market looks best for you, for each crop?** (Specify market or put a zero (0) where respondent don’t know).

AX.2. Explain how you conserve or capture water/moisture if any on your farm?

....

....

RAINFED CROPS (CONTINUED).

BD. **What is your major reason/goal for crop farming?(Tick)** 1: Marketing 2: Consumption 3:Cultural purposes	**BE.** **Do you aspire to increase your scale of production?(Tick)** **1: No. I'm happy 2: Yes Want Increase**
Explain whether you meet your goals……………………………… ……………………………………………………………………………… ……………………………………………………………………………… ………………………………………………………………………………	Explain reason…………………………………………………….. ………………………………………………………………………… ………………………………………………………………………… …………………………………………………………………………

BF. What are the reasons for you not being able to access any irrigation services from the relevant sources?

..
.

BG. What do you think can be done so that you are able to access irrigation services?

..

BH. **Livestock Type**	**BI.** **Total Number Owned**	**BJ.** **Source of Livestock** 1:Purchased 2:Donated 3:Inherited 4:Other…….	**BK.** **Do you have adequate water for all livestock categories that you keep?** 1: Yes 2 : No	**BL.** **What is your water source for each and every livestock?** 1: Dam 2 : River 3 : Tap water 4: Borehole 5: None	**BM.** **What is your major market for your livestock**? (Specify for each livestock) 1:Neighbours 2: Local Shops/Traders 3: Abattoirs 4: Don't sell 5:Other (specify)	**BN.** **What form do you sell your product? (Indicate for each product)** 1: Live-Unprocessed animals 2 : Slaughtered/ Processed 3: Both
1: Cattle						
2:Sheep						
3 :Goats						
4 :Chickens						
5:Turkeys						
6:Donkeys/ Horse						
7 Pig						

SECTION : EXTENSIVE LIVESTOCK PRODUCTION

BO. **Are you happy with the market for each livestock/ product?** 1: Yes 2: No	**BP.** **What price did you get for each livestock** **Product** (R/unit)	**BQ.** **Which market do you intend to sell your products if given the chance to do so.** (Specify market or put a zero (0) where respondent don't know).

BR. **What is your major reason/goal for livestock farming?(Tick and specify your major livestock e.g. cattle, goats, sheep, etc.)** 1: Marketing 2: Consumption 3:Cultural purposes	**BS.** **Do you aspire to increase your scale of production?(Tick)** **1: No. 2: Yes**
Explain whether you meet your goals……………………………....................................... ……………………………………………………………………	Explain reason ………………………………………………..................... ....

BT. What factors negatively affect water usage in the area?
....

BU. What can be done to improve access to both agriculture and domestic water in the community?
....

BV. What factors affect agricultural production in the area(both crop and livestock enterprises)?
....

BW. What can be done to improve farmer productivity?
....

BX. What factors affect marketing of agricultural products for both crops and livestock?
....

BY. What can be done to improve farmer participation in markets?
....

BZ. What support (government/private) are you currently getting to improve water availability and usage, for both agriculture and domestic uses?
....

MARINA

<u>Annexure 2: QUESTIONNAIRE FOR CROP AND LIVESTOCK FARMERS:</u>

*******Deliverable: Farmers needs and aspirations in Food value chains (Rain fed and Irrigation):*********
Interview No............... Interviewer's Name ....Date.........................Village....................................
Local Municipality................................... Province..
Interviewee's name……………………………

A. **Gender of Household head** 1: Male 2: Female	**B.** **Marital Status** 1: Single 2: Married 3: Divorced 4: Widowed 5: N/A (child < 16yrs)	**C.** **Age (yrs)**	**D.** **Household Size**	**E.** **Number of Members who work in the field/rear livestock (write actual number)**	**F.** **Relationship to Household Head** 1:Household Head 2: Husband 3: Wife 4:Child 5: Parents 6: Siblings 8:Other Relative (Specify)	**G.** **Level of Education** of the household head 1: Primary 2: Secondary 3: Tertiary 4: None 5: Other (Spec) …………………… …………………… …………………… …………………… ……………………	**H.** **Occupation (What the household head does for a living)** 1: Farming 2: Carpentry 3: Brick making 4:Knitting & sewing 5: Teaching 6:Other (Specify) …………………… …………………… ……………………	**I.** **Employment Status** 1: Employed 2: Not Employed 3:Self Employed 4:Full time farmer 5:Farm Labourer 6: Student 7:Other (Specify) …………………… …………………… …………………… …………………… ……………………	**J.** **What is your source of water for drinking?** 1. Tap 2: Protected well 3:Unprotected well 4: River 5:Rain Water Tanks 6.Dam 7.Other (Specify) …………………… …………………… ……………………

<u>HOUSEHOLD INFORMATION</u> **Interview a person who has a good knowledge of household and farming matters**

NB: Household member is considered to be anyone who stays with the family for 3 consecutive months and eats within the same pot with other family members

K. What other training/skills do you have? ....
....
K1 What training in agricultural topics have other members of your household had (Describe)?

Indicate the number of household members who fall in the following categories, as an indication of their health status?

L. **Fit for agricultural work**	**M.** **Chronically sick**	**N.** **Too old to work in agriculture (above 65yrs)**	**O.** **Too young to work in agriculture (0-12yrs)**	**P.** **Staying Out(Away but rely on this household e.g. school children in boarding schools)**

Indicate labour usage per operation.

Q. **Operation**	**R.** **What is the source of labour for these farm operations?** **1. Family labour** **2. Hired labour** **3. N/A**	**S.** **Who perform the different farm operations?** **1. Men 2. Women 3. Girls** **4. Boys 5. Anyone in the family** **6. N/A**	**T.** **Did any of the members receive training of the operations before?** **1.Yes 2. No** **3.N/A**
Weeding			
Planting			
Ploughing			
Harvesting			
Irrigation			
Crop Spraying			
Removing dead leaves			
Removing suckers / new stems			
Other task related to bananas			
Livestock herding			
Livestock Dipping			
Milking			
Other livestock tasks (specify)			

LAND HOLDINGS: **(**How many plots do you have to access your farming activities (cropping and livestock) within the farm, homestead, dry-land and irrigation scheme and Grazing area? Indicate the total area for each and the area under operation for each of these plots, and the reasons for under-operation or non-Utilisation)

U. **Location**	**V.** **Type of land ownership:** 1: Leasehold 2: Freehold 3: Private 4: Communal 5. Traditional allocation by chief 6. Other (specify)	**W.** **Total Area (Ha)**	**X.** **Which of the following best describe your farming Operations** 1: Member of Cooperative/Association 2: Operate a private company 3 : Operate a registered public company 4: Operate a non-registered individual/family enterprise 5:Other (Specify)............. (overall)	**Y.** **Operational Area: (1=0%, 2=25%, 3=50%, 4=75%, 5=100%)**	**Z.** **State the condition of the field/ garden** **1.Fenced** **2.Not fenced** **3.Partly fenced**	**Z.2.** **Reasons for Under-utilisation**
1: Homestead garden						
2. Separate banana plantation						
3: Dry-land dryland croplands						

4: Irrigation (separate from the home garden)						
5:Grazing						

Questions specific to bananas

- What areas of land do you have access to for your agricultural activities? What portion of each are you actually using?
- Where do you grow bananas? What area of bananas do you have? How many bananas do you have?
- Do you have irrigation in your home garden?
- Are the bananas irrigated? How do you irrigate them?
- Do you receive any technical support or advice? If yes, from who?

HOUSEHOLD DIETARY DIVERSITY SCORE

AA. Which of the following items did your household consume as part of a meal or snack**, Yesterday?**

Food Type	**1:Yes 2:No**	**Food Type**	**1:Yes, 2:No**	**Food Type**	**1:Yes 2:No**
1: Maize Meal		7: Nuts and pulses (beans)		13: Fruits	
2: Rice		8: Meat(chicken, beef, pork, lamb, game)		14: Tea/Coffee	
3: Cereals(Cornflakes, Oats)		9: Vegetables		15. Cakes/Biscuits	
4: Fish		10: Sugar		16. Samp	
5. Bread		11: Cooking Oil/ fat			
6: Tubers (Potatoes, cassava)		12: Eggs			

AB. Which among the above foodstuffs do you grow/produce on your own? ....

HOUSEHOLD INCOME

AC. **Removed**	**AD.** **What is/are your Sources of Income?** 1: None 2: Local trader/hawkers buying products from farmers 3: family remittances: 4 : Payment for casual labour: 5: Loans from bank: 6: Government Program/Grants: 7 :NGO Donations: 8: Association/ Club/Cooperative: 9 **:** Private firm that buys agricultural products from farmers: 10 : Personal Savings: 11. Local neighbour for produce sold. 12. Income from spaza shop:	**AE.** **What is your household expenditure patterns per month?** 1: Groceries: 2: Transport: . 3: School fees: 4: Input purchase:. 5: Clothes: 6. House rental. 7. Maintenance costs, 8. Entertainment, 9. Church contributions 10. Burial levies, 11. Other (Specify)	**AF.** **Do you use credit to finance household activity?** **1.Yes** **2.No**	**AG.** **If you used credit what are the sources of the credit (specify, all)** For example: bank, agric co-op, local stokvel, money lender. And what do you buy on credit?
	List all regular sources of income List main source of income	List all regular monthly expenses List 3 biggest regular expenses		

AG1 Is anyone from this household a member of an agricultural project or an organisation that represents farmers? Please provide details.

PHYSICAL HOUSEHOLD/FARM ASSETS

AH. **Indicate production Assets you have access to.**	**AH.1.** **Of the accessed assets, indicate actual number used. (use numerical values: 0 = None 0,1, 2, 3, 4, etc.**	**AI.** **Indicate the source of all accessed assets.** 1.Household 2. Borrowed 3. Hired 4.Leased 5. Other ……………… ……………… ……………… ……………… ………………	**AJ.** **If Owned, how were the assets acquired?** 1: Purchased 2: Donated 3: Inherited 4: Other …………………… …………………… …………………… …………………… …………………… ……………………	**AK.** **Year Acquired (Specify e.g. 2002, 2007 etc.)**	**AL.** **Do you consider the productio n assets to be adequate for Agric Activities** 1: Yes 2: No	**AM.** **Does the household own any of the assets below?(Tick)** 1:Bicycle 2: Radio 3:Television 4: Telephone 5: Sewing Machine 6: Stove 7: Solar Power 8: Refrigerator/ Freezer 9. Other (Specify) ……………………………	**AN.** **What type of housing does the household have?** 1:mud bricks, corrugated iron roofed 2: mud bricks, grass thatched 3: mud bricks, asbestos roofed 4: Pole and mud, grass thatched 5: Concrete blocks 6. Tin/Zinc House (shack) 7. Other (Specify) ....
1: Hand Hoes							
2: Shovels							
3: Plough							
4: Harrow							
5: Wheelbarrow							
6: Sledge							
7:Trailer							
8: Scotch cart							
9:Tractor							
10: Vehicle							
11:Homestead/ field fence							
12.Draught Animals							
13. Equipment specifically used for bananas (specify)							

AO1 If you do not have necessary access to farming assets (in a satisfactory state) listed above, what are the reasons for this?

CROP FARMING

AQ. Which Crops did you grow last season?	**AR. What season was crop grown** 1: Rainy 2 : Dry 3 :Both	**AS. Area of production (Ha)**	**AT. How much did you harvest?** (write quantity and units e.g. 20 x 50 kg bags)	**AU. How much was sold?** (write quantity and units e.g. 20 x 50 kg bags)	**AV. How much was stored for consumption?** (write quantity and units e.g. 20 x 50 kg bags)	**AW. Do you have enough rain water for your crops?** 1: Yes 2 :No	**AX.1. Do you use any water harvesting /conservation technique ?** 1: Yes 2 :No *If yes, answer question "**AX2**" on next page*	**AY. What is your major market for your surplus?** 1 :Hawkers 2:Neighbour 3:Local Shops 4:Fresh produce market 5:Agro-processors 6. Don't sell	**AZ. What form do you sell your product? (Indicate for each product)** 1:Unprocessed 2: Processed 3 Both 4. N/A	**BA. Are you happy with the market for each crop product?** 1 :Yes 2 :No 3. N/A	**BB. What price did you get for each crop Product per unit?** (R/Unit)	**BC. Which market looks best for you, for each crop?** (Specify market or put a zero (0) where respondent don't know).
Bananas												
1: Maize,												
2: Sorghum												
3:Drybeans												
4:Groundnut												
5:Wheat												
6:Cabbage												
7:Onions												
8:Lettuce												
9:Tomatoes												
10:Carrots												
12:Spinach												
13:Potatoes												
14:Beans (green)												

15.Butternut													
16.Cauliflow													

AX.2. Explain how you conserve or capture water/moisture if any on your farm?
AX3 Do you irrigate your crop? If yes, go to AX4.
AX4 How do you irrigate it (describe infrastructure/equipment and frequency)?

RAINFED CROPS (CONTINUED).

BD What is your main reason for crop farming?
1. selling 2 consumption. 3. Cultural

What is your ultimate goal?
1. selling 2 consumption. 3. Cultural

	Are you meeting your goal?	If not, why not?
Bananas		
Maize		
Vegetables		

BE: **Do you aspire to increase your scale of production?(Tick)** **1: No. 2: Yes**	
Bananas	Explain reason
Maize	Explain reason
Vegetables	Explain reason

Questions about banana production
A1 What proportion of your banana crop do you sell?
A2 Who do you sell the bananas to?
A3 Do you have to transport them? If yes, how do you transport them?
A4 What price do you get (indicate price / unit)

A5 What are the inputs that you use for your bananas and what is the cost per year?	
Packaging material (e.g. boxes)	
Fertilizer	
Chemicals (specify)	
Planting material	
Other (specify)	

A6 Where do you buy your inputs (shop, town)?
A7 Have you received any training in banana production? Describe (topics covered, organisation involved).
A8 Where did you get the original banana plants?

A9 What planting material do you use to you expand your area of bananas?
A10 How do you do land preparation?

Irrigation questions

A11. Which crops would you irrigate if it were possible? If you do not irrigate your crops, what are the reasons for this?
BF. What are the reasons for you not being able to access any irrigation services from the relevant sources?
BG. What do you think can be done so that you are able to access irrigation services?

SECTION : EXTENSIVE LIVESTOCK PRODUCTION

BH. **Livestock Type**	**BI.** **Total Number Owned**	**BJ.** **Source of Livestock** 1:Purchased 2:Donated 3:Inherited 4:Bred (through breeding) 5:Other ……………. ……………. ……………. ……………..	**BK.** **Do you have adequate water for all livestock categories that you keep?** 1: Yes 2 : No	**BL.** **What is your water source for each and every livestock?** 1: Dam 2 : River 3:Tap water 4:Borehole 5: None	**BM.** **What is your major market for your livestock**? (Specify for each livestock) 1:Neighbours 2:Local Shops/Traders 3: Abattoirs 4: Don't sell 5:Other (specify) …………………. …………………. ………………....	**BN.** **What form do you sell your product? (Indicate for each product)** 1:Live-Unprocessed animals 2 Slaughtered/ Processed 3: Both	**BO.** **Are you happy with the market for each livestock/ product?** 1: Yes 2: No	**BP.** **What price did you get for each livestock Product** (R/unit) What is the average price you have received for an adult male animal?	**BQ.** **Which market do you intend to sell your products if given the chance to do so.** (Specify market or put a zero (0) where respondent don't know).
1: Cattle									
2:Sheep									
3 :Goats									
4 :Chickens									
5:Turkeys									
6:Donkeys/Horse									
7 Pig									
8.Horse									

	BR. What is your main reason for keeping livestock? 1. Selling 2. Consumption 3. Cultural
Cattle	
Goats	
Sheep	
Chickens	

	BR1. What is your ultimate goal? 1. Selling 2. Consumption 3. Cultural
Cattle	Are you meeting your goal? If not, why not?
Goats	Are you meeting your goal? If not, why not?
Sheep	Are you meeting your goal? If not, why not?
Chickens	Are you meeting your goal? If not, why not?

	BS: Do you aspire to increase your scale of production? 1. Yes 2. No
Cattle	If not, why not?
Goats	If not, why not?
Sheep	If not, why not?
Chickens	If not, why not?

General farming questions

BT1 What factors negatively affect access to water for crop production?

BT2 What factors negatively affect access to water for livestock?

BU. What can be done to improve access to both agriculture and domestic water in the community?

BV. What factors negatively affect agricultural production (both crop and livestock enterprises)

BW. What can be done to improve farmer productivity?

BX. What factors affect marketing of agricultural products for both crops and livestock?

BY. What can be done to improve farmer participation in markets?

BZ. What support (government/private) are you currently getting to improve water availability and usage, for both agriculture and domestic uses?

Mooi River Irrigation Scheme

HOUSEHOLD QUESTIONNAIRE FOR CROP FARMERS IN THE MOOI RIVER IRRIGATION SCHEME (MRIS) – *BINGANIDZO MUCHARA*

The information captured in this questionnaire is strictly confidential and will be used for research purposes by staff and students at the University of KwaZulu-Natal, Institute of Natural Resources and Water Research Commission. Participation in the survey is not compulsory but voluntary and no financial or non-financial benefits are paid during or after participation. The respondent should be the (actual) household head or any one well informed about the household.

Signature of interviewee: ....

Homestead Number		Interviewee Name	
Contact Details		Interviewer:	
Date		Village Name	
Local Municipality		Province	
Block Number where plot is located			

A. SOCIO-ECONOMIC VARIABLES:

Question	Response
A1. Gender of household head: 1: Male 2: Female	
A2. Indicate the marital status of the household head 1: Single 2: Married 3: Divorced 4: Widowed 5: N/A (child < 16yrs)	
A3.Age of the household head (yrs)	
A4. Household Size (Total number of household members).	
A5. Number of children below 16 years.	
A6. Number of adult females above 16 years.	
A7. Number of adult males above 16 years	
A8. Number of household members who work in the field/ rear livestock (actual number)	
A9. Level of education of the household head (years attended)?	
A10. Occupation of head of household (What the household head does for a living) 1: Full-time farmer; 2: Formal employment; 3. Informal employment (e.g., Carpentry, Brick-making, Knitting & sewing etc.)	
A11.How many years have you been involved in crop farming (years)	

A12: Are you originally from the village that you are currently residing 1. Yes 2. No
A13: If No, state your village of origin. ....

A14. Do you consider the following to be important sources of household income?
1. Crop farming: 1. Yes 2.No
2. Livestock farming: 1. Yes 2.No
3: Family remittances: 1. Yes 2.No

A15. Do you use credit to finance agricultural activities? 1. Yes 2. No
A16. If not using credit, do you have access to credit if you want it? 1. Yes 2. No

Household asset endowments: Indicate agricultural production assets you have access to.

A17. Indicate production Assets you have access to.	A18. Of the accessed assets, indicate actual number used. (use numerical values: 0 = None 0,1, 2, 3, 4, etc.	A19. Do you own the assets 1. Yes 2. No	A20. If Owned, what is the estimated value of the assets? (Rand)	A21. Do you consider the production assets to be adequate for Agricultural Activities 1: Yes 2: No

1: Hand Hoes				
2: Shovels/spades				
3: Ox-drawn plough				
4: Wheelbarrow				
5: Trailer				
6: Tractor				
7. Tractor drawn plough				
8: Vehicle				
9. Draught Animals(Cattle)				

Give details of your household land ownership and utilisation?

A22. Type	A23. Type of land ownership: 1: Private (have title deeds) 2:Traditional (allocated by chief) 3. Rented-in...................... 4. Other (specify)................	A24. Total Area (Ha)	A25. Area under use (ha)	A26. If land is not fully utilised, give reasons for Under-utilisation
1: Homestead garden				
2: Dry-land fields				
3: Irrigation plots				
Total				

A26. Are your irrigation fields; 1. Fenced; 2.Not fenced; 3.Partly fenced/Need repairs?

B. CROP PRODUCTION

B1. Give details of the following crops grown on the farm between 1 Sep 2011 and 31 Aug 2012?

Crops	Is the crop irrigated (1.Yes 2. No)	Irrigated area (ha)	Quantity Harvested (units/ha)	Quantity sold (Units)	Amount consumed (units)
Maize					
Tomatoes					
Cabbage (heads)					
Other (specify)					

B2. Production inputs (irrigation farming in the Mooi River Scheme)

Crop	Inputs	Quantity	Cost (R)
Maize Ha……..	1.Fertiliser (kg)		
	2.Seed (kg)		
	3.Herbicide(Kg or ltrs)		
	4.Pest/Insecticides		
	5.		
Cabbage Ha……..	1.Fertiliser		
	2.Seeds/Seedlings		
	3.Herbicide		

	4. Pest/insecticides		
	5.		
Tomatoes Ha……….	1.Fertiliser		
	2.Seeds/Seedlings		
	3.Herbicide		
	4.Pest/insecticides		
	5.		
Other (specify)	1.Fertiliser		
	2.Seeds/Seedlings		
	3.Herbicide		
	4.Pest/insecticides		
	5.		

B3: What is your labour usage in the following agricultural operations (Sep 2011-Aug 12)?

Crop	Land preparation	Planting	Weeding	Harvesting	Other ………….	Other ………….	Other ……….
1.Maize							
2.Cabbage							
3.Tomatoes							
Others							

B6. How do you cultivate your land for specific crops?

Crops	Select the appropriate type of power used to prepare land for the specific crops. Tractor Animal drawn Human Labour	Source of power: 1.Own 2.Borrowed 3.Hired	Cost per plot (0.1 ha)
Maize			
Cabbage			
Tomatoes			
Other (specify)			

C. COMMODITY MARKETING

C1: Indicate the quantity and price of respective market channels for maize, cabbage and tomatoes during the 2011/2012 season.

Crop & Output	Type of market 1.Fresh produce market 2.Community 3.Hawkers/Middlemen 4.Retail shops 5. Millers 6.Fruit & Vegetable shop 7. Home consumption 8. Road side 9. 10.	Where is the market located? *(name of place)*	Quantity through each market (Units)	Unit price (R)	How much do you pay per load to the market?
Maize Cobs. ...……..					
Cabbage Heads. ……..					

Tomatoes Kg……….					

C2. How difficult is access to price information in your vegetable farming business?
Easy access to price information, 2. Difficult to access price information 3. No access

C3. Where do you get market price information? Specify. ....

C4. How is your produce moved to the marketing points? (Tick appropriate block).

	1.Own transport	2.Hired transport	3.Public Transport	4.Buyers Transport	5. No transportation involved	Cost per unit (R)
Maize						
Cabbage						
Tomatoes						

C5. When selling, do you combine with other farmers? 1. Yes 2. No

Product	Collective selling 1. Yes 2. No
Maize:	
Cabbages	
Tomatoes	
Other	

C6. Before selling your produce indicate the cost of all value adding activities you do?

Crop	Value adding activities					
	Washing	Packaging	Shredding	Drying	Grading	*other*	*other*
Maize							
Cabbage							
Tomatoes							

C7. Are you a member of any agriculture organisation? 1. Yes 2. No If yes give the name of the organisation. ………………………………	Answer
C8. If you are a member (D2), what is the most critical support that you get from the organisation towards your agricultural activities? (*circle appropriate)* 1. Provide price information; 2. Marketing; 3. Input acquisition; 4. Credit; 5. Agricultural water access; 6. Access to tractor; 7. Other (specify)…………………………	Answer

C9. Can you rank some the challenges that you face in marketing your produce through your preferred market channel?   1. Not a challenge 2. Minor challenge 3. Can't say / Neutral 4. Challenge   5.Major challenge.

Challenges	Rank 1-5	Comment
a) The search for information		
b) Lack of infrastructure support from the government (marketing sheds)		
d) Lack of market finance		
e) High levies/marketing fees		
Any other (Please specify)		

C10. Are you aware of what is deliberated in irrigation scheme meetings by the committee members? 1. YES
2.   NO

If yes, how do you access the information?
.………………………………………………………………………………………………
………………………………………………………………………………………………..

SECTION 2: INSTITUTIONS, GOVERNANCE, STRUCTURE AND OPERATION OF THE SCHEME

E1. How many days per week do you actually irrigate? ………………………………………days
E2. Indicate and describe if the aspects below have an influence on access to irrigation water access in the Mooi River Irrigation Scheme. Rank: 1. No influence 2.minor influence 3. Neutral 4. Have influence 5. Great influence

Aspect	Does the aspect/s affect irrigation water access? (Rank 1-5)	Explanation
Block position (1. upper, 2. middle, 3. tail-end)		
Structure of water related conflict resolution among members		
Water measurement		
Number of plots per farmer		
Number of allocated irrigation days.		
Unequal water distribution among scheme members (within same block)		
Water supply to the block		
Member involvement in water infrastructure maintenance		
Sanction on non-compliant members		
Number of irrigation days per week		
Belonging to a group/cooperative within the scheme		
Farmers' personal relations with canal rangers		
Farmers' personal relations with committee members		
Farmers' personal relations with Indunas		

WATER INSTITUTIONS AND FARMERS' INVOLVEMENT IN IRRIGATION WATER MANAGEMENT

E3. How do you rank your irrigation water access in the scheme (circle appropriate answer)
Satisfied; 2. Indifferent; 3. Not satisfied

E4: Do you have any knowledge of the following institutions 1. Yes 0. No

Institution	1. Yes 0. No	*Do you think that working with these institutions can improve water access in the scheme* 1. Yes 0. No
Water Users' Association (WUA)		
Catchment Management Agency (CMA)		
Department of Water Affairs (DWAF)		

E5. Do you hold any management position in the scheme 1. Yes 2. No
E6. If yes, what position do you hold? 1. Committee member 2. Chairperson 3. Other (specify) ……………………………….
E7. Are you in any way participating in the management of irrigation water in the scheme? 1. Yes 2. No

If yes, in what role/s? ……………………………………………………………………….

E8. Are you willing to participate in management of water resources in the scheme? 1. Yes 2. No

E9. Are you participating in the maintenance of irrigation infrastructure (canal)? 1. Yes 0. No

E10. Are you willing to contribute finance towards maintenance of irrigation conveyance structure (canal)? 1. Yes 2. No

E11. If Yes for question E10 above; How much can you contribute basing on the size of land you are currently irrigating?
Answer: R……………………….……/plot

b: If No for question E10; Explain your reasons?
………

E12. Are you willing to participate in any way in the water management structures in the scheme? (Circle one appropriate answer).

1. Farmer not participating and not willing to do so.
2. Famer is willing to participate but not participating.
3. Farmer willing and participating as an ordinary member.
4. Farmer willing and participating as a committee member
5. Farmer willing and participating as a chairperson of the committee.

E15: Can you answer the questions below.

Questions	Response Options	Response
Do you have any training in irrigation water management	Received training =1, Otherwise = 0	
How do you perceive water distribution among scheme members (within same block)	Fair distribution =1, Unfair = 0	
Is water supply adequate to meet your irrigation demands?	Adequate=1, Not adequate = 0	
Do you perceive existing committees as effective to instil discipline on water users?	1. Not effective 2. Neutral 3. Very Effective	
Are you involved in irrigation canal maintenance?	1. Not Involved 2.At times 3. Always involved	
Do you belong to any group/cooperative that deals with irrigation water management issues in the scheme?	Member = 1, Not a member =0	

F10. In your opinion, should water use outside the Scheme be stopped?
Yes 2. No 3. Don't know / Can't say

Explain your answer above:
………..
………..

F14. Please rank the following strategies to improve your skills. *Rank as follows: 1. Not at all 2. Less likely 3. At times 4. More often 5. Always*

Copping strategies	Rank(1-5)	Explain
Seek advice from fellow farmers (production & marketing)		
Utilise extension officers where necessary		
Keep regular contacts with clients for easy marketing		
Rely more on past experiences to solve production challenges		
Rely more on informal relations with influential people in the market and in the scheme		
Attend private training courses to improve my skills (specify)		
Hire private experts for help		

G. INTERVENTION STRATEGIES

Please rank the top 3 areas that you need assistance to improve your agricultural operations.

1. General management, 2. Financial management, 3. Resource mobilisation and fundraising. 4. Irrigation scheduling 5. Marketing.
1. ……………………………………. 2. ……………………………………… 3. …………………………..

THANK YOU FOR YOUR COOPERATION!

Muden Goat & Cattle Study

District of interviewee:……………………………….…………………………….
Municipality: …………………………………..………………………….
Ward: ……………………………………...……………………….
Traditional authority: ……………………………………...…………………….
Community: ……………………………………….....…………………

Personal Information

Farmer's name:…..………………………Tel:..…………………House number:…….
Gender: M F

1. **Rank the following sources of income (starting with 1 as the most important and 6 as the least important)**

Permanent work	Temporary work	Livestock	Crops	Grants	Other, specify

2. What are your current livestock figures? What were your numbers in June 2012?

Livestock	Current figures	June 2012
Goats		
Cattle		
Chickens		
Sheep		
Donkeys		

3. If your goat and cattle numbers have increased since last year, is due to what?

Livestock	Buying	Reproduction	Gifts	Other (specify)
Goats				
Cattle				

4. Why do you keep livestock? Just tick again

Reason	**Goats**	**Importance**	**Cattle**	**Importance**
Income				
Meat / milk				
Cultural purposes				
Prestige				
Ploughing				
Other (specify)				

5. What are your other farming activities?

Activity	**Yes / no**	**Scale**
Dry-land crop production		Size (ha)
Homestead garden		Size (m x m)
Irrigated farming		No of beds
Other		

6. What types of goats do you have? Indigenous (Zulu) Boer Others

7. What types of cattle do you have? Local breed/ Nguni Other specify:

<u>Land tenure arrangement</u>

8. Where do you graze your livestock?
Communal grazing land Irrigation scheme Private Land Rented Land
other (specify……………..)
If the land is private or rented, who does it belong to?___________________

9. Do you have access to other grazing areas during very dry seasons? Yes No
When do you experience feed shortages?
Never All year Specific times of year (describe):__________________

<u>Management level and skills</u>

10. Do you use any of the following items for your livestock?

Item	**Cattle (Yes/No)**	**Goats (Yes/No)**
Traditional medicine		
Modern medicine		
Dip (bought yourself)		
Bought feed		
Crop residues		
Hired labour		

11. What amount of time do you or your family spend doing the following with your livestock e.g. 1 hour per day or 1 hour per week

Activity	**Cattle**	**Goats**
Herding		
Fetching		
Collecting water		
Collecting feed		
Other (specify)		

12. Have you received any training in livestock care? Yes No
If so, by whom ………………………………………………..
what topics?..

13. Where do your livestock stay at night?
Kraal Yard leave them outside other (Specify_

14. Where do your livestock get water?
Canal River Stream Tap Other (specify) _________

15. Do you take animals to drink? If so, where?................................

16. Do you provide water at your homestead or at some other place? If so, for which animals_________________, which times of year_________________, how

frequently _______________and how much?________________

17. What is your livestock's main feed? _____________________________________

17b. Please name some indigenous feeds that your cattle like very much.

……………………………………………..

17c. Please name some indigenous feeds that your goats like very much.
……………………………………………..

18. Do you provide additional feed to your livestock? Yes No

18b. What feed do you give them**?**

Concentrates (feed in a bag) specify if possible_________
A lick (specify name if possible)
Hay
Maize Stover
Other crop residues (e.g. sweet potato leaves) specify_________
Pasture (Specify)______________
Other (specify)

Which seasons?

Summer Autumn Winter Spring

Additional detail – especially if different feed at different times of year:

____

NOTE: Collect samples of feed provided if available

19. Do you follow a vaccination plan for

a. Your goats Yes No
If yes, describe:________________
b. Your cattle Yes No
If yes, describe:________________

20a. Are there any diseases common to your goats? Yes No
if yes name……………………….
How are you treating/ preventing it. ……………………………………………………

20b. Are there any diseases common to your cattle? Yes No
if yes name……………………….

How are you treating/ preventing it. ……………………………………………………

21. Risks and mitigation

	List the possible things that can prevent your livestock production from being successful		What needs to be done to prevent this happening?
1a		1b	
2a		2b	
3a		3b	
4a		4b	

Marketing aspects

22. How many goats and cattle did you sell in 2012 and so far in 2013?

	2012	2013 (6 mths)
Goats sold		
Cattle sold		

23a. How do you sell your goats?

People come to buy livestock from me at home
I take my livestock to a market place
I take my livestock to an auction
I take them to abattoirs
Other (specify)………………………………………….

23b. How do you sell your cattle?

People come to buy livestock from me at home
I take my livestock to a market place
I take my livestock to an auction
I take them to abattoirs
Other (specify)………………………………………….

24. Who buy your livestock?

Community member/neighbour
Trader
Auctioneer
Butcher
8.3.1 Other (specify)

25. What challenges do you face with selling your livestock currently?..........
………………………………………………………………………………………

26. Do buyers want to buy more livestock than you have for sale?

Yes No
If yes, Goats Cattle

27a. What class of cattle is most demanded?

Gender: Male Female Castrate
Mature Immature

27b. what class of goat is most demanded?

Gender: Male Female Castrate

Mature Immature

28. Is there any goat or cattle market place / auction in the vicinity/community?

Yes No If yes,

How far is it from your homestead?

Does it sell goats? Yes No

Does it sell cattle? Yes No

If yes, is it? Formal Informal

29. When cattle are slaughtered at home, what do you do with the skin?

Discard Sell it Keep it for my use Other (specify)…………………………………..

29b. When goats are slaughtered at home, what do you do with the skin?

Discard Sell it Keep it for my use Other (specify)…………………………………..

30. Do you sometimes milk your cattle and use the milk at home? Yes No

31. Uses of goats and cattle in the past 12 months.

	June-Dec 2012	**Jan-June 2013**
Number of goats stolen		
Number of goats given out (as gifts)		
Number of goats consumed at home as food		
Number of goats used for ceremonies this year		
Number goats used to pay charges / fines / damages		
Number of goats used for other purposes (specify		
Number of goats sold		
Approximate selling price for an adult female		

	June-Dec 2012	**Jan-June 2013**
Number of cattle stolen		
Number of cattle given out (as gifts)		
Number of cattle consumed at home as food		
Number of cattle used for ceremonies this year		
Number of cattle used to pay charges / fines / damages		
Number of cattle used for other purposes (specify		
Number of cattle sold		
Approximate selling price for an adult female		

Willingness to be part of a group and of the industry

32. Do you belong to a livestock association or other group? Yes No

If yes, what is the name of the association?...

Has the farmer association assisted you in any way towards marketing or caring for your livestock? **** Yes No

If yes, describe:____

If not, would you like to participate in some sort of livestock association / cooperative?

Yes No

Why…………………………………………………………………………………..

33. Would you like to join other local livestock farmers to be able to market Animals more easily?

Yes No

<u>Institutional support for Livestock production</u>

34. What stakeholders do you have any contact with related to livestock?

If yes, what role do they play?

Traditional authority __________________________

Private vet ___________________________________

State vet ____________________________________

Animal health technician _______________________

Extension officer ______________________________

Auctioneer ___________________________________

Shop selling inputs _____________________________

Neighbours ___________________________________

Buyers / traders ______________________________

Other (specify) _______________________________

35. Is there any agreed time to graze certain areas of the irrigation scheme?

Yes No

If yes, describe:____

36. Do you buy any inputs (medicine/ feed) collectively with other livestock owners?

Yes, regularly Yes, sometimes No

If yes, what items and with whom? ____________________

Do you ever join with other owners to hire a herder to take your cattle out to graze?

Yes No