DEVELOPMENT OF A GENERAL STRATEGY FOR OPTIMIZING THE EFFICIENT USE OF PRIMARY WATER RESOURCES FOR EFFECTIVE ALLEVIATION OF RURAL POVERTY

by

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LIST OF ABBREVIATIONS

ACAT	Africa Christian Action Trust
Agri-SA	Agriculture South Africa
ARC	Agricultural Research Council
ARDRI	Agricultural and Rural Development Institute (at Univ. Fort Hare)
DLA	Department of Land Affairs
DoA	Department of Agriculture
FAO	Food and Agriculture Organization (of the United Nations)
FFS	Farmer Field Schools
FRD	Foundation for Research Development (presently NRF)
HSRC	Human Sciences Research Council
ISCW	Institute for Soil, Climate and Water
ISEN	Instituut vir Sosiale en Ekonomiese Navorsing (at UOFS/UFS)
ISER	Institute for Social and Economic Research (at Rhodes University)
LAPC	Land and Agriculture Policy Centre
LRAD	Land Reform for Agricultural Development
NIIB	Nett Incremental Irrigation Benefit
NRF	National Research Foundation (formerly FRD)
PAC	Pan Africanist Congress
PAWC	Profile Available Water Capacity
PET	Potential Evapotranspiration
PUE	Precipitation Use Efficiency
SARPN	Southern African Regional Poverty Network
SLAG	Settlement/Land Acquisition Grant
TLU	Transvaalse Landbou-unie
TSB	Transvaal Suiker Beperk
UFS	University of the Free State (formerly UOFS)
UOFS	University of the Orange Free State (presently UFS)
UP	University of Pretoria
WRB	World Reference Base for Soil Resources Working Group
WRC	Water Research Commission
WUEi	Irrigation Water Use Efficiency

EXECUTIVE SUMMARY

CHAPTER 1: INTRODUCTION

The objectives of the consultancy were:

a. To develop a general strategy for optimising the efficient use of primary water and land resources for effective alleviation of rural poverty, with emphasis on irrigated and dryland agriculture for subsistence farming communities and emerging commercial farmers.

b. To draft recommendations regarding approaches required during land restitution/redistribution to ensure efficient use of water and land resources and effective alleviation of rural poverty.

c. To draft recommendations regarding future research needs to ensure efficient use of primary natural resources for effective alleviation of rural poverty and promotion of food security.

CHAPTER 2: STUDY PROCEDURES

The study procedures consisted of:

- Studies of a large number of publications, reports and draft reports done in South Africa.
- Studies of relevant publications from elsewhere in the world.
- Personal and/or telephonic interviews and/or e-mail interactions with several persons inside South Africa and elsewhere in the world.
- Reference to relevant personal experience accumulated over many years.

CHAPTER 3: OVERVIEW OF RELEVANT INFORMATION

General: Rural poverty is one of South Africa's biggest problems. The consultancy looked at strategies to promote alleviation of rural poverty through optimising of the efficiency with which the scarce resources water and land are used.

Inter-relationships between agriculture and other economic sectors: There are important inter-relationships between agriculture and other economic sectors. Thus one needs to look at the whole picture and not at agriculture in isolation. Efficient resource use and alleviation of rural poverty is not possible in over-crowded rural areas. Thus, creation of the maximum job opportunities in other economic sectors, to draw as many people as possible away from being dependent on the land for survival, is imperative. This is presently not happening in South Africa. In reality job opportunities are dwindling.

The nature of agriculture: The highly seasonal nature of agriculture distinguishes it from other economic activities. Some operations perforce have to be completed within very short time spans, requiring long working hours for short periods. Labour legislation, *inter alia*, should make provision for this.

Categories of farmers in South Africa: The following categories of farmers can be recognised in South Africa:

- Subsistence farmers.
- Foodplot and backyard garden systems.
- Emerging farmers.
- Commercial farmers, including White and Black farmers and large scale farming by big companies and corporations (e.g. mining companies/ corporations)
- Land reform/restitution/redistribution farmers.

Realities regarding South Africa's physical agricultural resources: South Africa's physical agricultural resources are poor compared with those of the rich northern hemisphere countries. This is related to the fact that South Africa is much closer to the equator than those countries. This gives a much less favourable climate and much poorer quality soils. South Africa's rainfall is very low compared with world averages. It is also very unreliable and mainly in the form of inefficient thunderstorms. Potential evapotranspiration is very high, further reducing the efficiency of the rain. Soils are generally of a very poor quality.

Realities regarding the geographic distribution of South Africa's physical agricultural resources: Effective anti-apartheid propaganda created the impression that the former homelands had very poor agricultural resources compared with the White farming areas. This is incorrect. Only a few very small areas of former homelands receive less than 500 mm rain per annum, i.e. is too dry for crop production. In contrast all areas receiving less than 500 mm rain per annum (most of it below 400 and even below 200 mm per annum) were in the White farming areas. A 1995 Land and Agriculture Policy Centre report showed that over 80% of the high potential agricultural land of the present Eastern Cape Province was before the change of regime in 1994 already in the hands of Black small-scale farmers, while White farming in the province consisted mainly of extensive livestock farming in semi-desert areas receiving less than 400 mm rain per annum. Significant areas of former homelands have good quality soils. The former homeland areas thus have quite large unlocked agricultural potential.

Human resources: There are significant numbers of Black farmers with good potential to become successful commercial farmers, especially in the former homelands. They need large enough tracts of land ***per farmer*** and the necessary support services to fulfill this potential, however.

Non-agricultural factors determining the efficiency of agriculture and the selection of appropriate farming systems and technologies: A large number of non-agricultural factors determine the efficiency of agriculture and the farming systems and technologies that can be used effectively. The farmer has little or no control over these. Some of the most important of these non-agricultural factors include:

- Land tenure.
- Infrastructure.
- Poverty-related social problems.

Resource inventories, land suitability evaluation and land use planning: Optimisation of the efficiency with which basic resources like water, soil or vegetation are used, is not possible without good land suitability evaluation and land use planning. Proper land suitability evaluation and land use planning are not possible without high quality relevant resource information, collected by means of resource surveys.

Large amounts of valuable resource data and maps are available at the Agricultural Research Council Institute for Soil, Climate and Water (ARC-ISCW). Numerous resource surveys were also conducted in the former homelands during the apartheid era. The data from some of these, done at very high cost, have apparently already been lost. All efforts must be made to trace copies of these homeland survey reports before they are lost or destroyed. They should all go to the ARC-ISCW for safekeeping for future use and to be fed into the national resource data base. The ARC-ISCW, as national resource centre, should be tasked with collecting and collating all available resource data. The necessary legislation should be put in place to determine that copies of the data of all future surveys done in the country, irrespective of who commissioned or conducted them, must be submitted to the ARC-ISCW for inclusion in the country's resource database.

Good land suitability evaluation criteria and systems should be developed.

Appropriate technologies, best farming practices and related matters: An appropriate technology is one that is suited to the nature of the natural resources, the skills of the farmer and aspects like availability of production capital, infrastructure, etc. The best farming practice is the one that will give the best results within a specific context of a wide range of factors.

In ***dryland*** cropping it can broadly be said that in areas with relatively low rainfall water management becomes the over-riding factor, while in high rainfall areas soil fertility management becomes over-riding. The danger of generalization is emphasised in regard to practices like conservation tillage, fallow systems and water harvesting. South African data showing that these are in some situations not beneficial, and even negative, are discussed. Indications are given of situations where they may give positive results.

In ***irrigated*** agriculture there is ***no*** such thing as ***a*** *"state of the art"* technology that is the best. What is best varies in space and time. Three of the main factors determining the suitability of a specific technology for a specific situation are:

- Availability of the infrastructure required for that technology.
- Economic considerations.
- Matching of the technology with the basic natural resources (climate, soil, slope, water, etc.). *The report discusses this **very important** aspect in quite some detail for a wide range of irrigation technologies.*

Specific attention is given to two simple irrigation technologies that are widely used highly successfully in ***small-scale farming*** in other African countries and elsewhere, but not yet in South Africa, viz.:

- ***Treadle pumps***, i.e. manually operated pumps that bring about ***75% labour saving*** compared with rope and bucket systems, thus enabling families to irrigate much larger areas and thus gain more income from irrigated cropping.
- ***Subsurface clay pot irrigation***, with which ***water savings of up to 70%*** has been found in small-scale vegetable production systems.

Other special technologies and techniques, like gated pipes and short furrow irrigation are also discussed.

Agricultural and rural development: Agricultural and rural development is much more than just increasing production. Extensive discussion of this is given within the South African context. To illustrate the principles several examples from agricultural development projects in the former homelands are discussed. Just about all these schemes failed from a development viewpoint, despite many millions of rands being pumped into them, because they just simply became very expensive capital intensive production projects, operated at great losses, instead of development projects. Care must be taken that present revitalization of irrigation schemes do not end up in the same situation.

Examples of farming successes by small-scale Black farmers who rejected prescribed farming systems and developed their own systems are given. It is emphasised that the key to successful agricultural development is empowerment of farmers to individually take their own decisions on their own farms.

The importance of the development of rural industrial nodes in synergy with agricultural development is stressed.

Land reform: The central theme behind the discussion on land reform is:

> ***The primary objective of land reform must be the enhancement of the quality of life of rural Black South Africans in particular and all South Africans in general. All land reform policies and strategies must be aimed at achieving this objective.***

A brief ***history*** of the "musical chairs" in regard to land ownership in South Africa is given. As early as 1936 White farms were bought out in order to settle Black communities on them. During the 1960s-1980s this reached a peak when Black communities were removed, in many cases forcefully, from isolated "black spots" and large numbers of White commercial farms adjoining homelands were bought out, whether the owner wanted to sell or not, with a view to eventually settling displaced Black farmers on them, all as part of a policy of homeland "consolidation".

The ***target*** with the land reform programme is that by 2015 30% of the agricultural land that was in the hands of White commercial farmers at the change of regime in 1994, must be in the hands of Black South Africans. There was initially uncertainty whether the target was 30% of all agricultural land or 30% of White-owned land, but this has been cleared up.

There are ***two types of land reform***. The first is *land restitution*, where communities claim back land from which they were removed against their will. The second is *land redistribution*, where White commercial farms are bought out to make up the rest of the 30% target over and above the land restitution land.

There are essentially ***two types of funding arrangements for land reform***, viz. the Settlement/Land Acquisition Grant (SLAG) programme and the Land Redistribution for Agricultural Development (LRAD) programme. The SLAG programme makes money available on a per family basis. The amount is fixed and very small. The LRAD programme makes money available on a per person basis. It works on a sliding scale according to what a person can contribute. The more you can contribute, the more you can get, i.e. the poorer you are, the less you get and the more you already have, the more you can get.

Careful consideration of ***criteria for measuring the success*** of land restitution and land redistribution is required. Presently it seems that every time a land claim has been settled and the land handed over to the claimants, it is described as another land claim that has been settled successfully. This is surely not a criterion for measuring success. In the present report it is considered that ***a land reform case can be considered as being a success only if the people receiving the land have succeeded in making fruitful use of the land and that in the process poverty has been alleviated and/or food security improved.***

The status of land reform in South Africa: The overall picture that one gets, is that the land reform programme has failed miserably. The most serious crippling problems were totally predictable and could and should have been anticipated and avoided.

The first problem is that the farms were bought out and handed over to people with little or no production capital with which to farm. The consequence is that in several cases former productive grain farms have been lying "dormant" now for several years. In the case of perennial crop (orchard, vineyard, plantation) farms the orchards, vineyards or plantations have become totally destroyed and it would require many millions of rands to get them back into production again.

Secondly, the small amounts of money made available per family under the SLAG programme or to the poorest individuals under LRAD, meant that very large numbers of families or individuals had to pool their money to be able to buy a farm. In several cases it meant that a non-homogeneous group had to be rounded up together to get enough funds. One of the consequences was so little land per family that they cannot make a living from farming. Furthermore, it was found that serious internal conflict and strife is a general problem throughout group projects. Aggravating factors of the latter appear to be:

- The larger the group, the bigger the conflict potential.
- The more diverse the group, the bigger the conflict potential. This was strangely enough unexpectedly even found in land restitution cases, where one would not expect it.
- Any frustration, e.g. delays in meeting expectations or realization that the available land cannot provide a reasonable livelihood, can raise the level of conflict to "debilitating levels", to use a term of Moloi *et al*. (1997).

Apart from the lack of production capital and the inadequate size of the land the new farmers mostly do not have the skills or experience required for successful intensive commercial farming.

Positive and negative aspects of LRAD:

Positive aspects of LRAD include:

- The flexibility of the system.
- It makes family farm type projects possible (as opposed to collective group farms).
- Well-off Black entrepeneurs can become commercial farmers.

Negative aspects of LRAD include:

- The family-farm projects redress the racial imbalance of land ownership, but the number of beneficiaries is small and the cost for government is high relative to the number of beneficiaries.
- Well-off entrepeneurs are often not interested in full-time farming and absentee farming arises.
- In some cases the applicant's objective is more related to the prestige associated with owning land than with economic needs.

"External" managers: One way to overcome the lack of management skills and experience of the new farmers is by appointing experienced farm managers (usually White). This not without flaws since it often leads to conflict within groups or conflict between the group and management.

Mentorships: Another way of mitigating the problem of lack of farming experience amongst the new farmers, is by means of mentorships. This is where a specific experienced farmer acts as guardian for a new farmer or group of farmers. Grain-SA has a special mentorship programme. The most important finding about mentorships is that a mentorship succeeds only if it involves only giving advice, guidance and skills training. The mentor must never do things for his protégé. The latter is the surest road to failure. The mentor must just guide the protégé towards self-development and independence.

Joint ventures/Strategic partnerships: Due to the destructive experiences at especially high value intensive perennial crop farms, the Department of Land Affairs has apparently decided that in future settlement of land restitution claims will be made only on condition that external experienced consultants are involved as strategic partners.

Comments by Raath of Agri-SA: The two most important comments by Raath of Agri-SA are:

- At top policy level (Pres. Mbeki, Minister of Agriculture Didiza, etc.) there is ample understanding of what is required to make a success of South Africa's agriculture and land reform.
- The ability of the management of the Departments of Agriculture and Land Affairs, as well as the ARC and Land Bank, to develop and implement these policies and programmes coordinated and harmoniously, in cooperation with the private sector (especially organised agriculture), falls far short.

The Russian route: The Russian land reform programme, aimed at settling new individual small-scale farmers, instead of the former collective state farms, failed because the new farmers lacked production capital and management skills. Influenced by strong lobbying from rich, big companies, the Russian government decided to abandon the programme and to sell the agricultural land to big companies (not farmers). Makeev (2003) fears that this will lead to the local rural people being exploited by these companies (having to work for meagre wages) or that they will be replaced by cheap foreign labour and end up unemployed.

Research, extension and training: Appropriate and relevant research, extension and training are key requirements for optimising the efficiency with which natural agricultural resources are used, effective alleviation of rural poverty, enhancing food security, ensuring sustainable resource utilization and remaining competitive in international markets. The emphasis is on appropriate and relevant.

Agricultural research in South Africa: South Africa used to have a history of high quality agricultural research that was internationally recognised. ***True*** agricultural research (by people trained in ***agricultural sciences***) in South Africa is for various reasons under great pressure at present. There has been a gradual fragmentation of agricultural research over the last thirty years. Government funding of agricultural reasearch has dwindled. Problems in the ARC, especially in regard to research funding and staff management, has negative impacts on this body which should be the flagship of agricultural research in South Africa. ***It is absolutely essential that South Africa must have a vibrant and dynamic agricultural research setup of the highest quality.***

Extension: Research is meaningless and a waste of funds, mapower and time if its findings cannot be effectively transferred to farmers and are not adopted by them. Farmers cannot adopt research findings that are not realistic, appropriate and relevant to their specific situations, however.

In order for research data to be available, it must be published. In this regard the following is stressed:

- *Researchers must be encouraged to publish their research findings in **South African** scientific journals*. If necessary, incentives must be created to promote this. Only in this way will it be widely available and freely accessible for other South African scientists, extension officers, etc. who need it. *After all, South African research funding should be used to the best benefit of **South Africa***.
- *Researchers must be encouraged to publish their research findings also in **South African popular and semi-popular** scientific papers, so as to make it available for extension officers and well-qualified farmers.* If necessary new journals of this type must be started.
- *A special unit should be established within the ARC for the publication of simple instruction pamphlets. In this regard it is imperative to publish it in appropriate languages, and furthermore in appropriate dialects, jargon or slang.*

The importance of posts for a special category of “subject matter specialist” is stressed. These are scientists who fit in as links between researchers and extension officers.

A dynamic corps of extension officers is essential, especially to cater for the big needs of the new emerging commercial farmers, in order to ensure efficient dissemination of information and advice. The present situation with regard to agricultural extension in South Africa is totally unclear.

Aspects such as farmer-to-farmer extension, farmer field schools and the international trend towards having facilitators rather than advisers are discussed.

Education and training: Appropriate, high quality education and training of different types and at different levels are absolutely essential for successful agriculture. ***It is imperative that the training must be done in South Africa, because our conditions differ so vastly from North America and Europe.***

Degree education and training in agriculture at ***universities*** should include adequate components of both high level basic sciences on the one hand and hands-on practical training on the other hand. Top grade ***agricultural specialists*** (e.g. in agronomy, horticultural science, livestock science, soil science, plant pathology, etc.) should be produced. Although they should receive top grade training in their fields of specialisation, their "heads must also be turned the right way". I.e. they must understand that when they start working, e.g. as researchers, they have to fit into a bigger, more holistic, picture that they must understand. They should also realise the importance of working in partnership with farmers and extension officers and not think that they know everything and the others must listen to them. They must also learn to listen to farmers.

Specialised BAgric and BInstAgrar degrees are important for accommodating ***good*** candidates who, due to school education deficiencies or other reasons cannot get entrance into the BScAgric stream. In addition to matric results other criteria, like performance at agricultural colleges, should also be used for screening candidates for admission. These aspects are discussed in detail.

It is the responsibility of the Department of Agriculture, probably via the ARC, to make undergraduate bursaries available for studies towards degrees in agriculture, with the emphasis on ***agriculture***. Although preference can be given to candidates from certain groups to redress past inequalities, the bursaries should never be confined to just one racial group or certain groups. The latter would not be in the best interest of agriculture in South Africa.

Post-graduate training in agriculture has lately suffered because of ARC policies. The newly announced post-graduate bursaries for agriculture by the National Research Foundation (NRF) could greatly help to alleviate problem, ***provided that***:

- The bursaries are awarded to obtain degrees in ***agriculture*** and ***not*** for degrees remotely related to agriculture.
- Students are not restricted in their choice of university.
- Although bursaries may preferentially be awarded to a specific racial group, they may ***never*** be confined to just that group.

These aspects are also discussed in detail.

University training in agriculture at South African universities has major problems. The basic problem is that there are too many universities offering degrees in

agriculture, with the result of non-viable small faculties and departments. Universities have responded by lumping departments together as conglomerates of a number of different fields. Furthermore, agricultural faculties were merged with other faculties – usually natural sciences. The latter is an untenable marriage because the basic differences in mindset ***required*** between agriculture and pure natural sciences are just simply too big. Both the lumping together of departments and the merging of agriculture with other faculties ***are having very negative implications for*** the efficiency and relevance of ***agricultural education and training at universities***. *The* ***only solution*** *will be to create separate faculties of agriculture again and, where necessary, to "unbundle" departments again. This must be accompanied by reducing the number of faculties of agriculture* ***urgently*** *by means of a sensible rationalisation programme between universities.*

Traditionally there are ***two different types of diploma training at agricultural colleges***, and both of these are still required, viz.

- Training of farmers.
- Training of extension officers.

Training of farmers should address both farming technologies and practices and farm management. Training of extension officers should give them adequate knowledge of the enterprises with which they are going to work and practical hands-on training in farming practices so that they can understand farming and the farmers that they work with better.

The inclusion of ***agriculture as a subject at rural schools*** could play a very useful role, but then it must be done properly and sensibly.

Extensive discussions are given on the all-important topic of ***farmer training***. There is a move towards talking more about "facilitators" rather than "trainers". Political support, appropriate policies and assured sources of funding to train facilitators/trainers are essential. It is suggested that the Department of Agriculture, via the ARC, should provide this. Training of trainers is essential because it has been observed that the traing given to small-scale farmers by some individuals/bodies in South Africa is "hair raising". It is emphasised that ***the trainers of trainers must be South Africans***, who:

- Know the local resources, conditions and people.
- Have studied the latest approaches thoroughly.
- Have extensive field experience in developing areas and communities in South Africa.
- Have proven success track records.

In addition to training in technical skills new farmers must also receive training in marketing and labour management.

Extensive discussions are given on the important ***lessons that can be learned from California***.

CHAPTER 4: PROPOSED GENERAL STRATEGY FOR OPTIMISING THE EFFICIENT USE OF PRIMARY WATER AND LAND RESOURCES FOR EFFECTIVE ALLEVIATION OF RURAL POVERTY, WITH SPECIAL REFERENCE TO IRRIGATED AND RAINFED CROPPING FOR SUBSISTENCE FARMING COMMUNITIES AND EMERGING COMMERCIAL FARMERS

Introduction: The objective of this chapter is to propose a general strategy and not to discuss or describe detailed practices, etc. to implement.

Holistic approach required: Optimising the efficiency with which primary resources are used, requires a holistic approach. This must be the overall principle guiding the strategy. Although correct understanding of scientific principles and implementation of appropriate technologies are critically important, these alone will not give success. Social, cultural, socio-economic, political and various other factors must also be considered. Non-agricultural factors are often more decisive than farming practices.

Ensure political commitment: Ensuring the required political commitment is the most critical step in any strategy aimed at agricultural development. Without such commitment it is extremely difficult, if not impossible, to bring about the development that is needed for optimising resource use and alleviating rural poverty. Political commitment is required not only from government, but also from opposition politicians and extra-parliamentary bodies.

Ensure that politicians, opinion-formers, pressure groups, the media and the public know and accept the realities regarding South Africa's land and water resources and their geographic distribution: The biggest potential for drastically improving the efficiency of the use of water and land is in the former homeland areas with moderate to high potential for dryland and irrigated cropping. Some of these areas can become the food baskets of the country. A key facet in a strategy to bring about optimum resource use, alleviate rural poverty and promote food security must be to urgently find a way to break the "brain blockage" of the people who believe that the former homelands have no or little agricultural potential.Unless politicians, opinion-formers and pressure groups convince themselves of the potential of these areas, no meaningful urgent steps to develop them will be taken or supported.

Strive towards reducing the number of subsistence farmers to the absolute minimum achievable and towards optimising resource use efficiency in the remaining subsistence farming sector: Resource use efficiency under subsistence farming is poor and it also leads to serious land degradation. Most importantly, it does not offer a proper standard of living to subsistence farming families or the opportunity to improve their livelihood. In order to reduce the number of subsistence farmers, there must be a strategy to draw them away from the land. This can only be done by creating employment opportunities elsewhere. Drawing them to towns and cities without equiping them with the skills required for jobs that are available will be futile, however.

Promote and stimulate integrated rural development: Integrated rural development, including all sectors, like agriculture, industries, tourism, etc. must be

promoted, especially in areas well-suited for it. Such areas would, for example include the former Transkei and Ciskei, where water is abundant and an export harbour is close by – and there is a lot of rural poverty that must be relieved.

Ensure that all unused or underutilised agricultural land with dryland cropping or irrigation potential in the former homelands and state land elsewhere is brought into productive use: Areas with moderate to high cropping or irrigation potential are lying idle in the former homelands. Consequently their present resource use efficiency is low as is their contribution towards alleviating rural poverty. This land would be ideal for the development of emerging farmers.

Ensure that proper land use planning is done, based upon appropriate high quality resource surveys and land suitability evaluation: Optimisation of resource use is not possible without proper land use planning based upon high quality soil surveys and land suitability evaluation. It is overall important, but especially for emerging farmers, because they cannot afford to suffer losses due to cultivating non-arable land or implementing inappropriate technologies. The ARC-ISCW should be tasked with the responsibilty to ensure quality control in regard to resource surveys and land suitability evaluations.

Ensure that appropriate technologies and farming practices are recommended, adopted and applied correctly: A major problem is the failure to realise the importance of site-specific requirements and thus there is a tendency to generalise and use "recipes". Furthermore, scientists often look at the technical side only, forgetting the importance of non-technical factors. Another problem is that people may believe that a specific technology should work best under a specific set of circumstances and recommend it, despite the fact that research might have proven that it does not work.

Promote/employ appropriate land tenure systems: Land tenure system has a very big influence on resource use efficiency and on the potential to alleviate rural poverty. Therefore any strategy to improve these should have a strong component focusing on land tenure.

Strive for the institution of labour laws that are fair to labourers, but flexible and realistic enough to cater for the special circumstances of agriculture: The present labour laws are agriculture unfriendly, since they do not cater for the special circumstances of agriculture. Aspects of concern are, *inter alia*, minimum wages, maximum working hours and the role of children. In many cases big commercial farmers can mitigate the effects of the labour laws by intensive mechanisation. This creates a larger number of unemployed rural people, some of whom may then try to scratch out a living as subsistence farmers in already over-crowded rural areas.

Small-scale resource-poor emerging farmers are in the worst situation because they do not have the capital for intensive mechanisation, nor are their farming systems big enough to make it a viable option. They are thus much more dependent on labour than larger scale operations. They are consequently very vulnerable to the effects of restrictive labour laws. In small-scale family farming the contributions of children to the labour force is critically important, especially during peak labour demand periods.

Promote and maintain a dynamic agricultural research and extension infrastructure and ensure that both research and extension are appropriate and of a high standard: Because the resources, conditions and circumstances in South Africa are so radically different from those of the rich northern countries, we cannot simply "import" research findings from them and it is imperative that we must do our own research. Small-scale farming has special research needs and requires special research approaches. The ICTA approach developed in Guatamala is proposed as a strategy for use in small-scale farming research. Research is meaningless if it is not transferred effectively to farmers via a dynamic extension service.

Promote agricultural publications and create mechanisms for their publication: It is very important that South African research data must be published in South Africa to achieve maximum impact from it. Publications should include scientific journals as well as semi-popular and popular journals and practical bulletins and pamphlets.

Provide structures and systems for farmer training and development: Farmers need to be in a continuous learning process to be able to cope with the changing demands on them due to changing technologies, changes in markets, changes in labour laws, agricultural politics, etc. Training of emerging commercial farmers is particularly critical to enable them to become fully fledged commercial farmers. It does not help if farmers have land, capital, etc. if they do not have the necessary practical farming and/or management skills.

It is the responsibility of government to provide the required infrastructure for farmer training.

University and college education and training of researchers, subject matter specialists and extension officers: A key part of any strategy to promote optimum resource use efficiency and alleviation of rural poverty should be to ensure high quality appropriate university and college education and training for producing the required researchers, subject matter specialists and extension officers. One of the important strategies to optimise this training must be to reduce the present excessive number of universities offering degrees in agriculture and to create a smaller number of viable faculties.

CHAPTER 5: APPROACHES REQUIRED DURING LAND RESTITUTION/ REDISTRIBUTION

Introduction: The general picture emerging regarding the the land reform programme is one of agriculture grinding to a complete standstill on formerly productive annual crop farms and horrendous destruction of former highly productive perennial orchard or plantation farms after being handed over. Suggestions are made under the following headings in order to try to to put a brake on these destructive outcomes.

Define and describe the objectives and the processes of the land reform programmes very clearly and communicate them transparently: It is essential that the objectives of the land reform programmes must be defined very clearly. This should help the Department of Land Affairs to guide the process better towards achieving the objectives. Presently the impression is created that the DLA only has a

target of transferring 30% of previously White-owned farmland to Black hands by 2015 and have no other objectives with the land reform programmes. Aspects like alleviation of rural poverty or improving food security are never mentioned. It is imperative that DLA must clearly define the objectives of the land reform programmes. In order to avoid confusion and make people less restless the objectives must be communicated clearly and transparently to the nation.

Economic units, land tenure and management models and support systems: If the objective of land reform is to enable each household that receives land (individually or as part of a group) to make a decent living from farming the land, then it means that the size of the land allocated per household must be adequate to constitute an ***economically viable unit***. Presently the amount of money for purchasing land made available by government per household or poor individual is just simply far too little to achieve this. The amount per household or poor individual will have to be increased drastically if success is to be achieved with land reform. This will, of course mean that fewer people will receive land, but under the present system almost nobody seems to achieve a proper livelihood in any case.

A lengthy discussion is given on land ***tenure and management models***. The most important is that for each case a definite legal arrangement must be put in place ***before*** the land is handed over, so as to avoid untenable situations such as "free riding" or a few young turks claiming exorbitant "salaries" for themselves and the rest getting more-or-less nothing.

Land reform cannot succeed if the new emerging farmers are not backed up by the necessary ***support services***. It must be kept in mind that one is dealing here with people with very little or no experience or knowledge of commercial farming, especially no farm management skills, and little or no production capital. It is government's resposibility to put the required support services in place and to maintain and fund them.

High-income perennial orchard and plantation crops: Special approaches are required for the situations where farms on which high income perennial orchard or plantation crops are grown, are handed over to communities under land reform programmes. High income perennial or orchard crops cannot just simply be left dormant for some time with the hope of using them again later. Without uninterrupted proper high level management and adequate inputs the orchards and plantations will just simply die and the whole farm destroyed, as has happened in so many cases. This means a destruction of assets worth many millions of rands and further many millions of rands needed to bring them into production again by establishing new orchards and putting in new irrigation and other infrastructure. In addition it takes some years after the establishment of a new orchard before it is productive and bears profits again.

Where such a farm has been handed over in the past and the orchards and infrastructure already destroyed, one of at least the following four options can be used:

- The farm can be left as it is and the community can revert to purely subsistence farming, with each household planting some rainfed maize and a patch of vegetables on the small area of land available to them.

- A start can be made by growing high-income annual crops (special industrial crops or vegetables) to generate quick income that can be used to start with the stepwise establishment of orchards again. During this period the community will need a knowledgable partner(s) with enough capital to get the production off the ground and provide management expertise. This initial period should also be used for the training of community members to become successful farmers or potential future farm managers.
- It could be decided to start directly with the re-establishment of orchards/plantations. In such case it can only be done as a joint venture including a partner with enough capital to pump in and who would provide management. Since it would take some time for profits to start to accrue there will be a number of years without income from the farm for the community, except for wages that they could earn by working as labourers on the farm.
- It can be decided to rather sell the farm to some rich company and for the community to start all over again somewhere else. Since we are talking about farms that have essentially been destroyed and will require enormous inputs to revitalise them, it must be realised that they cannot be sold for nearly the same amount for which they were bought out when they were in a productive developed state.

In the case of farms of this type that have not yet been handed over, it would be unthinkable to in future hand them over unless one of the following two conditions are met:

- They must right from the start employ a capable manager ***or***
- They must right from the start make it a joint venture undertaking.

Communicate openly about successes and failures: An important approach that the Department of Land Affairs should follow to improve resource use efficiency and alleviation of rural poverty is to communicate very openly and clearly about the successes and failures under the land reform programme and the reasons for the successes or failures. Criteria for measuring success should be:

- Whether productive use of the land was maintained after the farm was bought out ***and***
- Whether the families who received the land are maintaining a decent standard of living.

Open communication would ensure that successes dispell the scepticisms of those that believe that the programmes are invariably doomed to failure. A condition for this is that the media and sceptics should be taken on visits to success cases. Conversely open communication about failures will hopefully warn activists about the tragedies caused to communities by injudicious handing over or grabbing of land.

Attend to areas vacated by communities who have moved to commercial farms under land reform programmes as well as to other unused areas in former homelands: Where a community under a land restitution claim now move back to the original land from which they were removed, their former resettled land in the homeland obviously must now become vacant and unused. They can not be allowed to keep one foot on this land. The vacated land should be made available to other people who desparately need land.

Understand the fears and trauma of the White commercial farmers: It would help to drive the land reform programme more smoothly if an honest attempt is made to understand the fears and trauma of the farmers whose farms are under land restitution claims or whose farms are targeted for land redistribution, if they are handled with empathy. The following are, inter alia, relevant:

- A farmer who has seen the destruction of farms that have been bought out (orchards destroyed, infrastructure pulled out and sold for scrap, houses demolished) must be horrified at the prospect that the farm which he (and often also his ancestors) has built up, will suffer the same fate after it is bought out and handed over. The phrase *"I will not sell my farm for land reform over my dead body"* then gets a different connotation.
- For some farmers it is the second time in 30 or so years that they are bought out. These are the farmers that were bought out for homeland consolidation and then bought land in "black" spots from which Black communities were removed and are now bought out again under land claims.
- In land redistribution cases farms may be bought out which have been in families for many generations. The land has also to them become "the land of our fathers" and sometimes the graves of ancestors rest in family graveyards on the farm.
- The "willing buyer, willing seller" should be applied appropriately in land ***redistribution*** cases. The proper route would be to buy all farms that are for sale in the market, then those of farmers that want to sell and only after that should negotiations start for farms that are still needed to fill up the 30% quota.
- It would enhance goodwill of private individual farmers if it would be made categorically clear that the vast areas of company/corporation owned farmland will be part and parcel of the pool from which land will be purchased for land redistribution.
- It would enhance goodwill if all out steps are taken to settle Black farmers on land that is lying vacant in former homelands, e.g. farms bought out for homeland consolidation. This will prove that government is busy with a programme of Black farmer development and not with a vendetta against White farmers.

Will the farms that have collapsed after handing over perforce lead to the Russian route?: If the buying out and collapse of especially expensive farms producing high value perennial crops continues, a point may be reached where it will cost so much to redevelop them that only big rich companies/corporations will have the capital to do this. This may mean ending up in the Russian route. South African labour legislation will prevent the companies from using people from the communities as cheap labour. The companies will be financially strong enough to mechanise to the ultimate, however, vastly increase the number of rural unemployed in some regions.

It is suggested that the situation could possibly be mitigated by trying to find an acceptable and viable variation of the "Nucleus Estate Smallholder" (NES) model.

CHAPTER 6: RECOMMENDATIONS REGARDING FUTURE RESEARCH NEEDS TO ENSURE EFFICIENT USE OF PRIMARY NATURAL RESOURCES FOR EFFECTIVE ALLEVIATION OF RURAL POVERTY AND PROMOTION OF FOOD SECURITY

General introduction: Just about all reports and theses on research done in South Africa over several decades on topics related to the fields of this report have ended with recommendations for follow-up research that was required and/or new research needs identified during the specific project. Unfortunately some important recommendations have not been followed up and important information is still lacking as a result. It is strongly recommended that someone be urgently tasked to go through the relevant reports, theses and other publications and compile a list of the important recommendations for further research made over the last 25 to 30 years that have not been followed up and should require urgent attention.

Recommendations for specific research/studies to be undertaken urgently: For each of the following recommendations a motivation is given in the report.

Non-technical research

- Research towards finding an effective strategy for convincing politicians, activists, officials of relevant government departments, opinion-formers, the general public, the media, etc. of the realities regarding the nature, qualities and geographic distribution of South Africa's primary natural agricultural resources.
- Research towards finding an effective strategy for convincing politicians, activists, officials of relevant government departments, opinion-formers, the general public, the media, and prospective farmers of the realities regarding the capital and management requirements for successful commercial farming – especially for intensive, high value cropping systems.
- Studies on the impact of agricultural unfriendly labour legislation – with special reference to the effects of minimum wages, inflexible working hours and other inflexibilities and to the importance of the roles of children in small-scale family farming.

Research in regard to irrigation technologies

- Studies on simple, easy to manage water and/or labour saving irrigation technologies for small-scale farming (clay pot subsurface irrigation, treadle pumps, gated pipes).
- Studies on the selection of appropriate irrigation technologies for different soil and climatic conditions.
- Development of instruction manuals for the planning, implementation and management of all types of irrigation systems, from micro-sprinklers through furrows to clay pots.

Studies on irrigation scheduling

- Collation, analysis and synthesis of South African research data on irrigation scheduling.
- Studies on high frequency deficit irrigation.

Studies on optimising rain water efficiencies under dryland cropping conditions

- Studies on water harvesting.
- Studies on conservation tillage techniques.

Studies on farming systems and indigenous farming techniques/practices

Studies on the wheat production potential of the former Ciskei and southern and central parts of the former Transkei

CHAPTER 1

INTRODUCTION

1.1 GENERAL

During June/July 2003 the Water Research Commission approached me with a request to conduct a short-term consultancy, primarily aimed at the development of a general strategy for optimising the efficient use of primary water and land resources for effective alleviation of rural poverty in South Africa.

1.2 OBJECTIVES

The consultancy has three sets of objectives, viz.:

a. To develop a general strategy for optimising the efficient use of primary water and land resources for effective alleviation of rural poverty, with emphasis on irrigated and dryland agriculture for subsistence farming communities and emerging commercial farmers.

b. To draft recommendations regarding approaches required during land restitution/redistribution to ensure efficient use of water and land resources and effective alleviation of rural poverty.

c. To draft recommendations regarding future research needs to ensure efficient use of primary natural resources for effective alleviation of rural poverty and promotion of food security.

1.3 APPROACH

The purpose of this document is to develop general strategies and approaches. It is, therefore, not intended to deal with “tactics”, e.g. detailing technologies to be preferred, etc. The main audience for which it is prepared, are decision-makers and opinion-formers, although scientists would hopefully also study it to establish how and where they should contribute in the overall picture. It is, therefore, written as a semi-popular document and not as a specialised scientific report.

CHAPTER 2

STUDY PROCEDURES

This chapter covers the procedures followed to compile an overview of the relevant information. Some adjustments had to be made to the original workplan in the light of findings during the collection of the data and difficulties experienced in certain respects. Two of the main aspects in this regard are:

a. It was difficult to find enough examples of successful commercial small-farmer development, especially within the land reform programme, which could serve as blueprint for future development. Even the two cases which were listed in the original proposal to be included to serve this role in comparative studies (Middle Letaba and Phokoane) have during the last ten or so years folded due to external factors. Comparison of the reasons for their success some ten years ago with the reasons for their demise since then, provided valuable insights, however.

b. The extremely dark and frightening picture emerging in regard to the areas that have been subject to land restitution/redistribution and the potentially horrific impact thereof on rural poverty, has necessitated much bigger investigations into these than originally envisaged.

The study procedures consisted of the following:

a. Several South African reports and publications dealing with principles of small-farmer development and/or reporting on existing small-farmer development projects in South Africa, including WRC reports, proceedings of WRC workshops, other publications, reports and theses were collated and analysed. In addition I was fortunate to obtain a number of excellent unpublished draft reports.

b. A limited number of relevant reports and publications from other Southern African countries, the rest of Africa and elsewhere in the world, were studied.

c. Personal and telephonic interviews were held with various persons involved with agriculture and/or rural development in South Africa.

d. Very valuable information was obtained via e-mail from various persons in South Africa and elsewhere, including Prof. Alexander Makeev, Director of Russia's Foundation for Agrarian Development Research at Moscow State University.

e. I drew on personal experience pertaining to agriculture in general, agricultural development and small-farmer projects in rural areas of South Africa and other African countries.

f. I attended to all aspects pertaining to the topic, such as quality of the natural resources, appropriateness and correctness of land suitability evaluation and land use planning, involvement of the local communities and farmers in the planning, development and management processes, infra-structure, support systems, etc.

CHAPTER 3

OVERVIEW OF RELEVANT INFORMATION

3.1 GENERAL

Rural poverty is one of South Africa's biggest problems, and possibly the biggest of all problems that the country is facing. This problem is not unique to South Africa. Worldwide 75% of the poor people live and work in rural areas, and depend on agriculture for their livelihoods (Watson & McIntyre, 2002). According to them for Africa this figure is 90%.

Watson & McIntyre (2002) point out that presently access to food is the primary problem for the 700 million hungry people of the world, not food availability. They describe it as "primarily a function of income". On a global basis much more food is presently produced than is needed by the world population. The developed countries of North America and Western Europe indeed have mountains of surplus food that they don't know how to get rid of. At some stage in the late 1980s the government of the USA instructed its farmers to withdraw 20 million hectares (much more than South Africa's total arable land of 14 million hectares) from grain crop production in an attempt to reduce the growth in grain surpluses, threatening to withdraw their subsidies if the farmers did not conform.

South Africa is often described as "the world in one country". Unfortunately this is also true in regard to the above. By September 2003 the country had such a large surplus of white maize, the staple food for the majority of the population, that Grain-SA advised farmers to plant 20% less maize the following season (2003/4) to prevent the price from dropping so low that production becomes totally uneconomical (newspaper reports). At the same time De Lange (2003) discussed the problem of "long-term, chronic food insecurity" or "chronic hunger" experienced by a large proportion of South African households. Based on information in reports of Statistics South Africa she states: "*Only **35%*** of households in in the thirteen poorest District Municipalities have '***never** experienced food insecurity*'. Nationally this figure is 51%. *For a **third** of households hunger is a **regular** part of life* – even when there is no official 'famine'."

The key part of the present document would thus be focussed on strategies to promote alleviation of rural poverty through optimising of the efficiency with which the scarce resources water and land are used. The term used is "optimising", not "maximizing". FAO (1996) emphasises the importance to find the correct balance between equity and efficiency in regard to the use of these resources, because more equity often leads to less efficiency.

Finally, the importance of addressing the requirements of inter-generational equity should be kept in mind. Basically this requires that resource degradation must be prevented and that the necessary steps must be taken timeously to ensure adequate food production for much larger future populations.

3.2 INTER-RELATIONSHIPS BETWEEN AGRICULTURE AND OTHER ECONOMIC SECTORS

There are very important inter-relationships between agriculture and development in other economic sectors. Some thirty or so years ago it was quite widely accepted that agricultural development was a prerequisite for successful economic development. According to Watson & McIntyre (2002): ”Typically, a one dollar increase in agricultural production generates almost two-and-a-half dollars in overall economic growth.” The rich industrialised countries of North America and Europe all had a strong agricultural base. In Japan strong industrial development followed on the back of successful agricultural development. During the same period India’s attempts to bring about industrial development without getting agriculture going, failed. The situation in India later changed dramatically, however, due to the so-called “Green Revolution”. This, *inter alia*, quadrupled wheat yields in that country, and kick-started industrial development. The incidence of rural poverty in India (and China) also declined as agricultural growth and the purchasing power of rural households rose (Watson & McIntyre, 2002).

On the other hand it is very important that as soon as economic development gets going the number of rural households, and especially the number that are dependent on the land (agriculture) for their livelihood, must decline drastically. It is just simply not possible for a very large number of families, each with a tiny piece of land, to generate an acceptable standard of living out of agriculture. In poor less developed countries typically more than 70% of the population depend directly on the land for their existence, whereas in the United States this figure is about 2%.

South Africa is usually seen as having a dualistic agricultural sector. The situation is no longer so simple, however, as will be outlined in Section 3.4. On the one hand in the simple dualistic model is a very strong commercial agricultural sector, which formed the foundation for the country’s industrial and mining development. This sector has achieved remarkable success, when considering the extremely poor natural resource (soil and climate) base that they have to cope with. Laker (2000; In press) and others have pointed out how poor this resource base is when compared with the high agricultural potential of the rich northern hemisphere countries. “It is clear enough that decay of a profitable farming sector could be a disaster for your country” (Makeev, 2003). It is not implied that an “all white” commercial agricultural sector should persist. It means that the process of land restitution and land redistribution should be managed such that it does not destroy the commercial agriculture sector, or a large part of it, in the process of transferring the land to “Black” ownership. Unfortunately the measures and structures required to ensure that this does not happen, have not been put in place and consequently thus far land restitution/redistribution has been disastrous. This is perhaps not yet so much in terms of the national economy and food security at national level, but very definitely in regard to aggravating rural poverty and household food insecurity, as will be outlined later.

On the other hand is the small-scale traditional farming sector, mainly situated in the former homelands. Simplistically this is often referred to as “subsistence” farming. Due to several factors agricultural production per unit area (or unit water) in this sector is extremely low, despite the fact that on average the former homeland areas are

blessed with natural resources (soil; climate) that have ***much higher*** average agricultural potential than the average for the commercial farming areas of the country. (See e.g. Laker, 1976). There is big potential in these areas for transforming poor subsistence farmers into well-off commercial farmers, if the constraints can be eliminated. Because of the very nature of some of these constraints, especially those related to land tenure and culture, it may be extremely difficult to overcome them. One of the requirements for agricultural development in these areas, would be to draw a large number of people permanently from them to urban areas. Under the previous regime this was not possible because of influx control and the fact that workers in the mines and industries were migrant workers, who perforce had to retain their claim to land in the "tribal" areas, as a "social security" cover. Job losses due to international boycotts of mines and industries forced increased numbers of people back to these areas, thus aggravating rural poverty and food insecurity. It would logically have been expected that this trend would have been reversed after the change of regime in 1994. Firstly, people from the rural areas could now get security of tenure in and around the urban (industrial; mining) areas. Secondly, with the lifting of sanctions and boycotts and opening of international trade to the country, one would expect a sharp increase in job opportunities and decrease in unenployment. In reality exactly the opposite happened, to such an extent that "the percentage of people without work has almost doubled in the last five years", according to De Lange (2003), quoting recent (2002) reports by Statistics South Africa. A glowing report by New York Times reporter Nicole Itano on July 18, 2003, hailing "South Africa's emergence as a player in the international automotive industry", *inter alia* contains the following two mind-boggling snippets:

> *"South Africa historically has never appeared high on the list of the world's auto manufacturers. Since the end of apartheid, however, the industry has undergone a significant transformation – from an inward, highly protected industry to an export-oriented one* ***with average compounded annual growth of 39 percent in the last seven years*** *despite the global economic downturn."*
>
> But then, in addition to stating that local small businesses benefitted little from this and that it has generally been large multinationals that have benefitted most, the correspondent reports:
>
> *"According to the National Union of Metal Workers of South Africa _ _ _* ***jobs*** *in automobile and auto-component manufacturing* ***fell by 16,200 between 1995 and 2001."***

Taking an average family size of about six, it means that the loss of just these 16,200 jobs means that about 100 000 people were left without income. According to the normal South African pattern it can be assumed that a significant proportion of them returned to rural areas. There one of their most likely means of survival would be to grow their own food. This means increased pressure on the limited land and water resources and increased need for urgently increasing the efficiency of the use of these resources to alleviate rural poverty.

Furthermore, Van Averbeke (2002) quotes recent (up to 2002) reports indicating that in many parts of South Africa, smallholder agriculture is on the decline and that "*in some parts of South Africa the decline in smallholder farming has been linked to*

increasing levels of unemployment. This appears to apply particularly to agriculture that is aimed at own consumption, which relies on off-farm income to cover production costs." "Agriculture that is aimed at own consumption" is a synonym for "subsistence agriculture", which is discussed later.

The large unemployment also leads to socio-economic and social problems, such as crime, which impact negatively on agriculture and aggravate food insecurity and poor use of resources in rural areas. Theft of farm produce has forced several small-scale "Black" farmers to abandon agricultural production altogether in some areas, as will be discussed later.

Reed (1996) pointed out that if a country, especially a poor one, has to import food, it has the at least the following two consequences:

a. The country "as a whole suffers a drain on its scarce foreign currency reserves in order to import food."
b. "Ultimately it runs the risk of being a political hostage of countries _ _ _ on which it is increasingly dependent for its food supplies."

3.3 THE NATURE OF AGRICULTURE

In order to promote and ensure sustainable optimal use of the scarce natural agricultural resources, land and water, it is essential that one must understand the very nature of agriculture. Unfortunately it seems that lack of understanding of the nature of agriculture and the requirements for successful farming amongst too many people like opinion-formers, decision-makers (including politicians), government officials, expatriate consultants, environmental activists, human rights activists and well-meaning (but often ignorant) people/groups that involve themselves in trying to advise/help small-scale farmers, leads to:

- Inhibiting/preventing sustainable optimal use of agricultural resources.
- Paralysing of both commercial and subsistence agriculture.
- Smothering of development of resource-poor farmers.
- Aggravating/perpetuating of rural household food insecurity.
- Causing of failure of the land restitution/redistribution programme.

Various aspects relating to this will be addressed in following sections. At this point I wish to draw attention to one critical factor that sets agriculture aside from all other industries, like factories, mines, etc., viz. its very strong seasonal nature. The latter is in especially most crop production enterprises associated with recurring very high short term seasonal peak labour demands. Most importantly it must be kept in mind that these peak periods are highly time-specific. A few illustrative examples are:

a. In the production of annual grain crops, like maize and wheat, under dryland conditions ploughing and planting at the right time is critically important to ensure a good yield (i.e. to optimise efficient use of rainfall). Under South Africa's "unpredictable and unreliable" (SARPN, 2003) rainfall conditions a planting opportunity usually constitutes an extremely short time window. Large-scale mechanised farmers can take advantage of short periods with favourable soil moisture conditions, but it means that tractors ***have to*** run 24 hours a day, day and night, for a few days when there is a suitable planting opportunity.

Failure to do the above is a major reason why state-run tractor/mechanization services failed in the former homelands, as they have done in the rest of Africa. In these services drivers worked only during office hours, thus missing planting opportunities and planting late. At the Middle Letaba irrigation scheme in the former Gazankulu the farmers stopped planting maize for grain and wheat due to yield losses resulting from late planting caused by the inefficiency of the mechanisation services (Khuvutlu & Laker, 1993). Elsewhere problems have been experienced because small private mechanization contractors did not realise the importance of the above and worked short and unpredictable hours, some days not even turning up.

b. In enterprises like especially deciduous fruit (and other fruit) and some kinds of vegetables, harvesting must be done at exactly the right time to achieve the best quality and highest prices. This also necessitates working for long hours during these periods. At my uncle's deciduous fruit farm near Tulbagh we used to work from 5 o'clock in the morning until after 8 in the evening during harvest time. I say "we", because most of the twelve brothers and sisters of the big family and their children "descended" on the farm during the December holidays and worked shoulder-to-shoulder with the farmer and his family and all the labourers and their families. Family members were expected to actually work harder and faster than the labourers and their families. This system enabled the farmer, who initially hired the farm on a share cropping basis, to build up enough capital to eventually buy the farm. I will return to this point in a later section again.

Certain developments in South Africa since 1994, and from even a few years before then, have had profound effects in regard to the above. Most notably amongst these are:

- Labour unrest and the possibility of strikes during critical periods became a real threat, and sometimes even reality, in the agricultural sector. A strike during harvest time on a fruit farm or an associated packing shed could be fatal to the economic survival of the farm.
- Labour legislation determining minimum wages and maximum permissible daily work hours became serious concerns, the latter due to its impact on capabilities to perform the necessary functions timeously during peak labour demand periods, e.g harvest time.
- Farmers became concerned about laws giving labourers rights to permanent residence on a farm.

According to SARPN (2003) the consequence was that "over the last ten years, commercial farmers, fearful of the intentions of their employees, and concerned about (the) new (labour and tenure) laws, _ _ _ _ have responded by fully mechanising field operations _ _ _ and by hiring a minimum number of seasonal piece-rate workers trucked in by contractors. The result has been a significant increase in returns to management." Technology has made it possible for a family to handle quite large farming concerns virtually on their own. This type of development took place in the United States about 30 years ago already, in response to labour unrest amongst farm workers, untimely strikes and minimum wage demands, fired on by student protests. The result was that engineers very quickly developed machinery like mechanical

tomato harvesters (of which two or three could replace 200 labourers), grape harvesters (for wine grapes), etc. The nett result has been a decrease in the number of permanent jobs on farms and in related rural industries, such as packing sheds, etc.

In a country like South Africa, with its high unemployment rate, this type of development could be socio-economically disastrous. In the context of the present paper such development will not have a negative effect on the effficiency with which land and water resources are used, but will have a significant negative socio-economic effect by enhancing rural poverty. Farmers cannot be expected to retain a large labour force under conditions that put the labourers in a position to jeopardise the profitability and economic survival of their farming enterprise, however.

Emerging farmers are much more vulnerable to the new types of labour problems than large commercial farmers. Their enterprises are too big to handle with family labour alone, but they are too small to replace labourers with machines. Previously small-scale (Black) farmers in South Africa had interesting labour relations. At the Middle Letaba scheme in the late 1980s it was found that the casual labourers working for the small irrigation farmers *preferred* to be paid in kind (produce) rather than in cash, because they could sell surplus produce earned, in excess of their family needs, in their villages. If they were paid in cash, they would have had to buy the produce that they needed for their own use at significantly higher prices, and would have been in a less favourable situation. During a severe drought many of the farmers showed a social responsibility by (in agreement with their labourers) not retrenching any labourers, but allowing them to work in turns for a reduced income (Khuvutlu & Laker, 1993). It is a question whether the new labour laws, which, for example, set limits to the maximum proportion of wages which may be paid in kind, make provision for these kinds of meaningful and sensible flexibility.

Another labour-related law that needs sensible, objective consideration, because of its implications in regard to rural poverty and household food security, is the one that is drastically curbing the role of children. In fact, often it appears as if children are now prohibited from playing any role at all. Traditionally children have played very important roles in agriculture, and in most developing countries they still do. During the 1970s a research team from Cornell University had to find a strategy to alleviate the peak period labour shortages in small-scale (family) farming in an area of Iran. They concluded that the only possible solution would be if the government could rearrange the school terms so that the schools had holidays during the peak labour demand period, thus enabling the children to help with the farming activities during that period. When I was a child we all worked on my uncle's farm during holidays and in the garden over weekends from virtually school-going age. One's type of work was according to your age and stage of development and you "graduated" through the different types of work as you became bigger, stronger and more skilful. In addition to equiping one with skills and insight into farming, this also installed a "work ethic" from a young age. Reed (1996) considers a "work ethic" as one of the basic requirements for successful agricultural development. Apart from contributing to the family welfare, this was really "learning by doing". In the latter vein, De Lange (2003) pointed out that one of the "debilitating consequences" that the migrant labour system under the previous regime had in remote rural areas was "an interruption in the intergenerational transfer of indigenous knowledge on low-cost food production, processing and storage methods". Agri-SA confirmed to me that commercial farmers

can no longer allow any child to do any work, no matter how much that child would like to work. This is probably not a problem for these farmers, apart from most deciduous fruit farms sitting with a lot of very bored children over the December holidays. It does, however, have serious consequences for subsistence farmers and the smallest emerging farmers, who essentially are reliant on family labour. I am very strongly opposed to abuse of children, e.g. by expecting them to do work that they cannot handle or keeping them out of school to do farm work, but prohibiting them from doing work that they can handle during school holidays or over weekends in the interest of reducing poverty and promoting food security for their families would be an equally big injustice.

Apart from the apparent lack of understanding and appreciation of the seasonal nature, and especially of peak period labour demands, of agriculture, there are at least three other ***major*** issues that seem to be poorly understood and appreciated. These issues, which will be discussed in later sections, are:

- The complex nature of agriculture and very high management skills required for successful commercial farming.
- The high input costs of farming.
- The infrastructure requirements, including support services, for successful farming.

3.4 CATEGORIES OF FARMERS IN SOUTH AFRICA

I know it is dangerous to try to categorise farmers, since there are scientists that revel in sterile rethoric on how to define a small farmer, what is a commercial farmer, etc. Where you exactly draw the line is really not the issue. As a soil scientist I am used to working with bodies that are not separated by sharp boundaries, but grade into each other, sometimes via diffuse transitions. My objective is simply to highlight that we do not just simply have two categories of farmers representing opposite extremes. With a view to the further development of the main themes of this report, I would like to give the following simple outlines:

a. ***"Subsistence farmers":*** These constitute the main component of the farmers known as "small-scale" or "resource poor" farmers. De Lange (2003) quotes statistics that 92% of resource-poor households in South Africa indicated that their reason for farming was to produce food for the household to eat. This is the real concept of "subsistence farming". Food production by "subsistence" farmers is, in fact, most of the time below (often very far below) the subsistence requirements of their households. In most cases it is, therefore actually a misnomer to talk of "subsistence" farmers. In a survey at Ndombeni, near Hluhluwe in KwaZulu-Natal, it was, for example, found that only 25% of the households were fully self sufficient in regard to grain (maize) (Tapson, Laker & Bembridge, 1986). The figures for beans, leaf crops, pumpkins and root crops were of the same order. On the other hand, almost 40% of the households produced less than 25% of their grain requirement. For other main food crops the situation was even worse, the number of households producing ***less*** than 25% of their requirements being 55% for pumpkins, 61% for beans, 67% for root crops and 75% for leaf crops.

In other cases "subsistence" farmers produce more than their self-sufficiency requirements, and market the surpluses. Also in these cases "subsistence farmer" is actually a misnomer.

Typically subsistence farming is practised under dryland (rainfed) conditions.

b. "Food plot" and "backyard garden" systems: So-called "food plots" have for several decades already been viewed as important for improving household food security in South Africa, especially in rural areas. Many thousands of food plots were established as components of the numerous irrigation schemes that were developed in the former homelands, with money provided by the South African government (Van Averbeke, M'Marete, Igodan & Belete, 1998; Bembridge, 2000). Food plots formed the "social component" of irrigation schemes and offered "a high degree of equity" (Van Averbeke *et al*., 1998). Although food plots have been one of the most successful aspects of irrigation development, average crop yields were generally "well below potential" (Van Averbeke *et al*., 1998). *The lower than potential yields mean that water use efficiency was lower than it should have been*. The reasons for the low yields in the food plots will be discussed in a later section. The small size of the food plots (0.25 ha or less, often only 0.1 ha) made them just that, viz. food plots capable of producing the vegetable needs required for a healthy diet, and nothing more. At the yield levels achieved they could not provide the subsistence grain needs of a family. They were definitely not, and were not intended to be, "viable livelihood" options (Van Averbeke *et al*., 1998). Very high subsidization of these schemes were required to make them survive (Van Averbeke *et al*., 1998). Under the previous regime at least some of these schemes were deliberately established to bring about social stability in some areas and in the process combat crime and unrest. The subsidies were probably justified on socio-economic/social grounds and not on economic grounds. With the demise of the small-farmer irrigation schemes after the change of regime in 1994, the food plot components of the schemes also collapsed, with serious consequences in regard to household food security and rural poverty (Bembridge, 2000). This is discussed in a later section.

"Backyard gardening", i.e. production of especially vegetables and fruit around the homestead, although perhaps just gardening rather than farming, can make important contributions towards household food production (De Lange, 2003). De Lange (2003) points out that according to information from Statistics South Africa and the National Department of Agriculture less than 10% of South African households presently plant food in the yards around their homesteads, "in contrast to most other African countries where this practice is very common, even in urban areas". According to De Lange (2003) lack of water is always cited by rural people as the reason why they do not plant crops around their homes. She believes this is partly true, but that to a large part it is due to the fact that "indigenous knowledge of low-cost intensive food production has been lost and/or distorted". I believe it is unfair to compare the South African situation with those in many other countries in Africa and especially with the totally different situations in Asia. I will pursue this further in the section on South Africa's natural resources. There are some

notable exceptions to the picture painted by the statistics for South Africa, however. I will mention just two that I know of:

- During a study in Mdantsane, the big township just outside East London, in the 1980s I observed that there was very intensive small-scale food crop production in the open valleys between the residential areas of the township. I concluded that this could be related to the combination of high quality stable dolerite-derived soils and high rainfall prevailing there. This was confirmed by Maswana (2001). I also saw ***excellent*** vegetable production even on a sidewalk in this township.
- Van Averbeke (2003a) mentions a survey in four rural villages in Victoria East (Alice) district in which it was found that 50 to 80% of the arable land had been abandoned. The important findings from the survey were, however: "*At present*, ***most*** households limit their crop production to their home gardens, which may range from $100m^2$ to $5000m^2$. *A few innovating farmers have developed sophisticated water harvesting and conservation technologies in support of this activity*. _ _ _ In many ways, the scale reduction brought about by the ***return*** to garden production provides farmers with an opportunity to experiment with water and nutrient management. Over time, some of these technologies may find application on a field scale _ _ _ _."

Related to small plot and backyard gardening is the trench-bed method of vegetable growing, which is propagated by a large number of development organisations (NGOs) as a system enabling water conservation to achieve increased vegetable production on small areas (Van Averbeke, 2003a). It has been propagated for close to 30 years now. It is generally known as the "Valley Trust system", because it was first conceived and propagated by the Valley Trust in KwaZulu-Natal. Amongst the prominent other organisations promoting it are, *inter alia*, ACAT, Food Gardens Unlimited and Masibambane (Van Averbeke, 2003a). In comparative studies at the University of Fort Hare the trench-bed method showed "no readily evident advantages" over conventional tillage (Van Averbeke, 2003a). He ascribes this to the effects of basic soil physical principles that are overlooked in the way that the trench-bed system is implemented. I believe that these errors can be corrected easily to make the system much more effective in terms of improving the efficiency of water utilization.

c. Emerging farmers: My understanding of the concept "emerging farmer" is that this is a "fledgeling" commercial farmer, i.e. a farmer that is in the process of developing towards becoming a fully-fledged commercial farmer. Many people seem to think that an emerging farmer is someone who used to be a subsistence farmer and is now in a "transition" phase towards becoming a commercial farmer. I don't believe such a person necessarily comes from a subsistence farming background, and in many cases an emerging farmer indeed does not come from such background, but from a non-farming background. In terms of farming proficiency it is probably correct to assume that such a farmer slots in somewhere between subsistence farmers and fully-fledged commercial farmers on a sliding scale. *In relation to efficiency of*

resource utilization and rural poverty issues these farmers comprise a very important group that need much support and guidance.

My impression is that most people have one of two incorrect perceptions regarding emerging farmers, viz.:

- Some view them as more-or-less simply a special type of subsistence farmer, i.e. just an "upgraded" or "super" subsistence farmer. This is, of course, a ***totally*** wrong perception.
- Some (fortunately probably just a few) view top class, highly efficient black commercial farmers as emerging farmers just because they are black. This is also a totally wrong perception, as I will indicate under Section d below.

d. Commercial farmers: Any reference to commercial farming in South Africa tends to conjure up the picture of a "White" farmer, making his (occasionally her) living from full-time farming, using intensive sophisticated mechanised crop farming systems on a large farm, or practising extensive rangeland livestock farming on huge ranches. To many it, furthermore, conjures up the picture of inefficient farmers because they do not nearly achieve the average yield levels of American or Canadian farmers, especially in grain farming. Both these perceptions are wrong.

Firstly, substantial areas of commercial farmland do not belong to individuals, families or groups that make their living primarily from farming, but to big mining, industrial, etc. companies/corporations, like Anglo-American, Gencor, etc. The farming enterprises of these companies can create large numbers of jobs, which would help to alleviate rural poverty, especially where fruit and plantation crops are produced. On the other hand, they also have the financial means to engage in highly sophisticated, capital intensive mechanised farming, with minimum labour, if this would give them higher returns on their investment, especially if labour would become unreliable and expensive. They have the potential to achieve a high degree of water use efficiency because they can achieve high production efficiency. An important factor contributing to the latter is the fact that they can appoint their own subject matter specialists at their estates. With subject matter specialists is meant specialists in fields like soil science, entomology, plant pathology, horticultural science, etc., usually with post-graduate degrees, who "translate" the best research information available in their respective fields into practical management recommendations. If such companies/corporations would be willing to accept a strong social responsibility, they could be extremely valuable partners in the development of emerging farmers, as will be explained later. If they do not accept such responsibility, they could be very damaging because they could push small-scale farmers completely out of markets, as has often happened elsewhere (Francke, 1977).

Secondly, not all commercial farmers in South Africa are "White". There are also significant numbers of "Black" commercial farmers in the country. Most of the latter are relatively small scale farmers, but they do also include large-scale farmers and farmers running sophisticated, highly intensive irrigated farming systems. The latter employ significant numbers of labourers, and thus

make important contributions towards reducing unemployment and poverty in rural areas.

A few diverse examples are:

- According to Van Zyl (2003), South Africa's "Black Grain Farmer of the Year" for 2002 planted 1 000ha of maize.
- Near Nwanedzi in the Limpopo Province a "Black" farmer farms with 70 ha tomatoes under drip irrigation (Du Plessis & Van der Stoep, 2001). He employs 100 full-time labourers and "considerably more" during peak seasons. He had only two years formal school education, but gained practical experience by first working on a commercial farm and thereafter farming together with his father on a small piece of land.
- Mr. James Moroka runs two intensive vegetable production systems in the Gauteng area. One is an 11ha farm with very poor soil. Because the soil is so poor, he is producing vegetables on 2.5ha in hydroponics under nets. He markets the vegetables through Woolworths, Pick 'n Pay and Fruit and Vegetable City. The other is a 164 ha farm, where he produces vegetables on 5 ha high potential soil under drip and micro-sprinkler irrigation. He markets these vegetables through Fruit and Vegetable City. Mr. Moroka obtained a B.Agric. degree at the University of Fort Hare in the mid-1970s and was in the first Soil Fertility course that I taught at that University.

During the 1970s and 1980s there was a big drive by the previous regime to get agricultural development going in the homelands. In view of the experience elsewhere that agricultural development is usually needed to trigger economic development, it was hoped that agricultural development would kick-start economic development in the homelands. For this reason many millions of rands were pumped into agricultural development projects in the homelands. The vast majority of these went into development of irrigation schemes, more than 70% of which were in the present Limpopo and Eastern Cape provinces (Bembridge, 2000). There was an interesting difference between the two provinces: In the Eastern Cape the schemes had 1439 commercial farmers (1000 of whom were at Qamata) and 4910 food plot holders (Bembridge, 2000). In Limpopo the trend was more than reversed, with 8433 commercial farmers and only 1717 food plot holders. I believe there are very important reasons for this difference, related to the aptitudes of different groups. Unfortunately these schemes were approached and implemented incorrectly, with the result that they were (a) not economically viable and most importantly (b) failed in regard to farmer development. The schemes could have contributed significantly to the development of "Black" commercial farming in South Africa if they were approached correctly. There were a few notable successful exceptions, mainly where farmers rejected the recommended farming systems and developed their own systems. In terms of the theme of this report it can be concluded that, with few exceptions, these schemes also failed in terms of water use efficiency and combating rural poverty. After the change of regime in 1994 all these schemes, including the successful ones, collapsed, perpetuating increased inefficiency of water use and rural poverty. This will be discussed later. A few sophisticated mechanised dryland cropping agricultural projects were also established with a

view to the development of Black commercial farmers. Best known amongst these are Phokoane in the former Lebowa (now in Limpopo province) and Sheila and Mooifontein in the former Bophuthatswana (now Northwest province). The latter two were huge projects, which were from a production point so successful that Bophuthatswana was actually self-sufficient in terms of maize production (Bembridge, Graven, Hough & Van Rooyen, 1982), but from a farmer development perspective it was a different story.

It is an injustice to describe South Africa's commercial farmers as inefficient farmers. Of course there are inefficient ones amongst them and of course there is always room for improvement. On the whole, they are excellent farmers, however. This is especially true in regard to staple grain (maize and wheat) production when considering the unfavourable natural resources, such as low, unreliable, erratic and inefficient rainfall and poor quality soils, that they have to cope with. This is discussed in Section 3.5. The South African farmers are highly admired for their achievements by agriculturists from the rest of Africa, especially those from other dry areas like Sudan, Ethiopia, Eritrea, Somalia, Kenya, etc., who would like to learn from them and would even like to get them involved in their countries.

e. ***Land reform/restitution/redistribution farmers:*** The people who receive farms under the government's land reform/restitution/redistribution programme are a special group that do not fit in under any of the other categories. The land reform programme is faced with ***very serious*** problems, which can have major negative social, socio-economic, economic and food security ramifications if they are not solved ***very quickly***. It also has very serious implications in regard to perpetuation of inefficient water use and rural poverty. Their situation will be discussed in detail in a later section.

3.5 REALITIES REGARDING SOUTH AFRICA'S PHYSICAL AGRICULTURAL RESOURCES

It is impossible to have meaningful and sensible discussions on water use efficiencies, rural poverty, agricultural development, etc. without looking at the realities regarding South Africa's physical agricultural resources (climate, water, soil) and their geographic distribution. The extreme lack of understanding of these by foreign advisors, decision-makers and even some local people in drawing up agricultural potential maps for the country can cause major damage, both in regard to resource degradation and in regard to perpetuating rural poverty. Unfortunately there is a global trend by politicians, decision-makers and the general public to disregard the facts presented by resource scientists if the facts show that the resources are not as good as they would like to believe them to be (Knox, 1981; Laker, 2000, and In press). In South Africa we also have the reverse, i.e. people refusing to believe that the resources of the former homelands, which on average are significantly better than the rest of the country, are as good as they are, because they were indoctrinated to believe that these were the areas with the poorest natural resources in the country.

It is important to realise and keep in mind that South Africa's natural agricultural resources are not comparable to the high quality resources, in terms of climate and soils, of the rich developed countries in North America (the USA and Canada) and

Europe (Van der Merwe *et al*., 2000; Laker, In press). These rich northern countries are at higher latitudes than South Africa, the rest of Africa and other developing countries (Laker, 2003a and In press). This is the factor determining the big differences in climate and soil quality between these rich countries and the developing countries. It should be noted that in the southern hemisphere there is, apart from New Zealand, Tasmania and a small tip of South America, no land at the latitudes comparable to those of the rich big northern hemisphere continents.

Regarding ***climate***, rainfall on the one hand and its relation to temperature, relative humidity and potential evapotranspiration (PET) on the other hand, are the key factors ***for this discussion***. This does not mean that other factors, like hail, frost and wind, are considered unimportant. South Africa is a dry country, with an average annual rainfall of only about 500 mm, compared with the world average of about 860 mm. About 65% (i.e. nearly two-thirds of the country) receives less than 500 mm/annum, which is usually considered to be the minimum required for dryland cropping. In this regard it is important to note that the long term average rainfall figures for all the weather stations in the Swartland and the Rûens, the wheat producing areas of the Western Cape, are only between 400 and 420 mm/annum. This, together with the general poor quality soils of these areas, prompted the late Prof. Hulme Moolman several years ago to state that people who see the Western Cape as a haven for the settlement of large numbers of small-scale farmers make a very big mistake – it could only lead to socio-economic disasters and degradation of the vulnerable resources.

The largest part of the country is a summer rainfall area, where the rain comes in the form of poorly distributed intense thunderstorms. Because of the intensity of the storms, there is a lot of runoff and poor water detention in soils. The efficiency of the rain is thus very low. Because of the high temperatures, high vapour saturation deficits (VSD's) and low relative humidities, PET is very high, thus further lowering the efficiency of the rainfall drastically. In a paper at a congress in Vienna information from a study in central Europe indicated that the study area had an annual rainfall of 500 mm and a PET of 300 mm, thus having a water surplus of 200 mm. In South Africa areas with annual rainfall of 500 mm, have PET's that can exceed 1 000 mm, thus having huge water deficits. According to Bennie & Hensley (2001) between 50 and 75% of the annual precipitation in South Africa is lost through evaporation from the soil surface, thus resulting in low precipitation use efficiencies. Due to the high PET's experienced in the country, more than 80% of the South Africa is classified as arid or semi-arid according to UNESCO criteria (Bennie & Hensley, 2001). Even areas receiving more than 700 mm rain/annum are classified as semi-arid. This is also the case for other Southern and East African countries.

The rainfall is also extremely erratic and unreliable, with large variations between years and big uncertainty within a rain season. Together with the inefficiency of the rain, this means that dryland crop production is a very high risk venture, especially towards the drier parts of the summer grain production areas. In addition over much of the "maize quadrangle" mid-summer drought is a normal phenomenon (Fourie & Gower, 1987; Mbatani, 2000). Breaking long-term rainfall data up into five day or decadal (ten day) averages reveals that for each area there are specific short periods (e.g. 10-20 January for Mohales Hoek) during which such drought occurs in the vast majority of years (Fourie & Gower, 1987; Mbatani, 2000). Maize is extremely sensitive to drought during the tasseling/silking stage and by adopting planting dates

that would enable maize to tassel outside this drought period, would secure a harvest during most years (Mbatani, 2000). The planting date is, however, also dependent upon rains that would constitute a "planting opportunity" (Mbatani, 2000). It is clear that for resource-poor subsistence and emerging farmers the risk of crop failures is a major problem. It is also clear that well-planned and executed management strategies are essential to reduce this risk to a minimum in order to alleviate rural poverty.

In the central Eastern Cape (former Ciskei and southern Transkei) the situation is somewhat different in the sense that it has two rainfall peaks, in spring and autumn respectively, with a long mid-summer drought. This type of pattern, viz. two relatively short and small rainfall peaks with a relatively long dry period in between, is also found extensively along the East African region, e.g. in Kenya and Eritrea. This type of rainfall pattern requires special management tactics, different from those appropriate for the marginal western Highveld areas, to make the most efficient use of the available water.

In the interior there is a very severe atmospherically-induced water stress period in spring (September-October) with serious implications in regard to job opportunities in agricultural enterprises like the tea estates in Limpopo province if it is not managed well. In September, and especially October, temperatures rise fast and relative humidities drop to problem levels. This causes severe stress in sensitive tea clones, which even shed their leaves and then have to recover later when the humidities rise when the rains start in November (Nethononda, 1994; and ecophysiological research by a team from the Universities of Pretoria, Venda, Antwerp and Ghent, of which I was one of the leaders). Because it is an atmospherically-induced problem, manipulation of the soil water content by improved irrigation cannot overcome it. Identification and selection of tolerant tea clones appear to be the solution. It is a much wider problem than just on the tea estates, however.

In regard to ***soils*** the picture is very much like that for climate. With the exception of a few small areas the soils of South Africa are of a much poorer quality than those of the rich northern countries (Van der Merwe *et al*., 2000; Laker, In press). In fact, most of the country has extremely poor quality soils (Laker, 2000). The country is dominated by very shallow soils. In addition large areas are dominated by sandy soils or by highly erodable duplex soils. The latter are unfortunately mostly in areas where the rainfall is such that fair dryland grain cropping could have been practised if it was not for the poor quality of the soils (Laker, 2000). The physically best soils in the higher rainfall areas are highly weathered and highly leached and have low inherent fertility (Van der Merwe *et al*., 2000). These soils consequently need high (and expensive) inputs to make them productive, which has important implications especially for resource-poor subsistence and emerging farmers (Laker, 1976). Compared with most of the rest of the world, South Africa has only extremely small strips of deep, fertile alluvial soils, suitable for irrigation, along its quite small rivers.

South Africa is part of the little-known "Third major soil region of the world", with soils that differ radically from the well-studied soils of the high latitudes of Europe and North America and from the soils of the humid tropics, which have been fairly well studied (Laker, 2003a). Injudicious technology transfer from such areas, especially from the developed northern countries, to South Africa is doomed to failure. Whether we are talking about commercial farming, subsistence farming or

emerging farming, the big requirement is that we must adapt foreign technologies to our circumstances before we can use them and where necessary develop our own appropriate technologies. An important issue is to study indigenous technologies that have been developed for specific South African circumstances and use these as basis for developing new technologies. As will be indicated later, these include both "Black" and "White" indigenous technologies and wisdom. We will not achieve efficient water use and effective alleviation of rural poverty if we do not attend to the management requirements dictated by our soil and climate resources. ***It is probably not unfair to say that South Africa is even more a soil-scarce country than a water scarce country.***

It is general knowledge that South Africa is a ***water***-scarce country and that there is strong competition between different economic sectors and different regions for the available water. An important example is the inter-catchment transfer of water to Gauteng, the economic heartland of the country, first from the Tugela and now from the Orange river system. At a meeting in Cradock in 1986 the then minister of Water Affairs informed the farmers that if the Lesotho Highland scheme would be fully developed it would take 56% of the water of the Orange river system to Gauteng. All the irrigation, industrial and urban areas in the Eatern Cape, Free State and Northern Cape that are dependent on water from the Orange river system would have to cope with the remaining 44%. This would be fine if large numbers of additional jobs were created in the mines and industries of Gauteng to absorb people from the the rural areas and alleviate poverty. In reality it appears as if there has been a sharp decline in employment in these mines and industries and it begs the question to what extent these water transfers are contributing to poverty alleviation.

Because "agriculture and forestry" use 74% of South Africa's "potentially available rain water" (Bennie & Hensley, 2001) the impression is usually gained that agriculture is using water very inefficiently and wasting a lot of the country's water. Because irrigation is the only visible "deliberate" user of water in agriculture, it is then assumed that irrigation must be wasting a tremendous lot of the country's water and that the sense of using such a lot of water for irrigation should be questioned. Breaking the statistics up into water use by the main different groups of agricultural enterprises paints a totally different picture, however. According to Bennie & Hensley (2001) only 2% of South Africa's water is used for irrigation. This means that even a 25% reduction in irrigation water use would "release" only 0.5% of the country's water for other uses. It is a fact, however, that irrigation water use efficiency (WUEi) can be improved significantly and that in specific cases this could have a major impact on improving equity of access to water and allevation of rural poverty at catchment or sub-catchment level. A further 12% of the country's water is "used" for dryland crop production (Bennie & Hensley, 2001). This is simply rain that falls on the specific area of land in any case and in the vast majority of cases runoff from the cultivated fields, thus delivering water to rivers, dams, etc., is significantly higher than it would have been had the land been left under dense grassland. By far the biggest part of the water used for "agriculture and forestry" (60% of the country's water) is "used to maintain the growth of forests and the natural vegetation that is used as grazing for livestock and game" (Bennie & Hensley, 2001). Again, the water "used" for natural rangeland is simply rain falling on that land. The only way to get more runoff from the rangeland, i.e. to deliver more water for domestic use in towns and cities, industries, etc., would be to degrade the rangeland, e.g. by overgrazing. This

would enhance runoff, but would also accelerate erosion, thus silting up dams, and cause increased flood damage. It would also change water delivery to streams from perennial steady flow to a system of floods followed by drought situations until you reach a stage where a drought "prevails before it has started" (Roux, 1990).

3.6 REALITIES REGARDING THE GEOGRAPHIC DISTRIBUTION OF SOUTH AFRICA'S PHYSICAL AGRICULTURAL RESOURCES

For the sake of optimising water use efficiency and alleviating poverty through agricultural and rural development it is critically important that decision-makers must understand and accept the realities regarding the geographic distribution of South Africa's physical agricultural resources (climate/soil/water). In the best interest of the rural people and of the country as a whole, decision-making and planning for the future ***must*** be based on facts and realities and not on obsolete propaganda and myths. Unfortunately many people seem to have been indoctrinated and brainwashed to such an extent that it is very difficult, even almost impossible, to get them to snap out of their false beliefs and accept the realities.

The biggest obstacle is the belief that the former homeland areas have very poor agricultural resources in terms of climate, soil and water and that "White" commercial agriculture had all the best land. Very little could be further from the truth. Overlaying a rainfall map of South Africa over a map of the borders of the former homelands shows clearly that only small pieces of a few homelands fell in zones receiving less than 500 mm rain/annum, i.e. having rainfall below the minimum required for dryland cropping. In addition major areas of some of the best soils in the country occur in the former homelands. What I write here about this is not just based on what I have read or heard, but on personal experience, and not just traveling through the areas, but conducting widespread studies and investigations in these areas. And these were not just studies along main roads, but even in remote areas without any proper roads.

Grobler (1969), as cited by Laker (1976), estimated that the homelands Bophuthatswana, Lebowa, Venda, Gazankulu, Kangwane and KwaZulu had the inherent potential to produce food for 25 million people as well as some products for secondary industries. Grobler estimated that just the homelands Lebowa, Venda and Gazankulu had the physical-biological potential to produce grain for more than nine million people, but according to Van de Wall (Undated), cited by Laker (1976), they produced in 1973 sufficient food for only 250 000 people. Grobler's estimates were probably somewhat optimistic, but the fact is that these former homeland areas have the potential for much higher agricultural production than they are achieving at present and have great potential for alleviating rural poverty through agricultural development. As indicated earlier, Bophuthatswana indeed became self-sufficient in terms of maize through agricultural development projects like Sheila and Mooifontein, illustrating the potential of the area. In the Phokoane area of the former Lebowa the maize yields of small-scale farmers were increased from about 0.4 t/ha to over 8 t/ha in the early 1990s by eliminating constraints (Adendorff, 2003). Unfortunately they have fallen back again.

In a report prepared for the Land and Agriculture Policy Centre (LAPC), edited by De Wet & Van Averbeke (1995), it is stated clearly that more than 80% of the high potential land in the present Eastern Cape province was ***before*** the change of regime

in 1994 already in the hands of Black small-scale farmers, mainly in the former Transkei. The recently completed land type mapping of the former Transkei by the ARC-ISCW confirms the potential of especially Umzimkulu and East Pondoland. Despite the potential of the area, the average maize yields in the former Transkei are only 0.5 t/ha and in the former Ciskei even lower (De Wet & Van Averbeke, 1995). Despite the low yields per hectare the Eastern Cape, according to Statistics South Africa, in 2002 produced about the same amount of maize as Mpumalanga and about 3.5 times as much as KwaZulu-Natal and Gauteng, the other two provinces with significant areas with high potential for maize production, in terms of soil quality and rainfall (Smith, 1998). According to Van Zyl (2003) the Eastern Cape has the potential to produce 1.2 million tons of maize per annum, if its potential would be fully exploited by means of good farm management.

Apart from the maize production potential of these areas, a ***large number*** of commercial farms, producing a range of high value crops like pineapples, citrus, etc., were bought out during the late 1970s/early 1980s and incorporated into the Ciskei as part of the homeland "consolidation" programme. These included some high potential areas, but unfortunately most of these have totally collapsed during the last few years. In one case more than 80% of the trees on a farm that used to produce the best quality navel oranges in the Kat River valley have died and the farm is now described as "a goat browsing area" (Badenhorst, 2003). They still have the same inherent potential, however. Again, these areas have great potential for successful Black farmer development and alleviation of rural poverty.

It must be kept in mind that although the former Ciskei has some areas with excellent cropping potential, the biggest part of the area has marginal rainfall for crop production (500-600 mm/annum) and relatively shallow soils and should better be used for rangeland (Laker, 1976; Hensley & Laker, 1978). These include potentially excellent rangeland. To a lesser extent this is also true for some areas in the former Transkei, especially towards the southwest (Laker, 1976).

In contrast to the significant areas with moderate to high cropping potential or high rangeland potential in the small-scale Black farming areas, the White commercial farming areas of the Eastern Cape are mainly in areas having average annual rainfall of less than 400 mm (De Wet & Van Averbeke, 1995) and their farming system consists mainly of very extensive livestock farming on large farms (Van Averbeke, 2003a). Some do practise irrigated farming in river valleys, however.

For South Africa as a whole probably 75% or more of the White commercial farming is practised in areas receiving less than 500 mm rain/annum, most of it in areas receiving less than 400 mm per annum. These include practically 100% of the 22% of South Africa receiving less than 200 mm rain per annum, viz. Namaqualand and a large area south of it between the mountains and the west coast, Bushmanland and the southern and western parts of the Karoo. In the latter rainfall records of a farmer showed an average annual rainfall of only 75 mm over a 30 year period. Looking at the relative quality of the resources (rainfall and soils) the fact that the White commercial farmers had 87% of the land and the homelands only 13% does not look quite so dramatic. One hectare of good soil in Lusikisiki, Bizana or Phokoane is probably equivalent to a few hundred (or even more than a thousand) hectares in Bushmanland. Considering an area in Bushmanland as being comparable to a similar

size area in East Pondoland would be like comparing the Sahara desert with the contiguous states of the United States of America, two areas with the same size.

According to Statistics South Africa about 75% of South Africa's maize was in 2002 produced by commercial farmers in the Free State and Northwest provinces, with each province contributing about half of this. The significance of this is that the Free State has only very limited areas with ***high*** potential for maize production and the Northwest province almost none (Smith, 1998). Much of the maize in these provinces is produced in climatically high risk marginal areas towards the west, including substantial areas for which several people for many decades have propagated that they should be totally withdrawn from cropping, especially from maize production. Failure to realise the marginal and very high risk nature of these areas for cropping can lead to very serious problems during land reform.

Lack of understanding of the realities regarding the natural resource distribution came out clearly a few years ago when a person phoned me and wanted to know what crops the farmers grow in the Karoo. The more that I tried to explain to him that the Karoo was a desert (in international terms) and that farmers cannot grow crops there (except for a few small patches of irrigated fodder crops), the more he kept on asking the same question over and over. I later told him that if he was looking for land with good agricultural potential, he should look in Transkei, and specifically East Pondoland. His reply was that he knew that Transkei had wonderful tourist potential. I tried to explain to him that I was not talking about the Transkei's undoubted tourist potential, but about its agricultural potential. I could hear that he was not going to listen to the realities and the conversation simply ended.

These discussions are not only important in regard to optimising water use efficiency and alleviating rural poverty, but also in regard to land reform. The question is whether it would be fair to settle more communities in situations similar to that of the Riemvasmaak community who have received back their land which is described by the London-based FarmAfrica as a barren moon landscape which receives 50 mm rain per annum.

3.7 HUMAN RESOURCES

In a brilliant lecture at the University of the Orange Free State in 1974, Dudley Meyer, a farmer from Bethlehem, pointed out that there are two basic resources that form the foundation for farming, viz.

a. The farm, with its specific natural characteristics and qualities (in terms of climate, soil, etc.) that determine its suitability (potential) for specific farming enterprises. *"Try to do anything that does not fit in with these and it will surely fail."*

b. The farmer, with his/her specific capabilities (and talents) and preferences (interests). *"Try to do anything that does not fit in with these and it will surely fail."*

All the other important factors, like eventual crop and cultivar selection, availability of labour, capital and implements, infrastructure, etc. fit on top of these two cornerstones in determining what eventual land utilization type (enterprise x management system) would be the most appropriate.

When considering South Africa's crop production potential and applying the norms that are used internationally to estimate whether a country can produce enough food to feed its population, South Africa should ***not*** be able to feed its present population. Yet, South Africa is presently producing a substantial maize surplus, and this despite the fact that the Eastern Cape is producing far below its potential.

As indicated earlier, a substantial proportion of the maize is produced in areas that are absolutely marginal in regard to rainfall (and even soils). And this is achieved without the huge subsidies that American and European farmers are receiving. It shows how well South Africa's commercial farmers have been able to adapt their production strategies to cope with such unfavourable conditions and to make the most efficient use of the little available water. Commercial farmers in the marginal western areas of the Northwest province expressed the opinion that the area is climatically marginal, but not economically marginal because they have successfully implemented a system of low planting densities, selection of appropriate planting dates and low inputs that enable them to break even in low yielding years and make substantial profits in good years (Mbatani, 2000). They have also found that soils with soft carbonate horizons (which are normally rated as having quite low cropping potential) give more consistent yields (thus reducing risk) and in the long term higher average yields than the more highly rated deeper soils of the area (De Lange & Laker, 1992). In the same area the small-scale Black farmers were also aware what the best planting time was, but believed in minimizing risk by spreading planting over a longer period around this time, so as not to lose everything should the usual mid-summer drought occur outside its normal time (Mbatani, 2000). These strategies are both perfect examples of how water use efficiency can be optimized and rural poverty minimized by sensible on-farm decision-making.

High awareness of risk and implementing various types of strategies to minimize it, are striking features of the decision-making of resource-poor small-scale farmers in South Africa. I have always been struck by how clear and wise they are about this, adjusting their decision-making to the circumstances in which they operate. More than 20 years ago some chiefs in the former Ciskei indicated that they believed that maize production in the Ciskei would be more stable if a technology could be developed that would enable planting of maize in late August or early September instead of the customary middle October (Laker, Undated). Looking at the rainfall patterns of the area this looks like a logical suggestion, but as far as I know it has never been tested in research. Instead research was done trying to overcome the January/February drought by delaying planting to middle December, a strategy that gave 20% *lower* yield than middle October planting (Van Averbeke, 2003a). The same chiefs pointed out that the maize input package advocated and supplied by the Ciskei government created problems because it entailed that small farmers had to incur debt to purchase it – in an area where the danger of a crop failure is great (Laker, Undated).

A second feature of the traditional small-scale farmers that have struck me is how flexible and adaptable they actually are, provided that conditions warrant it. More than 40 years ago as undergraduate student I was already greatly surprised by how eager a person like Gafney Mkula, living on a remote hill in Tabakulu district, was to find out how he could improve his agriculture – and that for his circumstances I did not have an answer. In the same district, at the end of the last horribly bad road, I also

saw the pride of a farmer in his ***excellent*** maize crop. The success of the maize farmers at Phokoane in the former Lebowa has already been mentioned. Van Zyl (2003) summed it up well when he stated: ***"There are a large number of existing farmers with latent potential in the former homelands."*** The challenge is how to create the opportunities to unlock this latent potential.

Irrigation will be discussed in a later section, but under this heading it is appropriate to point out that in regard to irrigation there is also substantial potential amongst small-scale Black farmers. But, again, it will need creation of appropriate opportunities to unlock this potential. A striking example is the highly successful farming systems that were developed by irrigation farmers at Middle Letaba in the former Gazankulu (Khuvutlu & Laker, 1993). This will be discussed in some detail in the section on irrigation development.

The general impression in Africa and the former homelands of South Africa is that irrigation is invariably doomed to failure – and in a very short space of time. Against this background it is interesting and important to take note of a "private", i.e. non-government, irrigation "scheme" that was established in the 1850s by Chief Kama near Middledrift in the former Ciskei and operated until the 1960s, i.e. for more than 100 years. Water was extracted from the Keiskamma river and conveyed in a nine kilometre long concrete canal to the irrigated area (Williams, 2003; Kopke, 2003). During the 1940s and 1950s Kopke (living there as a child) saw water flowing "every day" in the canal, which had to be cleaned once a year. A wide variety of crops were grown under irrigation, including *inter alia* maize, wheat, beans, peas and tobacco (Kopke, 2003). It was a big canal, as shown by the fact that in 1950 a car that left the road fell in the canal and the driver drowned because she could not open the door (Williams, 2003). It is estimated that it would cost about R3 million if such a canal would have to be built now (Kopke, 2003). It is not clear what led to the demise of the scheme in the 1960s. Kopke believes it was politics. The importance of this case is that it shows that if the people have the freedom of decision-making and take "ownership" of managing such scheme, ***they are capable*** of constructing and maintaining such a scheme, including the whole infra-structure.

3.8 NON-AGRICULTURAL FACTORS DETERMINING THE EFFICIENCY OF AGRICULTURE AND THE SELECTION OF APPROPRIATE FARMING SYSTEMS AND TECHNOLOGIES

Numerous factors that have nothing to do with the characteristics and quality of the natural resources and the nature and quality of the human resources of an area or with technology can over-ride the latter factors and determine the efficiency of agriculture and the degree of poverty in an area. These include a variety of economic, socio-economic, social, cultural, religious, political, etc. factors. Numerous books, articles and reports have been published about these. The peak period for these publications was probably the 1970s (and into the early 1980s), triggered by the realisation that these were key factors jeapordising agricultural development in the various countries that gained independence during the 1960s, especially in Africa. I have referred to a small selection of these (perhaps the more simple, straightforward ones) in previous papers (Laker, 1979, 1981, In press). The book by Clayton (1983) is perhaps of special interest.

According to Oyer (1979) a farmer, especially a small-scale farmer, has little or no control over these non-agricultural factors, whereas government policy "is probably a greater determinant of food production than is technology".

For the traditional "Black" rural areas of South Africa, Van Averbeke (2002) quotes work reported elsewhere by himself, showing *"the inadequacy of the institutional arrangements governing land ownership and exchange to be one of the causes of the failure of African agriculture to respond to obvious demands for farm produce at local levels. These institutions fail to encourage flexibility with regard to land ownership rights and land use rights. As a result, land markets in communal areas hardly exist. In a situation where the role of agriculture in the livelihoods of rural people is variable, conditions require high levels of flexibility. However, the institutions which must enable high levels of flexibility, encourage rigidity instead. There is evidence that access to water on some African irrigation projects is also affected negatively by institutional deficiencies."*

In nearly all developing countries ***population pressure*** is the biggest cause of agricultural malpractices and the biggest threat to national and regional food security (IFAD, 1992a; Scherr, 1999; Laker, 2000, In Press). In this regard it is important to note that it is irrelevant to look at the total area of land available per person, but that one must look at the area of arable land (and the quality of that arable land) available per person (Scherr, 1999; Laker, In Press). South Africa's resources are of such a nature and the size of our population so large that according to international parameters we should already be experiencing food shortages, but we are still saved by the achievements of our commercial farmers. The matter of population pressure is a special issue and will not be dealt with here.

Only three of the many important factors will be discussed here briefly, viz. land tenure, infrastructure and poverty-related social problems,:

a. Land tenure: "Systems of land tenure form one of the most critical issues related to agricultural development" (Laker, 1981). It is then also a key factor affecting the efficiency with which resources like water and land are used and also affecting rural poverty. There are widely divergent views on the the effects of different systems of land tenure. A person's view is often biased by his/her political views or personal ideas and it is difficult to get an objective analysis.

For the former homelands of South Africa, Laker (1981) stated that two land tenure aspects required consideration, viz.:

- *"The land tenure changes required in the traditional tribal areas to stimulate agricultural development in these areas. It is also important to identify how these changes can be brought about with the consent and goodwill of the traditional communities and without disrupting them."*
- *"The types of land tenure and production systems which should be promoted in the non-tribal areas."*

Beek (1981) describes ***traditional land use*** as *"a closed system, virtually without capital inputs, occasionally shaken by episodic hazards"* and points out that it *"aims at minimizing risk to assure a continuous food supply"*.

Two of the main limitations in this type of scenario are

- Lack of incentives to invest in measures to improve and sustain the quality of the land by means of required inputs and to curb land degradation.
- Absence of able-bodied men, leaving agriculture in the hands of women, old men and children.

Both these limitations are largely related to the traditional system of land tenure, which entails that there is no private land ownership and each of a large number of families is allocated only a small area of cropland. Lack of ownership of the land means that land cannot be used as collatoral for loans with which to purchase inputs to get agricultural development going. Furthermore, no one has any assurance that his/her land will not be taken away and given to someone else at any stage. Although the latter is probably not common, it does happen occasionally – just enough to be a disincentive. At a workshop in Thohoyandou some 24 years ago, involving community members of various walks of life (teachers, nurses, chiefs, etc.), one group, with a progressive young chief as spokesman, expressed the opinion that "no one will make inputs to improve or conserve the land if he/she does not have assurance that he/she will have that piece of land again the next year and if it is a little piece of land *the size of a baboon's face*"!

A consequence of the lack of inputs due to such land tenure system, is poor use of high potential land, eventually leading to its exhaustion. This also means very poor water use efficiency. As a result of the under-utilization of the high potential land, especially where there is high population pressure, marginal land is brought into cultivation. Unbearable pressures are then put on such marginal land, leading to its severe degradation. These are not just theories or things that I have read somewhere, but things that I have seen in practice.

The small area of land per family makes it impossible to make a living from agriculture and outside income is required. Since the able-bodied men have the best possibility to get jobs in mines or industries, they are the ones that leave to find jobs elsewhere. A study in a rural valley in Lesotho, for example, found that the people of that valley could not survive without the money earned by the men working on the Free State gold mines (Van Wambeke, 1981).

As indicated earlier, the challenge will be to find an acceptable solution to the traditional land tenure issue.

Regarding the ***non-tribal areas,*** the debate (e.g. in the Faculty of Agriculture at the University of Fort Hare) in the 1970s and early 1980s revolved around what type of tenure system should be implemented. These areas included the commercial farms that were bought out and incorporated into the homelands as part of the homeland "consolidation" programme. It did, however, also include the cases where agricultural development projects, especially irrigation projects, were considered in certain tribal areas. I believe this issue has not yet been resolved. The areas that are now being handed over to communities under the land restitution and land redistribution programme require similar consideration regarding appropriate land tenure approaches.

Because one was looking at relatively small scale farmers, to accommodate as many as possible "middle class" Black commercial farmers, there was a tendency in some circles initially to look at the Israeli *"kibbutz"* type system. As far as we could ascertain, it seemed that this system had never succeeded anywhere in Africa or South or Central America. This was, therefore, not an option. It seemed strange in view of the African culture of sharing. Experience in at least some areas that have recently been handed over under the land restitution and land redistribution programmes apparently confirms that such "share and share alike" system does not work and leads to conflict and inefficient use of land and water resources. In the 1970s/1980s it then seemed as if the other cooperative Israeli model of the *"moshav"* system seemed to be a system that might be more successful than the *"kibbutz"* system. The difference is that in the moshav system everyone reaps his/her own profits, instead of sharing profits equally amongst each other. Thus inefficient "passengers" cannot parasitise on efficient, hard-working members of the moshav.

In the end agricultural development projects in the homelands, especially irrigation projects, were, with some exceptions, handled according to one of two models which were both extremely inefficient in terms of farmer development. They were also of little (if any) value to the surrounding rural communities and had minimum impact on alleviation of rural poverty. Many projects were "cooperative" projects, which were planned, implemented and managed by consultants. The "farmers" had no say in management decisions, e.g. in regard to what farming systems or technologies to use. They simply had to follow instructions from the managers. In some cases all the work was actually done by contractors hired by the managers, according to the decisions and instructions of the managers. I coined the term that these were not farmers, but simply "glorified labourers", a term which was subsequently also used by De Lange (1994). According to Prof. H.U. Thimm, at the time Professor of Agricultural Economics at the Justus Liebig University in Giessen, Germany, these projects closely resembled the collective state farms of the then east block countries in terms of land tenure and management (Laker, 1981).

Eventually the ideal should be to have as many as possible independent private farmers, irrespective of race, colour or creed, either as individuals or within family set-ups, either owning their land or having long term assured access to it. An unhappy farmer at a scheme like those described above made it clear *"that he saw his participation as merely a stop-gap measure until he had acquired sufficient capital to become an independent private farmer elsewhere"* (Laker, 1981). Interestingly enough, the successful Black tomato farmer at Nwanedzi, mentioned earlier, expressed the opinion that farmers should ***not*** be allowed to own the land, *so that inefficient farmers could be kicked off the land and their land given to efficient farmers* (Du Plessis & Van der Stoep, 2001).

b. Infrastructure: Good, or at least adequate, infrastructure is a prerequisite for the efficient use of primary natural resources and for the alleviation of rural poverty. Unlike the situation in developed countries and developed areas, where good infrastructure is accepted as a given fact, poor infrastructure is one of the biggest constraints in less developed countries or areas (Laker, In press). Unfortunately the seriousness of the latter is often not realised by decision-makers and

politicians because they do not see the real problem areas and situations. In an unpublished seminar at Cornell University Robert Chambers warned against the dangers of "rural development tourism", defining rural development tourists as those rural development "experts" who only visit the main city(ies) and only drive along the main tarred road, thus seeing only the "tarmac elite" and their situation (Laker, 1978a, 1979).

Various types of physical infrastructure, e.g. roads and telephones, are important. Good roads are important for the transportation of inputs to the farms and produce from the farms to markets. In general South Africa's former homelands have better roads than the situations in most other African countries, such as those described for Madagascar by Laker (In press) or for western Zambia by Kwaw-Mensah (1996). In many deep rural areas of South Africa, such as major parts of the former Transkei, roads are bad and even practically non-existent, however. These include areas with fair to good cropping potential. The maize field of the proud Tabankulu farmer mentioned earlier was, for example, right at the end of the (not very good) road to that part of the district.

Poor or non-existent transport services and/or lack of vehicles are problems related to the above, because they also hamper access to inputs and the marketing of produce. Land use planning studies by undergraduate students at the University of Fort Hare in 2002 revealed that these were major constraints for small-scale farmers (individual farmers owning their land) in the Seymour and Balfour area of the former Ciskei, for example. Their farms are close to the Fort Beaufort-Queenstown tarred road, but the lack of transport and vehicles leave them at the mercy of hawkers who pay them just what they like for their produce, because they have no other means to get it to the markets in the surrounding towns. The worst type of scenario would be one similar to that in the Senanga district of western Zambia, where the small-scale farmers were able to grow the most fantastic vegetables in the fertile dambos, but could not get these to the market at Lusaka because of a combination of bad roads and lack of transport (Kwaw-Mensah, 1996). In contrast, the tomato farmers at Middle Letaba had no problem to market their surplus tomatoes, which they could not market locally, because they had an agreement with the huge ZZ2 tomato farms to transport their tomatoes together with those of ZZ2 to the Pretoria and Johannesburg markets (Khuvutlu & Laker, 1993). Thus, they had good roads and transport at their disposal to market their tomatoes even at distant lucrative markets. At the same time one of the (many) reasons why the same Middle Letaba farmers stopped planting wheat was because of lack of transportation for wheat to the ***very nearby*** Letsitele. Eventually closure of the Letsitele Wheat Board caused such serious marketing problems for wheat, as did closure of the Giyani roller mill for the marketing of maize (grain), that the vast majority of the farmers replaced them with other crops (Khuvutlu & Laker, 1993). Bembridge (2000) points out that in Limpopo province "*many (irrigation) schemes are poorly served by access roads, and transport services are inadequate, resulting in poor access to markets.*"

Availability and accessibility of inputs, e.g. seed, fertilizers, pesticides, etc., also have major impacts on the efficiency of the use of primary water and land resources and on the types of farming systems that are viable options (Laker, In press). In South Africa there is probably seldom a problem of unavailability of

inputs, although the best type of input (e.g. fertilizer mixture or seed of a particular cultivar) required for a specific purpose in a specific region may sometimes not be available. Poor roads and/or poor transport services and long distances to the nearest centre where an input is available, make accessibility to inputs a major problem for small-scale farmers and food plot and home garden producers. Closure of the agricultural cooperative in Fort Beaufort has, for example, apparently been a major blow for the rural population served by the town. According to the information gained by Fort Hare students from the Seymour/Balfour farmers (some 40 km from Fort Beaufort) they now have to get their inputs from East London, nearly 200 km away. I can't believe that inputs are not available from some of the nearer big towns, but even then it would be 100-130 km away. Without vehicles and suitable transport services this is not much better, in any case. The situation of the Seymour/Balfour farmers is not an exception. In other parts of South Africa similar situations prevail. In some cases a small-scale farmer may have to travel 80 km or more by mini-bus taxi to purchase inputs, and then have to pay extra to transport it by taxi (Van Zyl, 2003). For more remote areas, like major parts of Transkei, the Malonga Flats of Venda and others, the problem is even bigger.

Support services have important impacts on the efficiency and sustainability of especially more advanced farming operations. Each technology requires a certain minimum infrastructure for it to be used successfully on a sustained basis (Laker, In press). In less developed areas the support services required for a certain technology are often not available, or not easily available. Technical support services include things like service centres, availability of spare parts and qualified mechanics and technicians. If one of the diesel pumps pumping water from the Mzimvubu river to Sipetu hospital (in Tabankulu district) broke down, a mechanic trained for these pumps would have to come from Port Edward, over 200 km away. For the largest part he would have to travel on gravel roads, the last stretch being so that during/after big rains it could be negotiated only if chains were fitted to the tyres of the vehicle. And one must keep in mind that it could take three or more days just to get through to him by telephone. One can just imagine the problems that would face small-scale farmers if an attempt would be made to develop irrigation farming on the Mzimvubu floodplain at Wumbeka, from where the water is pumped to Sipetu, with systems like sprinklers, micro-sprinklers or drippers that would require pumping from the river. That is apart from the lack of inputs and the problem that it would be extremely difficult to get produce to markets via the terrible road.

In their *"Evaluation of the appropriateness of micro-irrigation systems in small-scale farming"* Du Plessis & Van der Stoep (2001) reported some very important actual research findings in regard to the above type of situation from the substantial number of projects that they studied in various parts of the country. A small selection of their findings include:

- *"Support services are essential for successful farming. This is true for commercial farming, and even more so for small-scale irrigation farming."*
- *"Small-scale irrigators are often isolated from support services and equipment suppliers, either by distance or absence of transport."*

- *"All the sites with poor infrastructural development had failed, or had great difficulties keeping their systems going."*
- *"Electricity is not readily available in rural areas."*
- *"The telephone service was often not functional for long periods of time."*

For specific cases Du Plessis & Van der Stoep reported things like, for example:

- *"During installation of the system at Strydkraal, two **simple** nylon fittings were needed to complete installation. Obtaining the parts involved a **50 km journey to the "nearest" supplier** where it was then purchased for **almost four times the price in Pretoria**."*
- And for Rooifontein (Kamassies) in Namaqualand: *"The supply system, mainly the pump and diesel engine, caused farmers many problems. Mechanical knowledge to repair the machine when it broke down was lacking. The same applies for the tools necessary for repairs. Rreplacement parts needed, caused major delays, because it had to be obtained from Springbok, **some 90 km away**. Parts were also difficult to obtain, since the engine was of relatively unknown Chinese make."*

For irrigation schemes in Limpopo province Bembridge (2000) likewise found that *"inadequate mechanisation back-up is a constraint."*

I have dwelt in some detail on the technical service infrastructure problems, because ***it is essential that the people in high places take cognisance of the realities regarding infrastructure in rural areas and the implications of these realities – and take steps to alleviate these crippling problems.***

Non-technical support services that are absolutely essential include, *inter alia*, ***research, advisory (extension) and training (for both farmers and farm workers) support.*** These are apparently in a very unsatisfactory state at the moment and this situation will hamper efforts to optimise the efficiency of resource use and to alleviate rural poverty.

Special attention needs to be drawn to the almost complete collapse of the water supply infrastructure of a major proportion of the hundreds of small-farmer irrigation schemes in the former homelands after the change of regime in 1994. The consequence is that many of these schemes became totally non-operational, leaving thousands of small-scale irrigation farmers and their families, as well as farm labourer families, destitute. At a few other schemes a few farmers are desperately trying to scratch out something for the survival of their families. Bembridge (2000) gives a comprehensive review of the situation. In terms of resource use efficiency and rural poverty this is an absolute disaster. Some of the schemes that have been worst hit, are schemes that are dominated by excellent high quality soils and have abundant high quality water. From a natural resource viewpoint they are, therefore, ideal for successful small-farmer irrigation development. It is tragic that the water supply infrastructure at Middle Letaba, where the excellent farmers had developed such wonderful farming systems, for example, was allowed to deteriorate so badly. It appears that the undue haste with which the agricultural development corporations of the former homelands were disbanded after 1994, without putting structures in place to take over their functions, is the main (if not only) reason for the collapse of the water supply

infrastructure of the irrigation schemes in the former homelands. The corporations had many weaknesses and in principle one could not argue about a decision to disband them, but to do it without provision for systems to take over their key functions was almost criminal in terms of the hardships caused for thousands of rural people. In Limpopo province a process of revitalization of irrigation schemes has started, but it will probably be a slow process and the costs will now be ***much higher*** than if the infrastructure had been maintained in good condition. In the Eastern Cape a contract has recently (end September 2003) been awarded for the revitalization of a small number of schemes, and the development of some new areas. *Quite frankly the selection of schemes for this process do not make sense to me, more particularly looking at the fact that some of those that should have been highest priority in terms of their good natural resources and extreme poverty in their surroundings have been left out.*

Bembridge (2000) gives a comprehensive outline of the infrastructure requirements for small-scale irrigation schemes, while Van Averbeke *et al.* (1998) give an overview of the support services required for successful small-scale irrigation farming.

c. Poverty-related social problems: Wide spread poverty-related social problems are serious deterrents to small-scale farmers in South Africa. The most serious of these is crime, and particularly theft of crops and livestock, but also theft of equipment. Farmers on small irrigation schemes are more vulnerable than those on bigger schemes (Bembridge, 2000). Dryland farmers are also victims, however (Adendorff, 2003). Two examples that I know of, almost at geographic extremes of the country, should suffice to illustrate the theft problem:

- In the Seymour/Balfour area of the former Ciskei, where individual small-scale farmers own land that used to be white commercial farms, the 2002 Fort Hare Land Use Planning students found that theft of crops and livestock was so severe that some farmers had to cease production. Ironically the Eastern Cape government plans to establish a tiny little irrigation scheme in the area as part of their revitalization programme. It is not difficult to see that theft would quickly put it out of business. The only sensible approach would be to establish a much bigger project, especially on the Balfour side.
- Theft makes it impossible for the "Venda Mango Growers" to market their fruit on the lucrative fresh fruit market. They perforce have to harvest the fruit while it is small and green and deliver it to the atchar factory at Thohoyandou at a much lower price. In addition they are at the mercy of the factory, which has a monopoly because only one licence for such factory in the area was granted. They are good, efficient farmers, but the theft is hurting them financially.

3.9 RESOURCE INVENTORIES, LAND SUITABILITY EVALUATION AND LAND USE PLANNING

Optimisation of the efficiency with which the basic land resources, like water, soil and vegetation is used is not possible without good land suitability evaluation and land use planning. Proper land suitability evaluation and land use planning are, in turn, not possible without high quality ***relevant*** resource information, collected by means of resource surveys, e.g. soil surveys. It is not possible to discuss this topic in detail here,

although the temptation is great to do so because such horrible errors are made in regard to both the relevance and quality of resource surveys and land suitability evaluations.

In a recent review I have touched a little bit on the South African research done in regard to land suitability evaluation and land use planning during the last 25 years (Laker, 2003b), but a much more comprehensive review and a guideline document(s) are urgently required.

I believe that the various FAO documents on land suitability evaluation form an excellent basis to start from. Weldegiorgis (2000) gives a comprehensive overview of these and various other land suitability/capability evaluation systems. Any person involved with agricultural development (including land reform), ***especially senior officers*** in the national and provincial departments of agriculture and land affairs, ***must*** at least study the little general document *Guidelines for Land Use Planning* (FAO, 1996) and the principles outlined in the first few pages of the *Framework for Land Evaluation* (FAO, 1976). It may be useful to just list the six principles of land suitability evaluation outlined in the *Framework* here:

a. *Land suitability is assessed and classified in relation to a particular Land Utilization Type (LUT).* A LUT is not a general concept (e.g. rainfed cropping), but very specific, e.g production of a specific crop using a specific technology.
b. *Evaluation requires a comparison of the input needed and the output obtained on different types of land.*
c. *A multidisciplinary approach is required.* These should include not only natural scientists, e.g. crop scientists, climatologists, soil scientists, etc., but also economists and human scientists, e.g. rural sociologists. In Laker (1980), I pointed out that this does not mean people from disciplines working in relative isolation on the same project, exchanging information between each other. They must really work as an ***interactive team***. To be effective each must also understand the "jargon" of the other disciplines involved (Laker, 1981).
d. *Evaluation is made with careful reference to the physical, economic and social context of the area under consideration.*
e. Suitability refers to use on a sustained basis.
f. Evaluation involves comparison of more than a single kind of use.

The FAO published a series of guidelines for different types of land suitability evaluation. In my opinion the best of these guidelines are *Guidelines: Land evaluation for rainfed agriculture* (FAO, 1983) and *Guidelines: Land evaluation for irrigated agriculture* (FAO, 1985). These are guidelines that lead one through a process and do not enforce criteria and class limits for parameters to be evaluated. In fact, they encourage the use of local criteria. They require evaluation in terms of three sets of requirements (and tolerances), viz.:

- *Crop requirements.*
- *Management requirements.* Apart from direct management requirements, they include here also aspects such as infrastructure, socio-economic factors, etc.
- *Environmental requirements.* Off-site environmental impacts also feature prominently here.

Regarding the first of the three above especially, evaluation consists of:

a. Establishing what the requirements and tolerances of a LUT is regarding factors related to natural resources, such as climate, soils, etc.
b. Determining the quality of the natural resources relative to these requirements and tolerances from the properties and characteristics of the different land factors.
c. Matching the requirements and tolerances of the LUT with the qualities of the land.

The biggest problem in regard to the above is usually a lack of adequate information regarding the climate and/or soil requirements of particular crops, and ***more importantly their tolerances of non-ideal conditions***. This almost universal problem was articulated as follows by Protz (1981) in view of his experience with the Pahang Tenggara Master Planning Study in Malaysia: *"The soil management literature was reviewed for specific soil properties affecting each crop. Precious little information was available beyond the standard . . . . this crop grows best on deep well-drained, friable, highly fertile soil . . . . Obviously, if a decision has to be made on which crop has the best chance of economic success on poorer soils, more specific soils criteria were required."*

One of the features of the reports of the detailed soil surveys done at county (district) level in the USA is that each include a whole series of comprehensive tables giving an interpretation of the suitability of each mapping unit for a wide range of land uses, from rainfed cropping to roads and urban development (e.g. SCS, 1977). For ***each*** of the most important crops in a county they go as far as to give the yield that can be expected on ***each mapping unit*** under both (a) "***average management***" and (b) "***improved management***". Since a farmer will know from the maps which mapping unit is found where on his farm, he can plan accordingly what to do where.

There are various books and other international publications having tables giving the requirements and tolerances of various crops in regard to several soil properties/characteristics, e.g. Young (1976) and Protz (1981). My own experience has shown that the criteria listed in some of these international publications can be way out for local conditions. The FAO (1983) also warns against using published foreign or generalized criteria blindly and advocates that as far as possible local knowledge, obtained from local researchers, extension officers and farmers, should be used. My experience has shown that even people working in one part of South Africa can make big mistakes when they try to make recommendations for another part of the country in which they do not have experience.

The following example illustrates a wider South African problem, similar to the general international experience: A discussion forum on practical problems and priorities for the Northwest Province regarding research in agricultural water management, *inter alia*, included the following conclusions (WRC, 2003):

- *"Inappropriate crop selection, which does not suit the soil or climate, is a problem."*
- *"The appropriateness of crops to be planted in different areas, whether under irrigation or dryland conditions, need to be determined."*

Field experimentation is useful and necessary, but it cannot nearly cover all possibilities. Except for the brilliant paper by Du Preez (1980) for deciduous fruit in the Western Cape, there are very few comprehensive publications on the requirements and tolerances of different crops in South Africa. There are lots of useful relevant information available in the country, but these are spread over various fields – such as publications that did not per se address land suitability, but give invaluable information; popular/semi-popular articles in local "information" periodicals like *"Die Landbouer"* of Vaalharts, *"Glen Agric"*, *"Dohne Agric"*, etc.; published and unpublished reports; unpublished lecture notes and, ***most importantly***, undocumented information in the heads of experienced ***local*** researchers, extension officers and farmers. The paper of Protz (1981) is an excellent example of the approach to use in developing tables with criteria for the requirements and tolerances of various crops and after a soil survey developing suitability tables for the different soil mapping units for the different crops. Hensley & Laker (1981) give a South African example (for the Makhathini Flats) of tables for a range of selected crops and the major soils of the Flats. Information solicited from various people through personal interviews formed the basis for developing crop tolerance criteria tables. When such criteria had to be developed before a soil survey for irrigation development in Chief Mabandla's area in the former Ciskei, I developed a document in which I gave the arguments of different people regarding their ratings for specific crops and soils and explanations for my final decisions. I believed that this would have more long term value for persons who had to follow it up rather than to just give the final criteria decided upon. People from different areas and backgrounds often have different ideas and one must weigh these up carefully within the context of the area for which your recommendation must be made. Above all, common sense must prevail.

Based on lessons learned during my involvement in a research project on soil resource inventories for development planning at Cornell University in 1977 and two international workshops (as part of the project) in 1977 and 1978, I wrote a small paper illustrating that different types and levels of agricultural development require different criteria for land suitability evaluation (Laker, 1980). Soils that have the highest crop production potential under intensive mechanised agriculture under a high level of management may be unsuitable for crop production by a resource-poor rural farmer with little or no capital and/or lack of access to inputs. Conversely the best soil for crop production by a subsistence farmer may not be a viable economic option for a large commercial farmer. But as small-scale farmers develop towards becoming commercial farmers, the land suitability evaluations need to be adjusted. This then brought about a need for a dynamic approach to land suitability classification in contrast to the original static approach *"typified by the Land Capability Classification of the U.S. Soil Conservation Service"* (Smyth, 1981). Smyth pointed out that the FAO *Framework for Land Evaluation* represents a dynamic approach. In the dynamic approach *"feasible land use options lie within a "field" determined by three main constraints: physical constraints (or land qualities), socio-economic constraints, and socio-political aspirations (the desires or objectives of the people. None of the constraining corners of the "field" is fixed; all can be changed. The path curves in the socio-economic direction. The anticipation of change is the essence of the dynamic approach."* (Smyth, 1981.) I published a little paper on dynamic land suitability evaluation as applicable to developed agriculture (Laker, 1982).

Land use planners in numerous countries, especially developing countries, are more often than not misled to believe that the USDA's eight class land capability system is suitable for land use planning – also at farm level. It is definitely not suitable for that purpose, and from what was outlined a few paragraphs earlier, it is clear that the Americans themselves actually do not use it for land suitability evaluation for production planning at farm level. ***Unfortunately mutants of the USDA's eight class land capability system are often also advocated or used in South Africa and its neighbouring countries, often with very serious negative outcomes.*** (See also Laker, 2003b.) Although I want to avoid going into much technical detail in this report, I believe the implications of erroneously using this approach for land suitability/ capability evaluation warrant some more attention to it. Davidson (1982), apart from referring to the rigid nature of the system and to my *"fundamental"* criticism to it (in Laker, 1980), also made the following important statements regarding it: *"A more fundamental problem is the evaluation methodology which by its negative approach cannot incorporate the varying needs of different land uses. In essence the system lacks a firm ecological foundation in contrast to the more recent schemes of land evaluation."*

Land suitability evaluation and land use planning is impossible without high quality resource maps and accompanying reports. There are many published guidelines regarding the conducting of appropriate resource surveys and a comprehensive discussion will not be given here. As indicated in its preface, I cooperated on the project that led to the publication of the *Guidelines for evaluating the adequacy of soil resource inventories* by Forbes, Rossiter & Van Wambeke (1987). The significance of this publication is that it gives methodologies for assessing the adequacy of different aspects of soil resource inventories. As indicated in the preface, I established standards for the adequacy of map scales and assisted with developing the methodologies for assessing the adequacy of map scales, the relevance of soil information and the purity of map unit composition. These are all factors determining the usefulness of soil maps. Otherwise one can end up with very expensive and beautiful soil maps (or other resource maps) that are totally useless for the purpose that they were intended for. Conversely, someone may totally inappropriately try to use them for a purpose that they were not intended for. The importance of the relevance of the information that is collected during a resource survey is often overlooked. Hensley & Laker (1981) outlined an approach for making sure that the required relevant information is collected during a resource survey. Although the paper was written for irrigation planning, the same basic approach is appropriate for resource inventoring for any purpose.

High quality soil surveys cannot be done without a good soil classification system that is being improved and updated continuously as new knowledge accrues. As indicated earlier, South Africa is in a zone where our soils differ quite radically from those in North America and Europe. Although we should try to fit into the big international schemes in the higher (broader) categories, and get them to make provision for our soils, we must keep on developing our own classification system in the lower taxonomic categories (family and series). One of the strengths of agriculture in the USA is their soil classification at series level. At the moment we have no series classification in our system and due to lack of funding for soil classification, we are paralysed in this regard. I recently discussed this comprehensively (Laker, 2003a) and will not repeat that discussion here. If the government does not wake up to its

responsibilities in this regard soon, agricultural development and the efficiency of the use of water and land resources will be seriously jeopardised.

Finally, I have to dispell another misconception or deliberate spreading of disinformation: I have noticed that there are people that say that the homelands were neglected in regard to resource surveying and that surveys were mainly done in the "White" farming areas. The opposite is, in fact, true. Millions of rands were spent on semi-detailed to detailed soil surveys in the homelands, especially during the 1960s and 1970s. The detailed surveys were mainly for the planning and development of irrigation projects, but also for dryland crop development (e.g. in the Phokoane area of the former Lebowa). Semi-detailed surveys for catchment level planning were done for the biggest part of the former Ciskei, covering the whole Keiskamma river basin from the mountains to the sea and the Kat-Fish basin. These were not only resources inventories, but also included land suitability evaluations for various uses. I know of these because I was in some way or other involved with many of them – either as member of steering committees or in evaluating the reports and maps. Broad scale resource inventories were also done, for example, for the Ciskei (Laker, 1975, 1978b). During the same period mainly only broad scale land type surveys were conducted in the "White" areas. Unfortunately it seems that some of the valuable documents of the homelands were lost or destroyed during the changeover of regime in 1994 and that it is unknown what happened to most. ***To avoid having to redo a lot of expensive surveys for the revitalization of the irrigation projects or other development or redevelopment projects, it is essential to urgently try to trace copies of these reports and maps.*** The ARC-ISCW, ARDRI at the University of Fort Hare, ISEN at the University of the Free State, ISER and the Department of Geography at Rhodes University, the Potchefstroom University for CHE (now part of Northwest University), Loxton, Venn & Associates and any remnants of former homeland Departments of Agriculture are potential sources. ***The ISCW particularly has a lot of extremely valuable soil information for several of the irrigation schemes.*** I have copies a few very important ones, including the original reports and maps for the then proposed White Kei scheme under the Xonxa dam in the former Transkei, as well as my re-evaluation of the resource information and revised planning proposals. If the latter were accepted at the time, the scheme would not have ended up in the bad situation that it did. I believe our 1978 report on the agricultural potential of the Ciskei should be a key document for the Eastern Cape Department of Agriculture to consult and use. It *inter alia* referred to certain important potential alternative crops for the area. The 1975 version did not include the "White" farming areas that were bought out for the consolidation of the Ciskei, but it did include the Sterkspruit/Herschel and Glen Grey areas, which were transferred to Transkei when it became independent and were consequently not included in the 1978 version.

3.10 APPROPRIATE TECHNOLOGIES, BEST FARMING PRACTICES AND RELATED MATTERS

A thorough understanding of the concepts "*appropriate technology*" and "*best farming practice*" is absolutely essential if optimum efficiency of the use of the basic natural agricultural resources is to be achieved.

In about 1984/85 I presented an invited paper on "*Toepaslike tegnologie as voorvereiste vir suksesvolle landboukundige ontwikkeling*" ("*Appropriate technology*

as a prerequisite for successful agricultural development") at a workshop on agricultural development in Pretoria (Laker, Undated). The full details of the paper, which includes a number of specific illustrative examples, will not be discussed here. Although the paper was written nearly 20 years ago probably at least 80% of it is very relevant at present in South Africa. Some of the main basic sections are summarised in translated form here:

*"**Appropriate technology** is a technology which, if it is implemented correctly, provides the farmer with an opportunity to manage his farming enterprise successfully.*

Successful implementaion of of appropriate technologies is important for all types of farmers – from the traditional small-scale farmer to the large sophisticated project under a high level of management.

Appropriate technology is not synonymous with "gimmick" technologies which are developed and presented to traditional small-scale farmers as methods to improve their farming systems.

Appropriate technology approaches include the following:

- *Correct implementation of an existing technology, where it is appropriate. Technologies can vary from very simple ones to highly sophisticated ones.*
- *Adaptation of an existing technology to suit local conditions and circumstances where necessary.*
- *Development of a new technology if a suitable technology is not available for a new set of circumstances.*

It is also important to distinguish between merely an appropriate technology and the most suitable technology for a specific set of circumstances. Note: The latter is the concept of best farming practice.

Appropriate technology is a dynamic concept which embraces large variation in both space and time.

A technology which at specific moment in time may be the most appropriate for a specific case (place) with a specific set of circumstances may at the same time be totally inappropriate for another case with a different set of circumstances. One of the biggest mistakes in agricultural development, is the assumption that there is for a specific type of farming system a "state of the art" technology which can be applied under a wide range of conditions and circumstances.

Development is a dynamic process. It can thus be expected that a technology which is the most suitable at a certain point in time may become less suitable and even inappropriate later on – especially as socio-economic circumstances change.

In order to be appropriate and useful for implementation in agricultural development, a technology must comply with a number of requirements. A few of these requirements are:

- *It must be adapted to the physical-biological natural resources.*
- *All essential supporting infrastructure must be available.*
- *It must be socio-economically acceptable and feasible.*

In January 2003 I presented an invited paper on appropriate soil fertility management at an International Symposium on Soil and Plant Analysis (Laker, In Press). In it I give a number of references to papers discussing the issue of appropriate technology, with special reference to Africa. I also discuss some of my personal experiences during the past two decades or so. Illustrative examples are given.

From the discussion on appropriate technology, it can logically be seen that the concept of ***"best farming practice"*** is also a dynamic concept that varies in both space and time. Apart from conforming with the above three principles of being adapted to the physical-biological resources, having the required infrastructure available and being socio-economically acceptable, the best farming practice is the one that will give the farmer the best benefits. For emerging and commercial farmers it means the farming practice that will give the highest benefit:cost ratio (without causing degradation). For subsistence farmers it usually means the farming practice that will give them the most consistent food supply throughout the year.

"Best farming practice" relates to the full range of decision-making in farming. In regard to dryland cropping and irrigated agriculture it includes things such as crop selection, cultivar selection, planting dates, planting densities, tillage methods, weed and pest control, soil fertility management, irrigation system selection, irrigation scheduling, etc., etc., etc. It is not the objective of this report to give a comprehensive discussion on all of these. There are numerous South African publications and reports that can be consulted. ***Brief (not complete) discussions will be given on a few aspects that are directly related to optimising water use efficiency***.

a. Dryland cropping: In dryland cropping it can broadly be said that in areas with relatively low rainfall, water management becomes the over-riding factor, whereas in high rainfall areas soil fertility management becomes over-riding (Laker, In Press). It is important to note that whereas in the international Benchmark Soils Project, soil fertility was the main limiting factor, water sufficiency was found to be the main factor limiting dryland cropping in most parts of the former Ciskei in a similar project (Van Averbeke, 2003a).

Selection of realistic low yield targets, low ***planting densities*** and low fertilizer levels (and appropriate planting dates) are the key aspects of *best farming practices* in dryland cropping areas with marginal rainfall, as outlined by Laker (2003b): *"Eloff (1984) pointed out that most of the problems experienced by crop farmers, especially maize farmers, in the low rainfall marginal areas of the western Highveld were due to unrealistically high plant densities and fertilizer levels, leading to over-exploitation of the available soil moisture and crop failures. Because it was accompanied by high input costs, it led to financial disasters. Mbatani (2000) indicates that the farmers have adapted and now survive by using appropriate low yield targets, low planting densities and low fertilizer inputs. Mbatani (2000), De Lange & Laker (1992) and Louw & Laker (1994) showed that with this strategy crop production is viable in these areas."* According to Mbatani (2000) the maize farmers in the area expressed the opinion that they now consider the area as *"climatically marginal, but not economically marginal"*.

In the former Ciskei (central Eastern Cape) Professor Jean Marais of the University of Fort Hare and his co-workers and students conducted excellent extensive research into best farming practices for dryland crop production in the area. Some of this work has been excellently summarized by Van Averbeke (2003a). The main component of the work is the 530 page PhD thesis by Van Averbeke (1991) on the effect of planting density on the water use efficiency by maize. As could be expected, the appropriate planting density for a specific case depends on the rainfall and water storage capacity of the soil, ranging from just over 10 000 plants.ha^{-1} for marginal areas to 30 000 to 40 000 plants.ha^{-1} for high potential areas. Van Averbeke (1991) gives actual appropriate figures for specific Ciskeian ecotopes, thus enabling farmers (and advisors) to make sensible decisions.

Van Averbeke (2003a) points out that migration of the Black population took place through the high rainfall eastern seaboard of the former Transkei. But then expansion took place into dry areas (southwestern Transkei and Ciskei) *"to which (the) farming systems were not adapted, leading to crop failures. The high incidence of crop failure did not lead to the adoption of alternative cropping systems adapted to dry conditions. Instead crop production in these areas (e.g. drier parts of central Ciskei) was gradually abandoned."*

A *"best farming practice"* related to the above is ***selection of drought tolerant crops*** for such marginal areas. How careful one must be in such selection was recently revealed regarding sorghum, which is traditionally considered to be a relatively drought tolerant crop. Ecotope studies in the former Ciskei showed that sorghum was actually less drought tolerant than maize (Van Averbeke, 2003a). Vanassche & Laker (1989) found that the profile available water capacity (PAWC) for sorghum was consistently about 15% lower than that of maize. The maize extracted water much faster than sorghum, however, and they concluded that this explained why maize performs poorer than sorghum on soils that release water very slowly, e.g. swelling clay soils. An interesting point is that according to land use planning officers from the former Transkei the Transkei farmers plant sorghum on black clay soils and not maize. The Mossi farmers of Burkina Faso in the West African Sahel classify stony soils as good for millet, sandy soils as good for groundnuts and clay and loamy soils as good for sorghum (Dialla, 2003). Thus it seems that sorghum is well adapted to soils which supply water slowly, but not to soils with poor water storage capacity, e.g. the shallow Glenrosa soils of the central Ciskei, in a low rainfall area. ***It highlights the danger of generalization and over-simplification and the importance of correct land suitability evaluation.***

So-called ***"conservation tillage"***, including techniques such as no-till, minimum tillage and crop residue mulching, is often advocated as a *"best farming practice"* to improve precipitation use efficiency. The review of Bennie & Hensley (2001) revealed the ***danger of generalization and over-simplification also in this regard***. The same practice can give exactly opposite results under different conditions. Bennie & Hensley (2001) refer to research in the Free State indicating that yields for both wheat and sorghum on a relatively sandy soil decreased in the order Conventional tillage>Stubble mulch (SM)>No-till (NT). The lower yields under SM and NT were attributed to poorer root development due to shallower tillage on

these soils with inherently dense subsoils. In another experiment on such soil in the same area both wheat and maize yields were lower with stubble mulching than with conventional tillage, despite the fact that deep ripping and controlled traffic were used in both to promote deep rooting. Some studies, contrary to expectations, gave higher wheat grain yields as the intensity of tillage was increased. In contrast to these results on sandy soils in a relatively low rainfall area in the Free State, Mallett and his co-workers in several studies obtained better or similar maize yields with no-till compared with conventional tillage on a well-drained highly fertilized soil with 60% (silt + clay) in a subhumid area (Bennie & Hensley, 2001). This means that the no-till or SM practices did not work in those areas where one would expect and need it to be most effective. The fact that no-till worked only in high potential areas could be related to the finding in an experiment at the Beltsville research centre in Maryland, USA, that no-till gave higher yields than conventional tillage only at nitrogen applications of higher than about 180 $kgN.ha^{-1}$ (Unpublished seminar presented at Cornell University in 1977). This level of application can only be made in a very high potential area on a good soil. In the Cornell seminar it was also stressed that a no-till system has much higher management requirements than conventional tillage. It is, therefore, not a best farming practice option for inexperienced, resource-poor emerging farmers.

When I arrived at the research station of the Highveld Region in Potchefstroom in 1962, I was told that it was "convention" in the region to plough in phosphate in July, just after the harvesting of maize. Peter Allem, a top maize farmer in Viljoenskroon at that stage, explained that he cultivated his maize fields just after harvest in order to make the soil receptive for any odd winter rains, and especially early spring rains, because this enabled him to plant earlier. An extremely enlightening and important related finding by Van Averbeke (2003a) is that traditional small farmers in the Eastern Cape, using *animal* drawn implements, developed a crop production system *"that involved mid-winter ripping of the sod of the previous crop, followed by seed bed preparation after the first good spring rains. Ripping left the soil surface in a rough state, improving the infiltration rate of soils, which are notorious for their susceptibility to soil surface compaction. Stover and weeds, which were valued as a winter feed supplement for the cattle, were left at the soil surface."* According to his informants this system was still in general use in the 1940s and 1950s and might have lasted into the 1960s (Van Averbeke, 2003b). Even in the early 1990s ox-drawn rippers were still used in Lesotho (IFAD, 1992b). According to Van Averbeke (2003a): *"Ripping was done during mid-winter (July), because the oxen would still be in good condition. Their condition would deteriorate during the rest of winter and early spring, reaching a low at the optimum planting time. But, because the land had been ripped, subsequent land preparation was less demanding in terms of the draught power required."*

The mid-winter ripping system was discontinued when government subsidised tractor schemes were introduced during the homeland era (Van Averbeke, 2003a). In order to limit costs, farmers adopted a system of a single ploughing operation in spring or early summer. Consequently crop production had to rely on rain received during the growing season, with very little water being conserved during the fallow period on these crusting soils. When the tractor schemes collapsed, about

50 to 80% of arable land was abadoned in some areas and 81% of the farmers who abandoned their land gave lack of means for land preparation as the cause. Steyn (2003) also remarked how the tractor schemes disrupted tillage systems in the former Transkei area.

Subsurface ***soil compaction*** is an extremely widespread and serious problem throughout most of South Africa. A comprehensive reference list of South African research into this is given in the recent review paper by Bennie & Hensley (2003). An excellent review was also given by Bennie & Krynauw (1985). Soil compaction is a limiting factor under both dryland cropping and irrigated agriculture. It drastically reduces yields and thus leads to decreased precipitation use efficiency (PUE). PUE is expressed as kg produce.ha^{-1}.mm^{-1} rainfall plus the change in soil water content in the root zone (Bennie & Hensley, 2001). In dryland cropping poor access of roots to the water available in the soil profile is the main crop production limiting factor caused by compaction. Roots are restricted to the shallow soil layer above the compacted layer and cannot access the soil water in and below the compacted layer. I saw this very graphically in fresh trenches made close to each other on the same slope in the same soil near Nelspruit (Laker, 2001). The one trench was in ploughed soil with a compacted layer and the other where the soil was ripped at the beginning of the season. In the ploughed area the soil above the compacted layer was bone dry and below it the soil was absolutely wet (not just moist). I.e. all the water stored below the compacted layer was "wasted". In the ripped area the roots could extract this water and the whole profile was just slightly moist (probably just above the wilting point). Research by Astrid Hattingh in the western Highveld showed that maize yields were 5.7 $t.ha^{-1}$ with "rip-on-row" tillage, compared to only 1.2 $t.ha^{-1}$ with conventional ploughing. A farmer near Wesselsbron told me that his maize yields increased from 0.5 $t.ha^{-1}$ before implementing rip-on-row to about 6 $t.ha^{-1}$ after implementing it.

This type of farming practice to alleviate the negative effects of soil compaction is important everywhere, but especially in areas with low and unreliable rainfall, as is for example the case in the western Highveld and the central Eastern Cape. These areas also have soils that are extremely vulnerable to compaction under intensive cultivation, but also have high subsoil densities even under natural conditions. It is important to realise that ripping as such is not a solution. Ripping must be done correctly, otherwise it is a waste of time and money. Subsequent cultivations must also be planned correctly. A lot of shallow cultivations after ripping will negate its effects, especially if it involves random travelling of tractors and implements over the field. Where compaction is a hazard, the *best farming practice* for a row crop like maize is rip-on-row combined with controlled traffic. ***It is very important for emerging farmers entering into commercial grain farming to take cognisance of this***.

Implementation of ***fallow*** systems is seen as another practice to improve precipitation use effeiciency and to eliminate or reduce crop failures due to drought. Thus it would minimize risk, which is important especially for resource-poor farmers. In the USA Smika (1970) in a 27 year experiment with wheat in an area with an average annual rainfall of only 400 mm found the following: The continuous wheat system had crop failures in 40% of the seasons, the wheat-

fallow system in none. The continuous wheat system had an average yield of 732 kg.ha^{-1}, the wheat-fallow system (recalculated to per year for comparison purposes) 1247 kg.ha^{-1}. The actual average yield for the wheat-fallow system was 2494 kg.ha^{-1}, i.e. an increase of 241% over the continuous wheat average. The average yield per mm rain was 1.3 kg.ha^{-1} for the continuous wheat system and 2.5 kg.ha^{-1} for the wheat-fallow system. Unfortunately studies in the central and western Free State did not give such good results. The fallow systems gave only 26 to 50% yield increases for maize and 0 to 68% increases for wheat over annual cropping (Bennie & Hensley, 2001). Consequently the PUE's were lower for the fallow systems than for the annual cropping – in the case of wheat almost 50% lower. Under such conditions it will be hard to defend a fallow system as a *best farming practice*, ***since farmers will actually lose if they implement it in that area***. (Note: I term their "long fallow" a fallow system and their "short fallow" an annual cropping system. The 5 month "short fallow" is simply the time between harvesting one crop and planting the next – a classical continuous cropping system.) Bennie & Hensley (2001) point out that the poor performance of the fallow system can be ascribed to the high evaporation losses from the bare soil during the fallow period. In the early 1970s, Ten Cate had major success in the somewhat higher rainfall eastern Free State (Marquard) with a 10 month "long fallow" type of system like that was tested later by Bennie and his co-workers. PUE's were as good or better with the fallow system than with annual cropping and economically the fallow system was superior. Unfortunately these important results were never published. ***What it again shows is that one should never generalize. There are circumstances where fallow systems work and others where they do not work.***

Bennie & Hensley (2001) point out that on a clay soil at Glen in the extremely dry 1998/99 season only the "long fallow" produced a "significant yield". They stress that: *"This feature has particular significance where annual food security is of cardinal importance since it decreases the risk of a total crop failure."* What they do ***not*** highlight from the results in their Table 1, is that a yield of about 4 t.ha^{-1} (as was obtained with the annual cropping) was sacrificed during the high rainfall 1997/98 season to obtain this "significant yield" of about 0.7 t.ha^{-1} in 1998/99. Hensley *et al.* (2000) who actually did the research quoted by Bennie & Hensley (2001) very clearly concluded: *"Although long-fallow has proved its value for extremely dry seasons, long-term yield predictions indicate that this strategy will be uneconomical."*

The four tons of maize could have fed a family for three to four years, while 0.7 tons would have fed them for less than a year. Annual food security is very important for resource-poor families, but one must realistically weigh up realities. Furthermore, people with limited land cannot easily set aside land to lie fallow. Again, the picture may be different under different conditions and there will probably be situations where the fallow system may indeed give better food security, but it was not the case in this instance.

Water harvesting is an efficient practice to enable crop production where rainfall is too low and unreliable and/or soils are too badly degraded to otherwise produce any crop. The yield from the area where water harvesting is practised is often low (in the order of 1 t.ha^{-1} or so), but it is a question of something or nothing (IFAD,

1992a,b). Several types of water harvesting techniques are used in the world and there are numerous publications on it. In Africa it is, *inter alia*, widely practised in the semi-arid Sudano-Sahelian region, where rainfall is not only low and unreliable, but the soils are also severely degraded (IFAD, 1992a,b). The most common practices are:

- Stone bunds.
- *Tassa* or *zay* (planting pits).
- *Demi-Lunes* (half moons).

These are all three essentially in-field water harvesting/water conservation techniques by means of which (a) water runoff losses from the field is minimized and (b) water is concentrated in certain areas where it will infiltrate and create high enough soil water contents to facilitate crop growth. They are used at *field scale* for the production of grain crops, grass pastures or trees. ***What struck me during field visits in Burkina Faso and Niger was that the local communities did not use rigid recipes, but adapted the type of technology used, and the specific way in which a technology was used, to local conditions, literally at field scale.*** Furthermore, they understood these better than the Europeans working in the region.

In the semi-arid areas of Somalia, where in-field water harvesting would probably not be adequate, the *Caag* system is used by means of which runoff is diverted from *"small water courses, gullies or even roadside drains"* to fields in which it is impounded by means of low earth bunds – to facilitate efficient infiltration (IFAD, 1992a). Elsewhere in Africa spreading of water is done by means of *"permeable rock dams"* (IFAD, 1992a). These are described as long (often over 100 metres) low level structures made from loose stone. *"They are constructed across valeys in semi-arid areas and spread water for crop production while healing gullies."* According to the figure in IFAD (1992a) it seems that an erosion gully is often in the centre of the dam, a loose stone barrier being built in the gully, with the low loose stone dam walls extending from it into the field on both sides.

I am not aware of field scale water harvesting of the above types in any of the traditional small-scale farming areas of South Africa. According to one former student from Venda they did stone bunding, but I could not get confirmation of this from other former students from the Venda region. According to Van Averbeke (2003a) most households in the former Ciskei who have abandoned their cultivated fields (as discussed earlier) now limit their crop production to their ***home gardens***. Then follows the following important observations by him: *"A few innovative farmers have developed sophisticated water harvesting and conservation technologies in support of this activity. These include water harvesting, the use of cement-lined micro-dams, gravity-fed surface irrigation and the use of organic mulches. Over time, some of these technologies may find an application at field scale, when they have proven their worth in gardens."* He does not describe the water harvesting techniques, but since these are indigenously developed technologies their chances of wider adoption should be very good and it should be followed up. De Lange (2003) describes Mma Tshepo Khumbane's successful water harvesting system for mainly vegetable production in her homestead garden. Water is harvested off-field and channeled to the garden, in which quite an intricate water management system is used. De Lange (2003)

wisely implicitly warns against blindly advocating this as a best farming practice everywhere by stating that the challenge is to determine "*whether these achievements are possible in other areas of South Africa, under different climatic conditions and with different soils.*"

Hensley *et al*. (2000) compared "*total soil tillage*" (conventional tillage) with "*water harvesting and basin tillage*" (WHB) on problem soils with poor infiltration and high runoff in the central Free State. Infiltration is poor and runoff high because the topsoils are strongly crusting (Swartland and Valsrivier forms) or have high clay contents (Bonheim form). Water harvesting in the WHB system was from micro in-field catchments, consisting of two metre wide strips of "*untilled, crusted soil*" from which water is concentrated in basins where two crop rows are planted in "tramline" configuration. The WHB system reduced runoff to zero. For maize, the following transpired:

- Yield increases over conventional tillage due to the WHB system were greater on the crusting Swartland soil than on the Bonheim soil.
- Real advantages due to WHB, in terms of actual yield increases ($t.ha^{-1}$), were found only in the high rainfall year – and such years are rare in this area. In the moderate rainfall year the yield increase of 779 $kg.ha^{-1}$ on the crusting Swartland soil may useful ***if*** it covers the additional labour costs required..
- In the dry and moderate rainfall years WHB gave little (35 $kg.ha^{-1}$) or no (actually -8 $kg.ha^{-1}$) yield increase on the Bonheim soil respectively. The yield increase of only 116 $kg.ha^{-1}$ on the Swartland soil in the dry year is hardly worthwhile, considering the labour inputs required for it.

Hensley *et al*. (2000) state: "*Because of the large amount of handwork involved, the WHB technique is well suited for use on small plots and even in townships.*" They further state: "*Many people in semi-arid areas could be usefully employed if the technique was widely adopted.*" ***When looking at the present labour laws, minimum wages, etc., even accepting that labour will be employed for only very short periods each year, and the limited yield increases with the WHB system, it seems clear that the system will cause financial losses for the farmer relative to conventional cultivation. Resource-poor small-scale farmers especially cannot afford this.*** The results from the high rainfall year indicate that WHB may, perhaps contrary to expectations, be a best farming practice in subhumid regions rather than in semi-arid areas. The research of Hensley *et al*. (2000) was very important, because it shed new light on aspects about which there was a lot of uncertainty and obviously some wrong perceptions before.

Conclusions from in-field water harvesting research in Botswana are in agreement with the above (Miller, 1992): "*The results of the research indicate that within-field fallowing, and systems such as strip tillage, that generate local runoff to be passed to crops do not have a viable future in the physical and climatic environment of semi-arid Botswana. They do not produce sufficient, agriculturally useful runoff* ***and impose a heavy labour and management burden that is not economically justifiable in the context of low-input, subsistence agriculture.***"

Miller (1992) found that off-field water harvesting had promise for a semi-arid area, but that there were some pre-conditions for success, *inter alia*:

- Crop lands had to be established on *"good soils"*.
- Farmers would have to develop new management skills.
- *"Designs would have to be specific to sites, but could be variations on a general pattern."*

b. Irrigated agriculture: In irrigated agriculture, even more so than in dryland cropping, there is not such thing as specific *"state of the art"* technology that is the best. What is best, varies in space and time. Consequently one can also not speak of a general *"best farming practice"* to advocate. Only two of the aspects related to best farming practice in irrigated agriculture will be highlighted here, viz. irrigation technology and irrigation scheduling.

Regarding ***irrigation technology***, three of the main factors determining the suitability of a specific technology for a specific situation are:

- Availability of the infrastructure required for that technology. This was discussed in a previous section and will only be touched on here to provide the link.
- Economic considerations. This will be discussed in the next section, but will be touched on here to provide the link.
- Matching of the technology with the basic natural resources (climate, slope, soil, water, etc.). This will be the main theme of this discussion here.

Until not many decades ago the choices of irrigation technology were quite limited. Large scale irrigation consisted of various models of surface or *"flood"* irrigation, including various types of flood beds, basins and furrows. In small scale irrigation, furrow irrigation and hand watering, by means of buckets and watering cans, were most common. Water abstraction was by means of diversion from dams or weirs into supply canals or various types of windmills, *"bucket pumps"* (or *"Persian wheels"), "rope and bucket"* systems and various types of animal or human driven pumps.

The introduction of various types of overhead sprinkler irrigation systems, radically changed the situation. By about 1990 only about 50% of the irrigated area in South Africa was still irrigated by means of surface irrigation (Du Rand & Kruger, 1995). Some flood irrigation systems were replaced by overhead systems and sprinkler systems were installed on almost all new developments (Du Rand & Kruger, 1995). The latter was also the case in most irrigation development in the former homelands during the late 1970s and 1980s.

I gained the impression that the perception was created, in some cases possibly deliberately, that surface irrigation systems were unsophisticated and outdated and had low efficiency. Farmers and homeland governments (especially) were indoctrinated to believe that to be "with it" they had to implement "fancy" capital intensive overhead irrigation systems. However, Russell (1982) quotes J.L. Merriam, *"one of the foremost exponents"* of flood irrigation in the USA, as considering flood irrigation as the most sophisticated irrigation system. He pointed out that if properly planned and managed, flood irrigation systems can have very high efficiencies (>90%). According to Du Rand & Kruger (1995) the efficiency

of flood irrigation can sometimes be higher than other systems, something that was also found in South Africa.

A survey of irrigation efficiency in 190 fields in California, quoted by Du Rand & Kruger (1995), revealed that furrow irrigation, especially "short" furrows, attained much higher efficiencies than sprinkler irrigation. (Note that their "short" furrows are equivalent to our normal furrows, and "long" furrows kilometres long – employing a system of "surge" irrigation in these long furrows.) This finding is not strange, since soil crusting and poor infiltration is a very serious problem in California under sprinkler irrigation. Even under drip irrigation crusting is such a serious problem in California that it is not a feasible system for use, e.g in orchards (Unpublished overseas study report by Pedro Berliner). The only feasible alternative for them is furrow irrigation, where the soil surface in the furrow is "churned up" by the running water, giving much better infiltration.

Similar situations also occur in South Africa and neighbouring countries. Severe soil crusting is a widespread problem. In a citrus orchard near Addo in the Sundays River valley in the Eastern Cape, I saw oranges floating in water ponded under micro-sprinklers. According to the farmer it would take 24 hours for the water to "infiltrate" after he stopped irrigating, which actually means that the water would have evaporated in that very hot, dry area, and not infiltrated. Rainfall simulation studies on this soil showed that it sealed, with its final infiltration rate dropping to 2 $mm.h^{-1}$, under zero energy mist rain. In Swaziland we found situations of water ponding under drip irrigation in citrus orchards, making it look like badly planned flood irrigation. When looking at the results of the infiltration studies of Russell (1982) under static (double ring) and dynamic (in a flood irrigation system) conditions in the Eastern Cape, it is clear that furrow irrigation would probably the only feasible alternative in these situations. Ironically, according to Green, Badenhorst & Marais (1995): "*Furrow irrigation has been neglected in South Africa in the last 25 years.*" They expressed the hope that in South Africa a closer look would be taken "*at furrow irrigation systems in future as they have considerably lower development costs.*"

Regarding the ***indigenous short furrow irrigation systems*** found in East and Southern Africa (including South Africa), De Lange (1994) made, *inter alia*, the following two important statements:

- "*Experience in Kenya and Zimbabwe has confirmed that correctly designed and applied, short furrow irrigation can be* ***more efficient*** *in water use than the more conventional (modern) irrigation methods,* ***and is particularly effective when water is a limiting factor****.*"
- "*It is highly manageable and* ***requires comparatively little in terms of permanent infrastructure and maintenance****.*"

In countries like the USA and New Zealand furrow irrigation, especially level furrows, have been intensively researched and developed to high levels of sophistication, including electronically automated control of water application, some 20 years ago already. Because of these developments furrow irrigation is for the last 25 years or so in those countries no longer considered to be a labour intensive system – one of the main factors previously viewed as a constraint in surface irrigation. In developed commercial agriculture automation of furrow

irrigation could be implemented, but in developing situations less sophisticated furrow irrigation systems would be more affordable and sustainable.

An interesting technology used to deliver water into the furrows in beds with row crops like vegetables, maize, cotton, etc., is ***"gated pipes"***. I saw this in California in 1983. I have never seen or heard of it in South Africa and De Lange (2003b) is not aware that it has been used here. The pipes that I saw, looked quite similar to those for overhead sprinkler irrigation, but instead of fittings for sprinkler stands, they have sliding metal "gates" that are just slid open to let out the water into the furrows. (A gate for each furrow.) They seemed to be especially suited for relatively small beds with fairly short furrows. According to Wichelns & Cone (1992) another version is collapsible polyethylene gated pipes. They give photographs of the use of these for large furrow-irrigated fields of, for example, vegetables like onions. Some advantages of gated pipes for furrow irrigation are:

- Using them together with supply pipes will cut down conveyance losses of water to almost zero. This will be especially beneficial where (a) water is scarce and (b) conveyance losses are very high. De Lange (1994) found that in some cases such losses for furrow irrigation can be as high as 100%, *"i.e. the water does not reach the irrigation furrows, but infiltrates completely in the supply furrow."*
- The opening of each gate can be adjusted to ensure equal advance of the water in all furrows, and as infiltration rates change during the season, the width of the opening of the gates can be adjusted (Nielsen, 2003). This *"allows more efficient control of irrigation than a head ditch"* (Wichelns & Cone, 1992).
- Water simply flows from the pipes and thus no pressure or pumping costs are required.
- Operation is simple and maintenance is minimal, and thus also maintenance costs.

A disadvantage is the increased capital costs, compared with "ordinary" furrow irrigation.

Clay pot irrigation is another simple, ***highly efficient irrigation system*** that is used in various developing countries. Porous clay pots are buried just below the soil surface. Water slowly seeps from it as plants extract water from the soil. I first saw it in a eucalyptus woodlot in Burkina Faso in 1995. My PhD student Angel Daka studied its use for vegetable production in dambos in Zambia and reported extensively on it (Daka, 2001). He found water savings of as high as 50 to 70% with this method, compared with conventional bucket irrigation systems. I.e. the same amounts of some vegetables could be produced with only 30% of the amount of water normally used. He emphasised *that clay pots cannot be used on all kinds of soils*. Apart from the water use efficiency of the system, *it also created a new home industry for the women making the pots in the villages, thus helping to alleviate rural poverty also in that way*. As far as I know, clay pot irrigation is not yet used in South Africa.

Daka (2001) in Zambia also successfully researched and introduced another irrigation device that is used widely in several developing countries, but not yet (as far as I know) in South Africa, viz. the ***"treadle pump".*** This is a manual pump, operated by human feet. It is simple and light to operate and can easily be

operated even by women and children from about the age of seven (Daka, 2001). He found it to reduce labour requirements by 75%, thus enabling families to irrigate much larger areas than with their previous conventional methods. It is important to note that the farmers in northwestern Zambia rejected the treadle pumps brought in from elsewhere. ***After the pumps were modified in consultation with the farmers according to their wishes*** no less than 2 500 pumps were purchased within three years. The pumps are constructed from simple materials by local men in the villages trained to do so. They also handle the maintenance of the pumps. *Again, this means real community development contributing to alleviation of poverty in the villages.* Treadle pumps have now also been developed in South Africa, but as far as I know it was not done in consultation with the prospective users. Also the developers are looking for some entrepeneur to manufacture it somewhere and market it, i.e. with no or minimal contribution to alleviation of rural poverty.

Regarding the better known irrigation systems, it is amazing how often researchers or planners overlook the most basic common knowledge about the adaptability of certain systems to certain soils. In one project I was astonished to see in a research progress report that at a site on typical Cape Flats course sandy soils in ***Gugulethu*** (near Cape Town) drippers were installed as irrigation system. It is just absolutely general knowledge that this could never work. The lady, originally from the Eastern Cape, who took over as "worker" on the experimental plot at the beginning of the first summer, ***showed much more wisdom and insight than the graduated project leaders*** (from two institutions) in the following two ways:

- She removed the topsoil, inserted cardboard barriers (to slow down water movement and also to give better lateral water distribution) and returned the topsoil. (Somehow this was not mentioned in the final report of the project.)
- Later she removed the drip system, and she "*requested that a micro-spray system, better suited to the seedbeds, be installed.*"

The tragedy is that the next year it was reported that she had left the project and gone back to the Eastern Cape. At the steering committee meeting it was stated that it was because her priorities differed from those of the development institution and they were not happy with this. My feeling was that her priorities should have been accepted. In the final report the reason for her resignation is given as "*she was unhappy about her working agreement with her employer*". This is technically correct, but it does not reflect the actual nuance. I mention this, because this type of attitude from "top down" people is all too common in development.

Numerous examples of huge problems caused by various types of resource/irrigation system mismatches could be listed, but this is not the objective of this report. The objective of the foregoing is to highlight the fact that different appropriate irrigation systems need to be selected for different scenarios.

Finally, regarding irrigation technology it must be made clear that there is a place for micro-irrigation where appropriate. According to Du Rand & Kruger (1995) the present trend is that: "*Highly sophisticated and expensive permanent micro-irrigation systems are only installed in favourable climatic conditions for high*

income crops, where the topography is in any case unsuitable for flood irrigation."

Proper ***irrigation scheduling*** is an important tool to optimise irrigation water use efficiency. Large amounts of research have been done in South Africa in this regard over the last 25 years, mainly with Water Research Commission funding, and numerous reports and papers have been published on these. No attempt will be made to summarise these here. I feel obliged to briefly discuss two important concepts in this regard here, however:

- The first is the ***Profile Available Water Capacity*** (PAWC) concept, the brilliant brain child of Dr. Malcolm Hensley, which he developed while lecturing at the University of Fort Hare (Hensley & De Jager, 1982). It was further intensively researched at the University of Fort Hare by Boedt & Laker (1985) and Vanassche & Laker (1989). Hensley's theory was that water use efficiency could be improved by stretching the intervals between irrigations as long as possible without causing crop losses due to water stress. This meant establishing the maximum amount of water that could be extracted by a specific crop from a specific soil without causing losses due to water stress. His theory was proven correct, but most importantly it was found that much more water could be extracted from soils without causing water stress than was previously believed. *A major advantage of using PAWC in irrigation scheduling is that the larger amount of water that can be applied during an irrigation greatly improves the efficiency of flood irrigation on sandy soils with high infiltration rates, e.g. at Vaalharts* (Du Rand & Kruger, 1995). PAWC forms a basic component of the very good and practical BEWAB irrigation scheduling model developed by Prof. Alan Bennie and his co-workers at the University of the Free State (Bennie *et al*., 1988; Bennie, 1995), *inter alia* using empirical models developed in the Fort Hare research for calculating PAWC for crops like maize and wheat.

- For field crops, e.g. maize and wheat, Boedt & Laker (1985) and Vanassche & Laker (1989) showed that the highest irrigation water use efficiencies, without lowering yields, could be attained by using the ***"deficit high frequency irrigation"*** concept of English & Nakamura (1982) and Miller (1977) in irrigation scheduling. At the University of Pretoria, Fischer (1990, 1995) found the same for tomatoes. Knowledge of PAWC is also here important, because the crop is not stressed, i.e. the water content is not allowed to drop below the lower limit of PAWC. *This approach simply means that the soil is* ***not*** *filled to field capacity when irrigating.* One of the advantages is that space is left for any normal rain that may fall soon after an irrigation. I pointed out that another use of this approach could be to start with a full profile at the beginning of the peak water requirement period and gradually draw the profile water content down to the lower limit of PAWC while applying "deficit irrigation" (Laker, 1985*).* This would have the advantage that a smaller capacity, and thus cheaper, irrigation system could be used. This principle was then also built into the irrigation scheduling model of Bennie *et al*. (1988), as also discussed by Bennie (1995).

3.11 AGRICULTURAL AND RURAL DEVELOPMENT

"Ultimately there is no justification for economic development other than the enhancement of the quality of human life." (Cherns, 1980)

"The primary objective of development should be the creation of a prosperous, happy, stable and peaceful nation and maintaining these conditions indefinitely for an expanding population." (Laker, 1979, 1981)

"Agricultural development can potentially be a powerful development tool, but it is crucial to see it as merely a tool which can be used to achieve the primary objectives of development and not as an ultimate objective in itself." (Laker, 1979, 1981)

When again reading the two papers which I wrote about agricultural development some 22-24 years ago (Laker, 1979, 1981), from which the above three statements (including the quote from Cherns) come, I came to the conclusion that these papers are probably even more relevant to the present South Africa than they were when they were published. A few things one would perhaps have written a little bit differently in view of experience gained since.

The areas for which agricultural development was studied most intensively and where agricultural development was pursued at the time, viz. the former homelands, are also the areas where agricultural development is most needed at present and which generally also have the best physical potential (in terms of soil and climate) for agricultural development. In former "White" areas only limited development is possible on state land. "White" farms which are bought out under the land reform (land restitution/redistribution) programme are already highly (and virtually fully) developed. Here the need is, therefore, not for *agricultural* development, but purely for Black *farmer* development.

During especially the 1970s and 1980s many millions of rands of South African taxpayer money were pumped into agricultural development projects in the homelands by the South African government, via homeland governments. Most of these went into the very large number of irrigation projects, listed by Bembridge (2000), that were developed. It was perceived that irrigation development would be the logical vehicle by means of which the largest number of small-scale commercial farmers could be developed, especially in areas with sub-optimal to marginal rainfall for dryland crop production.

Despite the huge capital inputs, the reality is that *"in general the contribution of irrigation to development has fallen short of expectations"* (Badenhorst & Crosby, 1995). This is, in fact, even a gross understatement. The vast majority of the projects were in various respects disasters. Studies on these have been written up in several reports, theses and papers in journals. Two examples are the D.Sc.Agric. thesis of Rossouw (1989) and the M.Sc.Agric. dissertation of Sebotja (1991). It should be made ***absolutely compulsory*** for ***everyone*** becoming involved in the revitalisation of small farmer irrigation schemes, or the development of new ones, to read the brilliant little paper by Badenhorst & Crosby (1995) and probably also that of Du Rand & Kruger (1995) ***before they start***.

The main problems included:

- The schemes developed especially during the 1970s and 1980s were excessively capital intensive, based on the most sophisticated modern technologies. At one dairy scheme someone remarked that the only way it could have been made more expensive would be by replacing the stainless steel milking machines with chrome ones. The consequence was that such schemes were economically totally non-viable. For the Ncora scheme in Transkei the *"operating losses **planned** by the consultants"* for the period 1978-1985 was ***over R15.2 million*** (Rossouw, 1989). In the end the actual accumulated loss for the period was not quite so bad, being "only" R13.7 million! So that was almost R14 million South African taxpayer money down the drain just on this one scheme in seven years. One could have justified it if it brought about significant socio-economic benefits for the "beneficiary" community, but it did not. In reality it created some problems in and for the community (Rossouw, 1989).

  In another case I was told that the scheme was made so capital intensive and mechanised in order to "simplify management", for the top-down managers. Ironically, this was in an area where officials of the specific homeland government indicated that creation of job opportunities was the *"highest priority"* (Laker, 1981).

  As in the other capital intensive schemes, those who benefitted most at Ncora, were the consultants. Since consultants always received a fee based on a percentage of the capital expenditure, it was to their advantage to plan the most capital expensive system. The South African government funded only capital expenditures and not running costs and it was thus easy to convince homeland governments to go for capital intensive projects, rather than those with higher running costs, e.g. labour intensive ones. In his book ***"Fool's gold for Africa: The wasted millions in development aid"*** Bruno Bandulet (1980) came to the conclusion that only two groups benefit from development aid to Africa, viz. consultants and the Swiss banks. Regarding irrigation development in the homelands the first of these was generally true. ***It is important to ensure that it does not happen again during the revitalisation of irrigation schemes or the development of new ones in future.***

- In the top-down managed projects, but also others, there was a tendency towards excessively high inputs, usually due to either over-optimistic production potential ratings during planning (see e.g. Rossouw, 1989) and/or aiming for too high yields on the response curve. This caused low benefit/cost ratios, with benefits often even being lower than the costs, causing a project or some farmers on the project to run into financial losses. In the centrally managed *"regimented high technological development"* projects (Badenhorst & Crosby (1995) the "farmers" had no say and could not choose to go for lower targets and inputs. At the end of the season a farmer would just get a financial statement, often indicating that his costs (subtracted by management from sales incomes) were higher than his income and that he was "in the red".

  Where small-scale farmers had the freedom to opt out of such high prescribed inputs, they often succeeded in achieving much better benefit/costs ratios and

could farm profitably. Badenhorst & Crosby (1995) give the following two examples for specific cases:

"Profits of R230/ha were realised by farmers who were dependent on the scheme during their operation whereas profits of R1 450/ha were realised by farmers who used their own labour, relied on their own management and who were subject to minimal official involvement in the development scheme."

"Farmers on a well-known project, using their initiative, greatly reduced costs and despite lower than budgeted profits achieved satisfactory net profits."

It is important to note the word "initiative" above. The lady in the Gugulethu study mentioned earlier, was also described as having "drive" and "initiative" and being "innovative" (Du Plessis & Van der Stoep, 2001). People who have not been involved with small-scale farmers at ground level in deep rural areas (or even in urban agriculture) apparently seem to find it hard to believe that these farmers have these attributes. Two of the main points of *"Farming Systems Research-Extension" (FSR-E)* are (a) the recognition that small-scale farmers that have these attributes are indeed found everywhere and (b) advocating its utilization in agricultural development.

I hope that during the present ***revitalisation of irrigation schemes*** it will be ensured that consultants and managers of the process do not take over again and relegate "farmers" to "glorified labourers". I have seen all the "correct" expressions in the terms of reference and business plans. ***Words on paper or spoken in meetings mean nothing, however. All that counts is whether they are actually implemented in practice.*** I have been through this too many times – the most noble words in documents, but when things go too slowly or if "unexpected" problems (which in most cases could have been predicted or should have been expected) occur, the managers of the process simply impatiently take over and all the objectives and nice ideals are just simply ignored.

- The contracts for many schemes included a clear clause that ***farmer training*** should be done by the management, but ***in practice this was just about never done***. The farmers were, therefore, not schooled in decision-making, etc. so as to eventually take over "ownership" of the management of the scheme. ***Again, the words on paper were terrific, their non-implementation in practice was horrific.***

- The impact of many of the schemes in regard to poverty alleviation, community development and food security in surrounding communities and further afield in their homelands/regions were just about non-existent or extremely limited. Some of the reasons are:

  As indicated earlier, ***the number of jobs***, especially permanent full-time jobs, ***created, were minimal*** due to the capital intensive, low labour nature of the projects.

  Provision was not made for supplying domestic water or stock water to surrounding communities. Irrigated foodplots were established as social

responsibility component on many schemes, however, and these were probably the most successful component of irrigation development (e.g. Van Averbeke *et al*., 1998).

The emphasis was usually not on producing food for the local communities at affordable prices. Some cases were classical examples of production of "runaway crops" as someone called them, i.e. "fancy" high income crops used elsewhere. An example was the production of special vegetables, e.g. baby carrots, Brussels sprouts, etc. on a Ciskeian scheme under contract for a freezing factory in Port Elizabeth. For the scheme growing of high income crops was probably the best option in view of the high costs of irrigated agriculture.

The findings of Khuvutlu & Laker (1993) at Middle Letaba are important in the sense that it could serve as encouragement for farmer-centred irrigation development in future, as well as during the revitalisation of irrigation schemes. Because it was not a "regimentally managed" scheme, farmers could reject the recommended farming system and develop their own farming systems. Most of them did this. Only a few with relatively large plots (>10 ha) found it worthwhile to continue with the recommended maize/wheat rotation. Those on smaller plots switched to a variety of high income crops, such as different vegetables and green mealies. Different farmers evolved different cropping systems and patterns. Enterprise patterns varied over short distances. An important advantage of this was that markets were not cluttered with the same product from everyone at the same time. Thus prices could be kept at acceptable levels. Farmers also minimized risk by diversifying their enterprises. An important observation was that enterprise patterns differed with distance from the main roads. ***The farmers also employed substantial numbers of labourers, thus playing an important role in reducing unemployment and alleviating poverty in the surrounding communities.*** Tomato farmers especially employed large numbers of labourers. The latter farmers also brought in casual labourers at harvest time for picking, grading and packing. Average wages for general labourers were R120 per month, not a bad salary for 1989. Foremen earned between R240 and R400 per month, substantial wages for that time, varying between farmers. ***To be able to pay their labourers their cropping pattern was aimed at continuously having work for their labourers and having a continuous steady income to pay them.*** Part of this was done by planting okra in winter. Although winter yields were lower than summer yields, winter prices were so much higher (due to food shortages that time of the year) that it gave higher profits. Maize cultivars were chosen to give green mealies over longer periods. At that stage cobs were sold for 50 cents to people who roasted them at the roadside and sold them for one rand. Indigenous pumpkins were planted that were fit for marketing of leaves and tips during late spring/early summer – a period of food scarcity. ***Thus the farmers also contributed to the promotion of food security in the surrounding communities.*** Casual labourers were paid by salt, produce or money. An interesting finding was that many casual labourers preferred to be paid by produce, which they could sell at a profit in their own communities. *This also contributed to the promotion of food security in the surrounding communities.* When water restrictions during a severe drought reduced cropping, some ***farmers displayed social responsibility*** by not retrenching anyone, but according to mutual agreement with the labourers allowing all to take turns to work (each working about two days per week instead of full weeks) for a reduced income.

The ***tragedy*** is that according to Adendorff (2003) and others the wonderful Middle Letaba situation has also collapsed due to collapse of the water supply infrastructure since the mid-1990s, as has happened in all the other small farmer irrigation schemes throughout South Africa because no measures were taken to ensure maintenance of the infrastructure after the change of regime – as was explained earlier. ***My big question and concern is how this specific situation is going to be handled during the revitalisation of irrigation schemes in Limpopo province.*** In this specific case the absolutely logical, uncomplicated strategy should be to:

- Repair the infrastructure as quickly as possible, which is clearly and with no argument a government responsibility. Apart from that it is just logical for ***government*** to provide ***and maintain*** such infrastructure for such scheme, it was a mistake by government that allowed the infrastructure to collapse. So government has a moral responsibility to get it operational again.
- See how many of these farmers are still on the land which they used to irrigate and find those who might have left and ***give these farmers first choice to the land. They have experience of irrigation farming in the area and have proven their drive and initiative.*** Because of their experience and proven qualities they will not need the on-farm management training required by novices. In fact, other farmers, extension officers and development "experts" could learn from them. ***It will be*** sin to let such experience go to waste and ***an injustice to these farmers if they are not given first choice to the land.*** It is not everyone that can be a successful irrigation farmer, and bringing in novices is always a gamble because you don't know and rarely can predict who will succeed.

In regard to revitalisation of irrigation schemes in general and development of any new schemes it should be kept in mind that novice farmers need to *"phase into irrigation"*, to use a phrase of Badenhorst & Crosby (1995). It is almost a quantum jump from subsistence or low level dryland farming to intensive irrigation farming. The following statement by Barbara Rosenthal (quoted by Laker, 1978a, 1981) is probably even more valid for irrigation development than for any other agricultural development: *"Agricultural development deals not only with increased production, but includes parallel changes in an entire way of life."* Badenhorst & Crosby (1995) in this vein pointed out that: *"The social* (and one could add psychological and sociological) *implications associated with the development of rural irrigated farming can lead to the failure of a development scheme."* In his very important unpublished report (now totally unavailable) for the WRC on a critical evaluation of selected small farmer irrigation schemes in the homelands, Legoupil (1985) stated that many of the problems on the schemes were due to *"the difficulty experienced in integrating national development objectives and the personal objectives and aspirations of farmers."*

Note: I believe that anyone involved in the revitalisation of irrigation schemes or development of any new small farmer schemes should study the report by Legoupil if a copy could be found somewhere.

In addition to learning lessons from cases and reports like those highlighted earlier, policy-makers and planners involved in the revitalisation and development of

irrigation schemes should study and take cognisance of various other key information available from and in South Africa. A few main points from these are:

- *The highly successful (Black) farmer* growing tomatoes on more than 70 ha under drip irrigation at Nwanedzi *expressed the opinion that "**a farmer should start small, and learn to do things right on a small scale, before considering further expansion"*** (Du Plessis & Van der Stoep, 2001). He himself had very little formal education (Grade 2), after which he started working on a farm. At the age of about 18 he joined his father (a tribal captain) on a small piece of land, where he farmed for about 15 years before deciding to expand his enterprise. *An important factor contributing to his success is clearly the way in which he learned his "trade" through hands-on practical experience.*

- Similarly Rossouw (1989), after concluding that the technology adopted by the consultants at Ncora was too sophisticated for the situation at the scheme and yield targets unrealistically high, stated: *"It would have been preferable to start off with a well-known and accepted crop such as maize and to gradually allow farmers to increase their target yields and to diversify as their knowledge and skills improved, or alternatively, to encourage less successful farmers to abandon their irrigation holdings."* In this regard it is important to note that the highly innovative vegetable farmers at Middle Letaba, mentioned earlier, started out growing the recommended maize and wheat before intensifying and diversifying into vegetables. Badenhorst & Crosby (1995) expressed it as: *"Rural farmers need to grow into the technology which will help them become successful larger operators."*

- Badenhorst & Crosby (1995), furthermore, emphasise the importance of the size of the area allocated to each farmer initially, stating: *"The area must be large enough for the farmer to make a good enough return and yet be within his managerial capabilities, say 5 ha modules to start with. The system should allow the farmer to acquire extra modules as he profits from experience and is capable of managing a larger area."* The size of the starting area is important in the sense that if everybody gets a too small piece, nobody will ever be able to generate enough funds to expand, becoming doomed to poverty and misery in perpetuity. Cohen (1979) also sees it as an *"economic necessity"* that small farms must be large enough to generate a surplus. Of course the most straightforward way for farmers who have developed the capabilities to manage larger areas to acquire additional land, would be by taking over land that have been abandoned by incapable farmers or buying out land from ones that have gone bankrupt. This is how it worked at the schemes developed in "White" areas during the depression of the 1930's. Each farmer on a new irrigation scheme, e.g. Vaalharts, got enough land to make a living from. Gradually those that did not have the aptitute for irrigation farming opted out and incompetent ones went bankrupt. The competent, efficient ones bought out the others, until later there were very few Vaalharts farmers that owned only one "plot".

  *There is no sense in keeping incompetent farmers artificially on a scheme. **It will just be a waste of scarce water and land.*** Their families will gain little or nothing from it. Such farmers will be much better off working as labourers for competent farmers, earning a fair wage.

Unfortunately small-farmer strategies are *"often legalised in such a way that no farmer can acquire additional land by buying it from a neighbour"* (Laker, 1981). *"Although this would enable the largest possible number of farmers to be settled on the available land, it is a deterrent to those who have higher aspirations in life. These are usually the persons with higher capabilities and more initiative and drive. They have the potential to be the most efficient producers, the main innovators and the fastest acceptors of new technologies."* In irrigation scheme revitalisation or development it should be ensured that restrictive legislation and/or strategies are avoided.

In his comprehensive WRC report on ***"Guidelines for rehabilitation of small-scale farmer irrigation schemes in South Africa"*** Bembridge (2000) leaves also no doubt as to the importance of what has been discussed under this bullet: *"The results of the study have shown that the economics of small-scale farmer irrigation is limited by the small size of holdings.* ***There is a need to create opportunities for poor farmers to make way for high performers on a compensatory basis.*** *Pensioners and those not interested in larger holdings could be compensated by setting aside a block of small food gardens for those interested in producing food for the household."*

In the revitalisation of irrigation schemes and development of new ones economic feasibility studies must be based on realism and realities. Over-optimistic and unrealistic yield and profit estimates must at all costs be avoided. Otherwise the same tragedies as in the past will be repeated. In the case of revitalisation it should be relatively easy, because one can ascertain what was achieved on a specific scheme in the past and use that as starting point. *In this regard it is interesting to note that the business plan for the revitalisation of irrigation schemes in Limpopo province projects a gross margin of R5 000 to R10 000 per hectare for small-scale sugarcane farmers (Golder Associates, 2002). At the same time I got (for a totally different purpose and not to check these figures) from Dr. Brian Sugden of the SA Cane Growers Association a figure of R 3 330 per hectare for existing small-scale cane growers in the Mpumalanga Lowveld, based on surveys of the Association.* This is a very big difference.

The old erroneous attitude of "yes, but we are going to do better" should be avoided. It must be kept in mind that irrigated agriculture is intensive and expensive. In high technology schemes the high risk and high cost easily result in a debt that the farmer is not able to carry (Badenhorst & Crosby, 1995). Also in this regard the scale at which the farmer starts and the type of irrigation system with which he starts are determining factors. Badenhorst & Crosby (1995) make it clear that: *"**In development, an irrigation system is considered appropriate** first, when it enables the user to utilise the natural resources to the optimum, and second, **when these systems enable a farmer to farm economically.**"*

Du Rand & Kruger (1995) showed that production costs are rising dramatically (*"excessively"*) relative to agricultural produce prices, threatening the viability of existing schemes and leaving little room for further capital investment. This is especially the case when a farmer has to borrow money for the installation of an irrigation system. Some years ago at a workshop for extension officers of the Free

State Region an agricultural economist of the region showed that if a farmer at Rama had to borrow money for a centre pivot ***it would be impossible for him to pay back the interest on the loan*** from his earnings from his crops, let alone paying for running expenses (pumping costs, labour, inputs, etc.) or amortising the capital of the loan. Cognisance must be taken of the findings of Bembridge (2000) that: *"On many projects the use of centre pivots and sprinklers has not only proven costly, especially for the cultivation of low value crops, but also unsuitable for small-scale farmers due to poor maintenance, theft and damage. Research has shown that well-planned gravity* (he meant flood) *irrigation in-field systems have proved just as efficient, and certainly more economic, than centre pivot, sprinkler or drip systems."*

FAO (1985) pointed out that the profitability of irrigation for a farmer over other land uses, e.g. dryland cropping or extensive grazing, termed the *"Nett Incremental Irrigation Benefit" (NIIB),* is seriously influenced by the extent to which the farmer has to contribute to the amortisation of the capital costs of the water supply infrastructure (dam, canals, pipelines, etc.) and/or the maintenance of this infrastructure. Adding such costs to his in-field capital and running expenses, will lower his NIIB. *Where his NIIB may already be low (often due to high in-field costs) these additional costs can easily turn a positive NIIB into a negative NIIB, meaning that irrigation will no longer be a viable option.*

In the pre-1994 era the homeland gorvernments (with RSA funding) were responsible for the provision and maintenance of the water supply infrastructure for the small farmer irrigation schemes. According to the policy of the Transkei, the Department of Agriculture and Forestry was, for example, *"responsible for conservation in the catchment area, distribution, storage and bulk supply of water to urban and rural communities"* (Rossouw, 1989). He then, for example, describes that at Ncora: *"In terms of this policy an agreement was entered into between the Department and the management agency in terms of which funds would be provided to the management agency for the maintenance and repair of the water distribution system."*

From the business plan for the revitalisation of irrigation schemes in Limpopo province (Golder Associates, 2002) it seems that there is a totally different policy by the new provincial governments in this regard. According to the business plan it seems that the Limpopo government will make funds available ***"once off" only*** for the rehabilitation of the infrastructure of the schemes *"which were well constructed originally,* (but) *have degraded through lack of maintenance in recent years"* (Golder Associates, 2002). After rehabilitation of a scheme the whole responsibility for the maintenance of the water supply infrastructure and for scheme management, including water distribution management, will be transferred to the (small scale) farmers and government will take no further responsibility. This has, *inter alia,* the following *implications for the* ***farmers***:

- Since they will have to carry the costs of all future rehabilitation and maintenance of the water supply infrastructure of the scheme, it means an additional financial burden/cost factor to them. Since they will not have the time to do the work themselves, over and above the work on their farms, they will, in addition to the materials (and equipment) needed for maintenance works, have to hire technicians and labourers to do it. ***This may be a substantial cost factor, that may impact significantly on their NIIB.*** In this

context it should be kept in mind that in the business plan it is also stated that: *"The farmers have no financial resources for scheme management."*

- According to the business plan the farmers will be expected to handle the day-to-day operation of scheme infrastructure, including water distribution management. I cannot see how farmers actually physically can do this. They could decide on principles and approaches (but see the discussion below) regarding water distribution, and elected committees could see to it that these decisions are implemented. The actual day-to-day operation and management will have to be done, however, by full-time infrastructure operation and water distribution managers which the farmers will have to employ – ***adding another cost factor negatively affecting their NIIB.*** To do it properly, we in modern days probably talk about more highly qualified (and thus more expensive) personnel than the old style water bailiffs (or "ditch riders", as the Americans call them).

Water distribution and allocation can be done according to a very simple system. The most simple system is to make a certain amount of water available to each farmer at set intervals, say once a week or once every ten days, or whatever. ***This is, however the most inefficient system in terms of water use efficiency.*** It does not allow any flexibility and farmers cannot actually do on-farm irrigation scheduling. No matter how hot or cool or wet or dry it is, they are in a rigidly regimented structure. The only way to on-farm improve such system, is by having a storage dam/reservoir on-farm. A farmer with a very small piece of land cannot do this, however. At the other extreme is where soil water measurements are taken regularly, e.g. with neutron probes, and the data fed into a central computer that generate predictions about the water needs at certain dates in certain parts of a scheme and water allocations to different laterals are scheduled accordingly (as done in USA schemes under the Salinity Laboratory). These are updated and adapted continuously. This information is relayed to water bailiffs (and in a highly developed situation farmers can access it by internet). ***Such system allows for by far the highest water use efficiency****, but it is probably far-fetched to even think of it for small farmer schemes* – unless it is a big scheme and the management of the water supply and distribution (not on-farm) ***is done centrally by government****,* as in the USA cases mentioned above. (Note that in the USA cases the neutron probes, vehicles and technicians taking the readings are provided by government. Farmers usually just pay a fee for the service.)

In the Limpopo business plan for the revitalization of irrigation schemes the transfer of all maintenance and management costs and the responsibilities and duties for the water supply and distribution to irrigation schemes to the small scale farmers, while government is shirking their own resposibilities and inputs, is clad in the most beautiful terminology: *"The main focus of the revitalization program is to* ***empower(!!!)*** *farmers to be able to take ownership of their schemes, to rehabilitate infrastructure, to construct conservation works and to manage the infrastructure and conservation works properly."* It is more or less like saying: "You should thank us for giving you the privilege to in future use your own money, energy and time to provide and maintain an infrastructure that in the past used to be made available to you by government." This discussion is not meant to single out Limpopo's government for criticism. They should be praised for taking the lead in the rehabilitation of irrigation

schemes. The whole idea is to open debate on the principles to be followed in such redevelopment projects and new projects throughout South Africa.

An important objective of the Limpopo business plan for the revitalization of irrigation schemes is to "*ensure that the programme has long-term benefits beyond the limits of the irrigation schemes themselves into neighbouring rain-fed production areas and homestead gardens by means of an integrated rural development approach."* This is correctly seen as necessary *"to ensure sustainability and avoid creating 'an island of wealth in a sea of poverty.'"* The business plan is correct in stating that each community will have its own special needs and circumstances and that these must be analysed and addressed in the revitalization process. As indicated earlier, foodplots are seen as the "social component" of small farmer irrigation development. Water for home gardens (for vegetable production), domestic use and stock watering are other important water requirements of surrounding communities. If water provision for these purposes is seen as essential for "integrated rural development", as it should be, then surely farmers cannot be held responsible for managing and maintaining the water supply infrastructure and water distribution. Apart from the fact that it would not be fair to expect them to carry the costs, they cannot be expected to manage the wider water allocation. ***It brings it back to the responsibility of government to provide, maintain and manage water supply and distribution. Otherwise great conflicts may arise.***

Although many irrigation schemes in the former homelands had very successful foodplots as "social components", their biggest failure was the lack of looking at the surrounding communities, and especially looking at integrated rural development. The Eastern Cape is one province where this should receive a lot more attention, because it has such an abundance of water in the rivers of the former Transkei, and even parts of Ciskei, from the high rainfall in the mountains. In most cases the amount of water far exceeds that which can be used for irrigation on the irrigable land. A classical example is the case of the White Kei (or Xonxa) irrigation scheme under the Xonxa dam in the southwestern part of the former Transkei, for which I still have boxes full of reports that were compiled before the project was launched. The dam has the capacity to provide enough irrigation water to irrigate an area of 4 000 ha. Thus a total of 4 000 ha was duly "identified" and demarcated for irrigation development. I was asked to evaluate this proposed development. I concluded that there was only 2 200 ha irrigable land in the area under consideration. The rest of the demarcated/ recommended 4 000 ha were absolute poor quality non-irrigable soils. I repeatedly warned the South African and Transkei governments against development on these areas. I also demarcated the non-irrigable areas that were recommended by the "planners". Nobody listened and the outcome is history. Of the 2 200 ha that I recommended about 1 500 ha (nearly 70%) are excellent, high potential soils. My recommendation was that only the 2 200 ha irrigable land be irrigated and that the remaining water rather be used for the following:

- Water for domestic use and intensive vegetable production in home gardens in the very large rural villages in this semi-arid poverty-stricken area. This would at least partly alleviate the huge food insecurity in the area and enhance the quality of life of the population.

- Development of light, labour intensive industries in the area. I believed the area where the railroad and excellent tar road from Umtata via Queenstown to

> the north crossed the White Kei river would be the ideal site for this. There was also a short link to the tar road to East London, in case any product for export was considered. The people working in the industries would not have to move from where they lived. Apart from creating jobs and alleviating poverty, it would also create an "on-site" market for food crops produced in the irrigated area. At the time (late 1970s) there was a professor at the University of the Orange Free State who made a survey of the wide range of stupid little articles that South Africa was importing that could be made here – from paper clips to bicycle pedals.

Right next to this area was also Occupation Post, a farm that was bought out as part of homeland consolidation, and developed as an agricultural development corporation estate. Again large areas of non-irrigable soils were included under irrigation and a peach orchard was (against my recommendation) developed on a soil that was excellent for most other crops, but not suitable for peaches. It went the expected way of bankruptcy and abandonment. By 1996 it was a desolate shambles. Again, Occupation Post has significant areas of very high potential irrigable land and if only these are developed for irrigation and the rest for extensive grazing, it could make a significant contribution to alleviation of rural poverty in the area.

Because of the huge food insecurity in the area, the people indicated that their first priority crop on the White Kei irrigation was maize (for grain) and only if enough maize was produced would they be interested in producing high value other crops. They opposed the contrary proposal by the developers. Similar sentiments were found at other schemes also.

An important principle in the business plan for the revitalization of irrigation schemes in the Limpopo province is that priority has been given to the schemes that fall within the *"poverty nodes"* of the Province. This should be the approach everywhere. In line with this, the ***White Kei scheme under the Xonxa dam*** (and including Occupation Post) ***should be the highest priority scheme*** for revitalization in the Eastern Cape, for example. It is an area with extreme poverty and food insecurity, but with resources with tremendous potential for integrated rural development – including major irrigation development.

An important lesson from the White Kei scheme and Occupation Post is that ***successful agricultural development, and especially irrigation development, requires high quality resource surveys and good land suitability evaluation*** for each land utilization type (specific crop/ technology combination). Otherwise it is doomed to failure. I could cite numerous examples where this was not adhered to and caused serious (often irreversible) problems. In small farmer irrigation it is a disaster for a specific farmer if he/she ends up on an area of poor quality soils. Ncora is a good example where the soils are predominantly of very high irrigation potential, but some farmers have landed on very poor quality soils that should never have been included under the scheme (Rossouw, 1989).

Knox (1981) pointed out that soil scientists often have bad news to tell, because soils often have lower potential than politicians or the general public want to believe. Because they tend to ignore and/or discard the recommendations of the soil scientist, Knox (1981) states that the soil scientist must document his recommendations very

carefully – and I add keep them for decades, as I have done regarding the areas under the Xonxa dam. But Knox (1981) also adds that the soil scientist should keep his eyes open for areas with particularly good potential. One such example is the Keiskammahoek irrigation scheme in the former Ciskei. It has absolutely excellent soils and a climate suitable for the production of a range of high value crops. Yet, here the Ciskei government, against my recommendation, allowed a dairy scheme to be developed. There were several other areas which were suitable for growing irrigated pastures, but not for growing high value crops, on which dairy schemes could have been developed. After the demise of the scheme a few remaining farmers are now trying to grow some vegetables here (Williams, 2003). Due to the collapse of the water supply infrastructure this is very difficult, however. ***In view of its great potential and the general high poverty in this central Eastern Cape area, Keiskammahoek is a scheme that should also be highest priority for revitalisation.***

The above are just a few examples to indicate the importance of ***first conducting a thorough survey*** looking at (a) the potential of former irrigation schemes which had well developed infrastructure and (b) food insecurity and poverty in their vicinities ***and then to determine revitalisation priorities based on these.***

A big issue in the Limpopo revitalisation programme for irrigation schemes is the promotion of "Joint Ventures" by the Limpopo Department of Agriculture. There are a few worrying aspects in this regard. ***(Note:*** *This discussion is not aimed at Limpopo province only, but as general guidelines for all provinces.)* Firstly, enterprise adaptability, which is used in advising farmers on Joint Venture opportunities seems to be based purely on climatic adaptability. Determination of the suitability of any area for a specific enterprise involves ***much more*** than just climatic adaptability (FAO, 1985; Hensley & Laker, 1981). Secondly, although it is clearly stated that each individual farmer will be allowed his own free choice regarding his cropping systems and whether he wants to join a Joint Venture or not, I am afraid that in practice individual farmers will have very little choice. In the worst scenario one may end up in some cases with the typical "glorified labourer" situation of the former homelands. Thirdly, with commercial Joint Venture partners involved there is always the danger that one may end up with capital intensive projects again, instead of labour intensive projects. E.g. will a cotton project use hand picking, and thus make maximum contribution towards alleviating unemployment and rural poverty, or will it use machine harvesting?

Van Zyl (2003) sketched the following "Joint Venture" scenario that recently according to him occurred at the Taung irrigation scheme in Northwest Province: A malting company made an agreement with small scale farmers that barley for malting would be grown. The company planted the barley, made the fertilizer, etc. inputs and did all the work. No farmer was required to do any work. They were just spectators. One of the consequences was that the farmers' study group collapsed. In the end the quality of the barley was too poor for use for malting and it had to be sold at a much lower price as animal feed, thus sinking its profitability. I was wondering whether malting quality barley could ever be grown at Taung. Prof. Alan Bennie then informed me that experiments of Prof. Boet Human, formerly from the UOFS, many years ago have shown that these central irrigation regions are not suitable for high quality barley production. According to Prof. Bennie opportunists that are not farmers

also virtually "highjacked" the barley project at Taung. Assuming that all this information may perhaps be correct, it highlights two things:

- If a joint venture is not done with the correct approach, it can do a lot of harm.
- The importance of correct land suitability evaluation for any specific enterprise.

Most experience with "Joint Venture" small farmer irrigated agriculture in South Africa has been in the growing of sugarcane in the Lowveld of Mpumalanga and in KwaZulu-Natal. Good lessons can be learned from these, in regard to both positive and negative aspects. Some points extracted from Sugden (2003) are:

- The sugar industry funds its own research, training and extension and all these services are available to small scale farmers also. My comment here is that the importance is that this is a specialised service by people who know what they are talking about and an umbrella service from an industry and not by individual companies. I am not in favour of advisory services provided by generalists or by individual companies, especially input companies.

- Milling companies support growers in their cane supply area. For example: At Komatipoort and Malelane TSB provides *"considerable support"* to the small scale cane growers in regard to irrigation pump and equipment maintenance, infrastructural maintenance and supervision and cane harvest scheduling. There is a very important reason for this support: TSB's mill needs a sustainable cane supply from the small scale growers since they supply about 30% of the mill's cane. Sugden stresses that this type of support can be positive or negative, depending on how it is done: "***The involvement of the 'vested interest' stakeholder can be positive provided there is a genuine transfer of skills through mentoring and counseling. If however, the objective is purely to ensure throughput at the sugar mill then the involvement is negative and not sustainable."*** In this regard it is also ***very important*** to study the papers by several authors in the publication on community participation and sustainable development in smallholder irrigation, edited by Thomas & Stilwell (1994). *The little paper by Wolhuter (1994) is particularly illuminating and important.*

- *Sugden points out that* ***because of the collective nature of water rights*** *allotted to Irrigation Project Growers,* ***water is not used efficiently*** *and irrigation scheduling is not adhered to.* He refers to the effect of the National Water Act of 1999 in this regard. Consequently poor irrigation management is affecting soil quality and leading to yield decline. Such a situation will definely not optimise irrigation water use efficiency or help to alleviate rural poverty. ***This statement by Sugden thus warrants serious attention.*** He believes that *"water licences"* should be issued to ***individuals***.

Apart from the revitalisation of irrigation schemes, attention should also be given to revitalisation of the ***highly developed and productive farms that*** were bought out and incorporated into the homelands and are ***now in badly degraded states***. Only one case will be discussed ***as an example***: The "White farms" (referring to the name of the previous owners, not to race) near Fort Beaufort used to produce the best quality navel oranges in the Kat River valley (Badenhorst, 2003), a valley renowned for its very high quality navels. Apparently these farms became one of the first "land reform"

handovers. Unfortunately they have totally collapsed. By now over 80% of the trees have died and the orchards have become *"goat browsing areas"* (Badenhorst, 2003). Added to the deteriorated situation also in other parts of the Kat River valley that used to be former "White" (referring to race) commercial farms the number of "crates" (term used by a person from Agri-Eastern Cape) packed at the Kat River Citrus Coop in Fort Beaufort dropped from 27 000 in 1999 to 3 500 in 2002 . ***Looking at the potential of the area to produce a high quality export crop, I would think that such a case should receive very urgent high priority and support*** from the Eastern Cape government. This is even more important when looking at the poverty and high unemployment and resultant social problems (theft, etc.) in the area. The Katco management is trying to stimulate revitalisation of the "White" farms for small scale farmer settlements through partnership with the Industrial Development Corporation (IDC) and Government, but according to Badenhorst (2003) Katco is not making any progress in negotiations with these bodies. Since citrus trees take time to get into full bearing, Katco is suggesting to start out with a group of other high income crops, viz. essential oil crops, which would generate quick income which the small scale farmers could use for the citrus development. Thanks to decades long research into essential oil production in the area at the nearby University of Fort Hare and the availability of an extraction plant, this is an option with real potential. I cannot understand why the IDC and Government are dragging their feet so about this. Meanwhile the Eastern Cape irrigation revitalisation programme is investigating just the possibility of a tiny little scheme (barely 10 ha) in the upper Kat River valley. ***There must be several such high potential cases for small farmer development on former commercial farms that were incorporated into the former homelands, that should be identified urgently – especially in view of the high poverty and food insecurity in most of those areas.***

Development of ***dryland cropping projects*** was not seen as a major vehicle for the development of Black commercial farmers in South Africa in the past. Three main factors played a role in this: Firstly, irrigation development produces much quicker results than dryland development (Daniel, 1981). Secondly, in areas with less than 600 mm rain per annum the dryland cropping area required to sustain a family from farming alone is large (Bennie & Hensley, 2001). Thirdly, the areas with annual rainfall of 800 mm or more are found predominantly in strongly traditional tribal areas, where the system of land tenure militates against such development. These areas also have very poor infrastructure. The statement of Bennie & Hensley (2001) that "the goals of economic viability and natural resource sustainability are relatively easy to achieve" for small scale dryland crop production is, therefore, based on physical-biological grounds only, without taking socio-economic and cultural factors into consideration.

The two best-known (contrasting) cases are briefly discussed here as examples:

a. Sheila and Mooifontein: These projects were in the Ditsobotla district of the former Bophuthatswana (Northwest Province). The projects were large, Sheila alone being 26 000 ha and producing 23% of Bophuthatswana's maize. They were typical of the development projects of the time, with all decisions taken top-down by management and even implemented by them, via contractors. *"Farmer involvement was extremely limited. Only 6-10% of landowners were involved in the project at any stage, and then mostly as* ***employees****."* (Verschoor, 2003).

Although the project was supposed to do farmer development/training, so as to eventually produce independent farmers, this did not feature in practice (Verschoor, 2003). Typical of such projects, inputs were excessively high. Yields were as high and higher than those of the commercial farmers in the area, but since the commercial farmers made lower inputs, the profits on the project were much lower than those achieved by the ("white") commercial farmers (Bembridge *et al*., 1982). No wonder that about 30% of the project "farmers" actually made losses (Bembridge *et al*., 1982; Laker, 1981). In fact, the farmers did not "make" losses, because they had no say in the management decisions, they "suffered" losses. On average the *"family farm income"* of farmers on the projects was not higher than the family income for other areas in Bophuthatswana (Bembridge *et al*., 1982).

Because the farmers were not equiped/trained to farm, the project was not sustainable and after the termination of the project by the new regime in 1994 the number of active farmers decreased significantly (Verschoor, 2003). The remaining ones currently have serious debt problems, because they were used to their debts being written off in the past and they were not prepared for *"a free market"* (Verschoor, 2003). Verschoor (2003) points out that the objectives of the project to utilise the arable potential for increasing food security *"was achieved temporarily, for a limited number and at significant public cost."* With yields having dropped from over 3 $t.ha^{-1}$ at one stage (Bembridge et al., 1982) to about 1.7 $t.ha^{-1}$ now (Verschoor, 2003) and so few farmers remaining, food self sufficiency in the area is possibly no longer achieved.

In terms of the main matters addressed in this report, the effect of the project was:

- It ***did*** bring about increased water use use efficiency, through higher yields under the same rainfall. Prior to the project *"farming methods were poor and yields were less than one ton per hectare"* (Bembridge *et al*., 1982).
- It ***did*** improve food security, through the higher yields.
- It ***did not*** improve family farm income.

This is ***not*** a "***high potential*** *cropping project*", as described by Verschoor (2003). For that the rainfall is far too low. It does, however, have some of the best cropland of the area in which it is situated and is an important area for maize (especially the all important white maize) production. Thus, for achieving food security its revitalisation is essential. Farmer development will be possible, provided each farmer obtains an adequate area of land to make a proper living on and sensible farming strategies are employed, as is done by the commercial farmers in the area (Mbatani, 2000). The latter accept that it is a climatically marginal area for dryland crop production (rainfall just over 500 mm per annum) and have adjusted their production systems accordingly.

After an in-depth study Verschoor (2003) recommends that revitalisation of the project should be done by means of a *"revived project approach"*. The *"proposed intervention* ***would to an extent be similar*** *to the previously used* ***capital-intensive*** *projects but with a shift in focus to participation and human capital development. Central facilitation of services and inputs is foreseen."* To me its sounds no different from all the nice project proposals of 25 to 30 years ago, including all the nice rethoric on "participation", "farmer training and

development" (now nicely called "human capital development"), which featured in those proposals, but were never implemented. It is nice to state that: *"The state should act as facilitator and **watchdog**."* In the homeland days this "watchdog" was totally ineffective and did not even react when outsiders prompted him that it was time to bark and bite because things are not done according to the original objectives. I may be cynical, but I very much doubt if the outcome will be any different this time from what happened previously at all projects, including at Sheila, where according to Verschoor (2003) the commercial management agent *"in collaboration with the Bophuthatswana government was profitably involved in input and market provision"*. The classical ***"fool's gold for Africa"*** scenario. This is also what I fear for in the Limpopo irrigation scheme Joint Venture approach.

b. Phokoane: The Phokoane dryland maize project in the former Lebowa near Stoffberg differs totally from the Sheila and Mooifontein situation. Firstly, it has really very high potential natural resources, amongst the best in South Africa. The soils are high quality deep Hutton soils (Adendorff, 2003) and according to reports the average annual rainfall is between 800 and 1 000 mm. Despite the enormous potential the area was poverty stricken and land degradation was serious. Despite the high cropping potential, the area was primarily used for extensive grazing. At that stage ***all*** the families ***had shortfalls in*** regard to the ***maize*** required for subsistence and *the **total shortfall** amounted to **92%.*** The average expenditure on maize meal per family was R759 per annum, a huge amount at that stage. In 1984 the Lebowa government decided to launch a dryland maize project in the area – to bring about food security and alleviate poverty. Contrary to the general pattern in South Africa at that stage, they did not employ a commercial external management agency. Things started off very badly: Theft was rife, and whereas farmers could have harvested more than 5 $t.ha^{-1}$ the eventual yield after all the theft was only 0.4 $t.ha^{-1}$. Where theft did not occur some farmers harvested more than 8 $t.ha^{-1}$ (Adendorff, 2003). There was tremendous resistance to the project because rangeland was taken away for the project and the "farmers" were no more than labourers. In 1986, the 10^{th} anniversary of the Soweto uprising, there was also major political unrest. So much so that Lebowa officials, like Adendorff, were threatened with necklacing and tractor drivers had to be smuggled in and out under loads of hay to do the ploughing. A year later Lebowa wanted to close down the project.

Fortunately Adendorff and his colleagues convinced the Lebowa government to give them one more year. They brought about a turnaround in a way that has been documented a few times as a blueprint for how to make such a project successful. Many aspects played a role, but the most important is that the people on the ground were empowered to take full "ownership" (reponsibility) for the project and getting them to believe that they can do it. By 1993 only 4% of the farmers did not produce enough maize for their families' needs and 78% produced surpluses for sale. It cost a farmer R217.50 to produce the maize needed by his family in a year (as opposed to paying R759 per annum to buy maize meal). This meant a saving of R541.50 per family per year, just on their staple food. For the families on the project as a whole it meant a saving of R649 800 (Gouws, 1993). In addition surplus maize could be sold for R744 276, meaning a turnaround of no less than R1 394 067 for the families involved in the project (Gouws, 1993).

Unfortunately this success story has since also collapsed, largely exactly because it was so successful (Adendorff, 2003). I cannot go into too mauch detail here, but wish to highlight just three of the reasons given by Adendorff (2003), because they hold important lessons for future:

- *"The programme became too big too fast and became too big to handle. The farmers could no longer get quality time from the advisors. This was the fault of the Lebowa Development Corporation, because this was their success story and they wanted to expand it too fast."*

- *"The **death-blow** was that the project did not satisfy new needs. Development creates new needs/demands. Not satisfying the new needs led to frustration amongst the participants and groups (formerly a strength in achieving success) broke up."*

  At the University of Fort Hare we debated this already during the late 1970s, some 10 to 15 years earlier, and in Laker (1981) I already wrote: *"**As development progresses certain changes are brought about to both the community and the land. These changed communities and land areas have new requirements.** The original plan for any specific case should cater for predicted sets of changed conditions over time. In practice the actual rates and directions of changes will probably more often than not be significantly different from predicted ones. This will necessitate periodic alterations to the original concepts, models, strategies, plans, etc., **which means that development strategies also have to be dynamic and highly adaptable in time**."* But, as usual, nobody bothered to listen to us or to believe us.

- *"After the change of government in 1994 everything that was part of the the old government had to be destroyed."*

One would hope that steps are urgently taken to get small farmer crop production, and especially a staple food like maize, developed to high levels at Phokoane again as soon soon as possible. The country cannot afford such high potential land to remain under-utilised. In terms of this report, ***Phokoane has the potential for:***

- ***A large increase in water use efficiency, by sharply increased yields.***
- ***Huge improvement in food security in and around the area.***
- ***Enormous alleviation of rural poverty in the area.***

All other high potential areas in the former homelands should also be identified and programmes set in motion for their optimum utilisation. Here one thinks especially of parts of the former Transkei, like major areas of Umzimkulu, significant areas in East Pondoland, occuring in especially Bizana, Lusikisiki and Flagstaff districts and the part of Tabankulu district between the Mzimhlava and Mzimvubu rivers and some areas of various other districts in the rest of the former homeland, e.g. Mqanduli and Gcuwa (Butterworth). Development will require careful planning, because in most areas high potential soils are interspersed with extremely poor quality soils. These areas are strongly traditional, which pose special challenges because of the limitations imposed by traditional systems of land tenure. ***Any "relative neglect of dryland farming" has serious implications in terms of staple food production and food***

security, because these are the areas where the staple grains are produced, with the irrigation schemes being used mainly for production of high value crops (Daniel, 1981). Daniel (1981) also points out that ***it is "on the drylands that the bulk of the rural population will have to live and farm****."*

Attempts at ***changing land tenure systems*** *in traditional tribal areas,* ***especially imposing them from outside and/or doing it at a too fast rate****, will lead to* ***resistance and serious conflict.*** Even violent conflict could perhaps erupt in some cases. I have always maintained that the person who can devise a solution for effective and peaceful land tenure reforms in traditional tribal areas in Africa should receive a Nobel prize. In Laker (1981) I wrote: ***"The challenge is to find a formula by which a change from the tribal system of land tenure to a more private land-ownership can be effected without disrupting the whole social structure of the community. It would be disastrous to force any such change from outside. It will have to come from within the community."***

Some people seem to believe that it is mainly tribal leaders (chiefs, headmen) that strongly want to retain the tribal systems of land allocation. Some were of the opinion that the traditional leaders in South Africa (especially in the Eastern Cape) were kept artificially strong by the apartheid regime, overlooking the fact that it is a common system throughout Africa. The Quail commission, conducting studies not only amongst Ciskei Xhosa people, but also other groups in South Africa, found that that the ordinary people gave very high ratings to land "ownership" in the rural areas and to the granting of land for use by the chiefs (Quail, 1980). The migrant labourers were the most conservative group in this regard. This is not surprising when considering the social security which land in the tribal areas afforded them: It was a refuge during unemployment when losing his job or during ill health. It also served as a residence during old age. It provided a secure residence for the family and a place to have holidays with them in a nice environment. (See also Rossouw, 1989). Many of these areas, especially in Transkei and parts of Ciskei, are in the most picturesque environments. Once, when looking down on the beautiful Amatola basin, a Fort Hare colleague remarked: *"Why do we want to change this? They have everything that we are dreaming of for the day that we retire!"*

Quail (1980) also found that the vast majority of not only the Ciskei people, but also the "city Xhosa" attached very great importance to socio-cultural and religious functions and ceremonies, ancestral celebrations, etc. Rural tribal areas play important roles in these ceremonies. In the Western Cape a special area was even recently proclaimed for Xhosa cultural purposes for the large number of people who have over the last decade or so migrated permanently to the province from the Eastern Cape's traditional Xhosa areas. If land tenure changes have to become acceptable in tribal areas, a sufficient number of specially selected areas will have to be set aside in the tribal areas.

During a visit to Fort Hare in 1979 Prof. H.U. Thimm of the Justus Liebig University in Giessen, Germany, told me that some Kikuyu chiefs in Kenya had on their own initiative started certain land tenure reform programmes, to good effect. Thimm indicated that also in this regard ***one's approach should be dynamic: Those who want to change, should not be held back by those who do not want to. Conversely, change should not be forced upon those who at a certain stage are not yet ready for***

it. After all: *"Development of any sort is no different from other forms of personal relations on an extended scale. The same rules apply to both: It is no more logical to beat someone's head on the wall to get him to agree than it is to force a method upon unwilling recipients."* (Barbara Rosenthall, as quoted by Laker, 1981).

From experience in West Africa, Lewis (1995) wrote: *"**Centrally planned solutions to local land and natural resource tenure problems do not work.** Few villagers are aware of national land and natural resource legislation and there is very little practical application of the texts in rural areas. **Legislation is of course needed** to provide the legal basis for national policy on land and natural resource tenure. **But to be effective, it must relate to the reality in the field and be based on solid practical experience."*** According to Darga (1995) one of the reasons for the serious land degradation in Burkina Faso is the fact that land legislation and the realities of the country are "out of phase" with each other.

At the workshop with community representatives in Venda in about 1999, *inter alia* attended by a progressive young chief, I mentioned the Kenyan experience told to me by Thimm. Some time afterwards Venda chiefs requested the then Venda government to look into the possibility (and probably most importantly pros and cons) of land tenure changes away from the traditional communal tribal system. Judge Van Rhyn, the then chief judge of Venda, was appointed as one man commission to handle this enquiry. Several people, including myself, were called to testify and make proposals. I never saw the report of the commission. It could be very valuable to try everything to obtain a copy of this report, although it may be hard to find any remaining copies at this time. ***The fact that chiefs requested it was a very significant development that should be followed up again in the present process of putting new legislation in this regard in place.***

To complicate things further present South African draft legislation (which has apparently already been accepted by Cabinet), not only makes provision for radical change of the land tenure system in tribal areas, but also allocates equal land rights to women and children as to men. This is very noble and applaudable and in theory must be strongly supported, but to include such a series of radical changes all at once may not be wise and backlash in practice. ***I believe it would be wise to read the following outline by Lewis (1995)*** from his experiences in West Africa very carefully:

- *"The role of women in gestion des terriors has long been a subject of special concern. However, experience indicates that this question must be approached with caution and a high degree of understanding and professionalism. There are many cases where commendable, but poorly conceived, attempts to support the role of women have eventually had a negative impact, and contributed to further marginalisation."*

- *"The complex and delicate structure of the internal relationships of families and village communities can not be easily understood by outsiders.* ***Any effort to target women inevitably impinges on these relationships and enters the social minefield of traditional rights and customs.*** *Certainly, women, as well as other groups with marginal access to and control of natural resources, must be encouraged and assisted as much as possible. However, this must be done within the existing boundaries of acceptable local behaviour."*

- *"It is, for example, counterproductive to insist that women address a public meeting attended by outsiders in societies where local custom normally prohibits such behaviour. There have been cases where, knowing that a particular donor is insistent on the active and vocal participation of women in meetings, project staff have coached the women on how to make a speech and got the men of the village to agree to allow them to speak. This is not very useful."* Note: Two days after receiving this paper from Lewis we attended a meeting in a village in Burkina Faso. The South African delegation (including the women) sat in the shade of trees together with the men of the village, while the women and children were standing in a row against a wall a "respectful" distance from us. One of the South African ladies absolutely insisted (in a very insensitive and rude way) that she wanted to ask one of the women a few questions. The chief eventually got up and walked to the women. After scrutinizing them, he stuck his finger under one's nose and instructed her to come and answer the questions. Of course, she was shaking like a reed and did not answer any question put to her. This action by the South African lady was definitely "not very useful". In complete contrast a few days later in another community in Niger a young lady made the whole presentation and during question time a few old ladies openly had some very interesting and often not very complimentary remarks about the men. Again, one should be open-minded and flexible in one's approach.

- *"On the other hand, societies may need to adopt more open and participative practices in order take part effectively in modern development.* ***But this must evolve from within the society (albeit with external encouragement) rather than being artificially imposed from outside.*** *The lesson here is that while the "gender issue" is very important, it requires knowledgeable and professional handling. It is not a field for amateurs, no matter how enthusiastic they may be."*

Women play key roles in agricultural development and carry heavy burdens. In agricultural development major attention, therefore, must be given to lighten the burden of women. De Lange (1994) refers to the major impact that just simply sensible irrigation system choice could have. Shifting of overhead sprinklers early in the morning and late in the afternoon interferes with household chores that women have at those times. In contrast short furrow irrigation can be done any time of the day and has the advantage that weeding can be done while irrigating. Distance to fields are as important. In discussions with a brilliant (commercial) female irrigation farmer, farming way out in the bush, who had to be displaced from the basin of the newly built Maguga dam in Swaziland, I asked her whether she would like to pursue such farming again at the new area where she had to move to. Her answer was yes, but the irrigated fields must again, as in her present case, not be more than half a kilometer from her new home, otherwise she would not be able to manage the farming properly together with her household chores. Irrigation techniques like treadle pumps, that bring about up to 75% labour saving in irrigation (Daka, 2001), or clay pots are valuable tools to reduce the burden of women. These are but a few examples. Numerous other possibilities exist in regard to things like collecting of firewood, milling of grain, etc.

Because ***agricultural development*** involves so much more than just increased production, it ***is a very slow process***, especially in traditional rural areas. Governments and other bodies involved in development most of the time want to see quick results, and thus jeopardise the whole process. Steyn (2003), for example, is greatly concerned about the fact that the present development programme under Land Care in the former Transkei is only a three year programme. It is too short. He believes at least 10 years would be required to effect meaningful change. Barbara Rosenthal (quoted by Laker, 1981) stated that *"the processes of meaningful change are slow**, but must be honoured if such change is done in the best interest of the beneficiary**."* She further stated (as quoted in Laker, 1979): *"It must be kept in mind that agricultural development is intended to benefit the community and not to gratify the donor."* Vink (1975) believes that the slowing down effect caused by traditional approaches to agriculture may in itself have certain advantages, because *"sudden changes in land use cause disruptions which may result in grave hazards for the agricultural population as well as for its lands, and therefore for a country."*

Looking at agricultural development in isolation will not solve the problems of especially densely populated traditional tribal areas. In Laker (1981) I wrote, referring to development of industrial nodes like Butterworth and Dimbaza: *"The creation of the maximum number of employment opportunities and sensible and effective urbanisation programmes, in order to draw the maximum possible number of families from the rural areas, will therefore be required if agricultural development in tribal areas is to have any chance of getting off the ground. Not only home-ownership and an attractive town or city life, but also an acceptable social security system must be created. As long as a man does not have some form of security in the town during times of unemployment or in his old age, he must still retain his stake in the tribal area as his 'built-in social security'."* And further: *"The mere creation of job opportunities, especially in cities, is not a feasible way of relieving the human pressures on tribal lands if it is not accompanied by well-conceived education and training programmes."* According to Cohen (1979) a job in a city is to ill-trained and ill-educated persons from rural areas *"the worst possible choice"* because they cannot *"find steady employment and end up in greater poverty and hunger. Moreover, they no longer produce food, much less goods and services."*

Daniel (1981) made some very important points. Although these were made within the Ciskei context, they are valid for all former homeland areas: *"Attention* (should move) *away from capital intensive investments which lead to further forms of spatial inequality, to the idea of **service centres** which have a positive impact on agricultural development. A small service centre is a powerful stimulus to agricultural development. The services that are needed are to be found in the fields of health, education, marketing, transport and processing industries. The creation of the right infrastructure would assist all farmers. **In this manner agricultural development would be transformed into rural development which includes social and economic activities as well as the development of agriculture**. More thought* (should be) *given to generating employment both for the landless families and the underemployed by **encouraging growth in the intermediate sector which is characterized by small family enterprises using labour intensive methods to produce a variety of goods and services."***

Furthermore, the development of "rural" industrial nodes like Butterworth (Transkei) and Dimbaza (Ciskei) made a lot of sense. These are areas with abundant water supplies, large populations needing employment and having good road and rail links to the nearby port of East London and to the interior of the country. In the struggle against apartheid these had to be discredited and degraded by those involved in the struggle, even producing the documentary film *"Last grave at Dimbaza"*, because they could not be allowed to succeed. ***One would think that now that apartheid has been destroyed every effort should be made to revive these urgently – and start a few other centres in the area.*** In an interview published in Beeld of August 23, 2003, Dr. Motsoko Pheko, leader of the PAC said (translated by me from the Afrikaans): *"I was in Umtata shortly after I returned from overseas. I was surprised to see how well it looked, what excellent economic work was done in that Bantustan. But now! Umtata has degraded tremendously. Is this what democracy does to one?"* With apartheid, boycotts and sanctions gone for 10 years now, surely there should be great opportunities for much greater economic development in these areas than ever before.

An important challenge will be to find the correct balance between the development of emerging commercial farmers, with big enough land to make a living from agriculture and the opportunity to expand, and subsistence farmers. Many extensive texts have been published about this. The maximum number of subsistence farmers will give the maximum equity in terms of access to land and the minimum number of "landless" people. But these people will not have any income from agriculture to buy anything with and will make no contribution towards food production for the urban population. Ntšeke (1993) voiced strong objections against the ***"monstrous solution called 'sustainable subsistence agriculture'".*** He contends that under "sustainable subsistence agriculture" attention is only given to sustainable use of resources, but no attention is given to farmers or their livelihood. Ntšeke (who hails from Lesotho) believes that *"no normal rational human being would like to live under 'sustainable subsistence agriculture'. **Clearly 'sustainable subsistence agriculture' does not contribute to** the attainment of any profits or **any development**. The system has no room for any financial improvement. The system is bound to lead to serious frustrations and family instabilities."* He concludes: *"Any normal rational thinking human being likes to continually or continuously improve his or her standard of living. It is therefore unthinkable, even unethical, to imagine that unfortunate farmers who found themselves forced to live under subsistence agriculture would in any way desire to perpetuate the system or accept to make it sustainable."*

3.12 LAND REFORM

Ultimately there can be no justification for land reform in South Africa other than the enhancement of the quality of life of rural Black South Africans in particular and all South Africans in general

I believe that the above variation on the statement by Cherns (1980) on development, quoted earlier, ***must*** always be central to any debate or decision-making regarding South Africa's present land reform programme. In a politically emotional atmosphere it is important that this focus should not be lost, either by government or by those that

advocate or drive land occupation campaigns. An outsider like Alexander Makeev, Director of Russia's Foundation for Agrarian Development Research at Moscow State University, who has visited South Africa twice since 1996, indeed expressed the opinion that his impression is that land reform in South Africa has nothing to do with economics, it is purely political (Makeev, 2003).

Turning the statement in the block around into a statement of what the objective, policy and strategy of land reform should be, it should read: ***"The primary objective of land reform must be the enhancement of the quality of life of rural Black South Africans in particular and all South Africans in general. All land reform policies, strategies and actions must be aimed at achieving this objective."***

The situation regarding land reform in South Africa will be discussed against the background of these principles.

3.12.1 Historical background

In order to understand the strong emotional undertones to land reform, it is necessary to have a brief historical background. Mainly twentieth century history will be looked at, but one should not ignore events during the nineteenth century, as for example described for the Ciskei area by Daniel (1981).

Two acts that were enacted by the South African parliament early in the 20th century were key events in this regard. Daniel (1981) describes it as follows: *"The Native Land Act, No. 27 of 1913 and The Native Trust and Land Act, No. 18 of 1936 confirmed the principle of territorial segregation between Blacks and Whites throughout the Union of South Africa. The Blacks were restricted to specific areas and had to adjust to living and surviving in a defined space, and adapting their cultivation accordingly."*

Some of the most publicised present land resitution claims are related to removals of Black people from their land not only according to the 1913 act, but in fact taking place very early in the 20th century. I don't know about 1913, but the *"musical chairs"* with land distribution, with "White" farms being bought out to settle Black people on, while at the same time Black people are removed from their land, clearly started at least in 1936 already. Bembridge *et al*. (1982) describes it as follows for the area on which the Sheila and Mooifontein dryland agricultural projects were eventually developed in the former Bophuthatswana: *"The trust land area of the present project was acquired from white farmers in terms of the 1936 land act, and settled between 1936 and 1944. After the departure of the white farmers, only a few of the farmers' employees remained. They were soon joined by families from Western Transvaal urban areas such as Potchefstroom, Carltonville, Klerksdorp and other areas. Agriculture developed gradually, as more people were allocated land and acquired livestock."*

After 1948 apartheid, later called "separate development", became government policy. This was then implemented in the form of the "homeland" concept. From about 1955 resettlement and planning of Black rural areas under "betterment" schemes started. The betterment planning was disastrous because it was not based on sound land suitability evaluation principles and resource information (e.g. Laker,

2003b; Maswana, 2001). At least these areas were now receiving major attention, after the *"relative neglect of the Black rural areas by the Central Government between 1914 and 1955"* (Daniel, 1981).

When the different homelands started receiving "self governing" status at different times from 1961 onwards (and a few even "independence" later) it not only heralded the pumping in of millions of rands into agricultural development in these areas, but also a hectic period of "land musical chairs" to facilitate homeland "consolidation". It, on the one hand involved buying out of quite a large number of "White" farms bordering homelands for incorporation into the homelands. This was quite a traumatic experience for many of these farmers, who had well-developed farms in nice environments – and especially in the case of family farms that had been in a family for a number of generations. Farmers that were bought out relatively late had an extra trauma having seen degradation of top farms that were bought out earlier, and often destruction of beautiful homesteads, and fearing it might happen to their farms. Most importantly, in view of the present emotions around land restitution at this time, the Black people living in isolated rural spots in various parts of the country were removed from those areas and resettled in consolidated homeland areas. Communities were opposed to such removals and often resisted it, leading to the traumatic and hated "forced removals". Since this happened so recently people still remember it vividly and therefore the emotions around returning to such areas are so strong.

3.12.2 Target of the land reform programme

The stated target with the land reform programme is that by 2015 30% of the agricultural land that was in the hands of white commercial farmers at the change of regime in 1994, must be in the hands of Black South Africans. Initially it was apparently just stated that 30% of the agricultural land in the country must by 2015 be in the hands of Blacks. When I had discussions with Agri-SA in August 2003 and asked them whether this was 30% of all agricultural land or 30% of the land that was in the hands of white farmers in 1994, they did not know. According to them it was never spelled out clearly. They subsequently asked the Minister of Agriculture, who then made it unequivocally clear that it meant 30% of the land that was in the hands of white commercial farmers in 1994.

I call it a "target" and not an "objective" or "purpose", because merely aiming to transfer a certain amount of land from one group to another can never be called an objective or purpose. Even saying that the aim is to bring about more equitable access to land does not really mean much. The overall objective (although somewhat vague) should at least be to enhance the quality of life of the Black rural population of South Africa (and all South Africans) through giving Black South Africans more equitable access to the agricultural land resources of the country by means of land reform. One could narrow the objective(s) down to more specific ones like poverty reduction and promoting food security (at household, local and national level).

According to reports a senior official of the Department of Land Affairs has clearly stated that the purpose of the land reform programme is simply to *"right the wrongs of the past"* and not to bring about sustainable development. If one looks at the present land reform strategies and what is happening in practice, it is fair to say that it is indeed not bringing about sustainable development. The HSRC Review of

September 2003 reports that Mini and Randela (2003) also found that *"poverty reduction and food security strategies are rarely explicit features of land reform."*

3.12.3 Two types of land reform

As I understand it, there are basically two types of land reform where it comes to white farms being bought out for handing over to Black people, viz. (a) land restitution and (b) land redistribution, which are executed in the same way. I understand them to be as follows:

- Land restitution is where a community claim back land from which they or their ancestors have been removed under the 1913 or 1936 land acts or in the process of homeland consolidation. Here it deals with the psychological, sociological, cultural, religious, etc. value of land, i.e.*"the land of our fathers"* syndrome. Because emotional non-tangible factors are over-riding, such claims sometimes do not make any economic or practical sense. A case in point is the Riemvasmaak people, who went back to a barren desert area. In a FarmAfrica newsletter the area was described as a barren moon landscape with an average annual rainfall of 50 mm. It is not quite as bad. The long term average annual rainfall at Onseepkans, the nearest weather station, is about 72 mm! During a long absence people may also grow out of phase with the realities of an area. Riemvasmaak is in a region where people used to live in movable "matjieshuise" (dwellings made of grass or reed mats draped over a construction of sticks), that can easily be packed up and moved as they follow grazing and water with their sheep and goats in a semi-nomadic lifestyle. Upon their return the Riemvasmaak people demanded sedentary houses built with bricks.

  Claims can go back a long time. The Bjatlabi community, for example, lodged a successful claim to get back the area which is now the Zebediela citrus estate on the basis that their ancestors were removed from the area in about 1916.

- Land redistribution is where "white" farms are bought out for transferring to Black people in order to achieve the full complement of 30% of 1994 White owned farmland to become Black owned farmland. These cases do not have the emotions of "returning to the land of our fathers" as in the land restitution cases. They should all be simple straightforward business transactions. The big problem is that it could be difficult to find enough "White" farmers that wish to sell their farms within such a short space of time, since 30% is a big proportion of the farmland. According to a report in Rapport of August 24, 2003, it is Government's stated aim to have this 30% of the agricultural land in the hands of ***individual farmers*** from previously disadvantaged communities. *According to the report, the aim is not only to transfer the land to previously disadvantaged people, but to* ***"encourage"****(!) them to use the land for production and to* ***eventually*** *become successful commercial farmers.*

  The *"Land Redistribution for Agricultural Development" (LRAD)* programme is descibed as the "flagship" land reform programme. The name of this programme is for the majority of cases a misnomer. The farms that are being bought out are highly developed commercial farms, often highly sophisticated, and there is no such thing as further "agricultural development" possible for

the vast majority of these farms. In fact, there is in most cases apparently a sharp retrogression (or degrading) of agriculture on these farms after being handed over, as will be indicated later. A more appropriate title for the programme would have been "Land Redistribution for Black Farmer Settlement" or "Land Redistribution for Black Agricultural Development".

3.12.4 Funding arrangements for land reform

Cross & Aliber (2003) give comprehensive discussions on LRAD and refer to the other two of the three funding mechanisms of the Department of Land Affairs (DLA) for land reform, viz. the Settlement/Land Acquisition Grant (SLAG) and the Municipal Commonage programme. Buso (2003) gives a discussion of the Commonage programme.

It is important to understand what SLAG and LRAD funds are made available for. Because of the very small amount made available per household under the SLAG programme (only R15 000, later apparently R16 000), I assumed that it was meant for purchasing materials and inputs to enable emerging farmers to make a start with farming. I later realised that ***DLA used this money to purchase the land*** for would-be farmers, and that ***the farmers actually received no funding with which to start their farming operations***. SLAG started in 1995. LRAD was launched in August 2001 (Cross & Aliber, 2003). It appears that, like SLAG, LRAD funding is made available purely for purchasing land and not as production capital.

LRAD differs in five respects from SLAG (Cross & Aliber, 2003), viz.:

a. LRAD makes funding available per individual, not per household. This means that whereas under SLAG only one application could be made per household, several members from a household can apply for funding under LRAD, thus being able to access a much larger amount for the household.
b. LRAD makes more money available per grant than SLAG.
c. LRAD works on a sliding scale from R20 000 to R100 000.
d. The size of a LRAD grant is determined by an "own contribution" made by the applicant. *"The minimum contribution is R5 000, with which an applicant can qualify for a grant of R20 000, and the maximum is R400 000, with which an applicant qualifies for R100 000"* (Cross & Aliber, (2003).
e. According to an "agency agreement" with the Land Bank, people receiving LRAD funding could apply for production loans from the Land Bank for "approved projects". According to Cross & Aliber (2003) something has apparently recently gone wrong with this agency agreement. This will be discussed later.

3.12.5 Measuring the success of land restitution or land redistribution

Careful consideration of criteria to be used for measuring the success of land restitution and land redistribution is required. Presently it seems that every time a land claim has been settled and the land handed over to the claimants, it is described as another land claim that has been settled successfully – end of the story. Surely mere transfer of land to people does not mean the process has been a success. ***It is only if the people have succeeded in making fruitful use of the land and that in the process poverty has been alleviated and/or food security improved that the transfer of the***

land can be termed a success. In this report the failure or success of land reform will be evaluated within this context.

Looking without blinkers at one classical case that was recently hailed as a showcase of how a land claim could be settled fast and amicably, and should serve as example for others, clearly showed the following: The main farmer wanting to sell was obviously not a young man and did not want to wait any longer for the claim to be settled. He simply wanted to retire and to move as soon as possible to the house that he had bought at the coast. The two leaders of the group who put in the claim were just interested in moving with their families into the two nice houses that would become available. They did not say anything about being excited about farming on the nice, well-developed farms. In my opinion this should surely not be viewed as a "model" case.

3.12.6 The status of land reform in South Africa

The overall picture that one gets, is that thus far overall the land reform programme has failed miserably. Success stories are few and far between and mostly of more-or-less similar nature. The most serious crippling problems were totally predictable and could and should have been anticipated and avoided. Some serious problems were perhaps a little bit less predictable, but not totally unexpected.
Certainly the most important factor that led to the problems that are now experienced in land reform in South Africa, especially SLAG cases, was the total lack of appreciation of the realities and demands of farming in South Africa by consultants - often very young and inexperienced, usually White, mainly from foreign countries - contracted to advise the Departments of Land Affairs and Agriculture regarding land reform strategies and approaches. Listening to them during the early years (just after 1994) during interviews or where they presented papers at conferences was a hair-raising experience. They obviously had no appreciation of the cost to develop agricultural land, especially under orchard and plantation crops, or the costs of inputs, or the high management demands of commercial agriculture, especially under non-ideal conditions. At the Agritech '97 conference one of them explained what the farmers would use the R15 000 per family grants for, after pooling the grants of a number of families, and that with what was over *"will buy a tractor"*. I whispered to the person next to me that with what remained they would not be able to buy a donkey, forget about a tractor. At that stage I still thought the R15 000 was meant as production capital. It was only much later that I realised that it was meant for paying for the land and that the farmers would have no production capital. Furthermore, these advisors clearly had no understanding of the nature of South Africa's natural resources and were using information based on the inherently fertile croplands of Europe and the American mid-west.

The first big problem is that farms were bought out and handed over to "emerging farmers", but because they did not have any capital with which to purchase any equipment or inputs like seed, fertilizers, etc. they could not farm. The new farmers repeatedly mention lack of production capital as reason for their inability to farm successfully. When it was reported that on a former commercial maize farm in the Northwest Province no crop has ever been planted since it had been bought out and handed over three years ago, i.e. in 2000, I tried to get information on the farm so that could have interviews with the new "farmers". An official of the Northwest

Department of Agriculture informed me that I would have to be more specific, because there are *"quite a few that are still **dormant** after being handed over"* (E-mail communication). Up to this point the balance sheet for these farms would then be:

- *Water use efficiency has been **zero*** for the time that they have been lying "dormant', because nothing is produced with the rain falling on the land. This is a negative movement from the previous productive use of the rain for grain production.
- Since the farms were lying dormant, they have not been generating any income for the households now living on them. Meanwhile the farm workers who used to earn a living working on the farms, have lost their jobs and they no longer earn any income on the farms. So in terms of income for Black people has been negative. ***So, instead of alleviating rural poverty, it is exacerbating rural poverty***.
- The farms used to be maize producing farms in one of the most important regions for the production of of white maize, the staple food of the majority of the South African population. While lying dormant, they are not producing any maize. ***So, also in terms of food security this is a negative development***. At present it is not yet a problem, but in future it could become significant if more farms go the same route, especially in a drought year when yields on the remaining commercial farms are low.

The same official of the Northwest Department of Agriculture mentioned above stated that one of the problems with the group projects was that there were no clear selection criteria for members. From other sources it seemed as if even strangers were sometimes recruited to join a group, in order to enable them to generate a big enough grant to be able to buy a farm. According to Harman (2003) people sometimes wanted the land, but were not capable of farming. The few who want to farm are often demotivated by the *"masses."* He mentions a case near Ventersdorp where six group members got started and ploughed and planted. Before they finished planting the *"young Turks"* called them together and told them that the harvest belonged to the whole group. The result was that the six could not repay their production loan. Cross & Aliber (2003) also mention that *"free riding"*, i.e. group members not doing their share of work, but sharing in the benefits, is a problem that is *"known to be common."* And so is the problem of beneficiaries stealing from their own group farm (Cross & Aliber, 2003).

When a group in 2000 received a farm in the Hendrina district that used to be a maize and livestock farm, they decided that they were not growing to grow any maize *"because the input costs are too high and the risks too big."* The irony is that the Hendrina area is one of the highest potential maize growing areas in the country, with the highest profit possibilities and the lowest risk. The group decided to farm just with cattle, but there is no possibility that they can make a living from this – as will be explained later. Again the negative implications in terms of water use efficiency, food security and rural poverty are clear.

The dryland grain farms are more-or-less the "middle of the road" group. But similar, and often more serious, problems are found towards the extremes – intensive farming with high value enterprises on the one hand and very extensive rangeland on the other hand. A much publicised example of the first group (high value enterprises) is what happened at the farm Rietvallei near Delmas. This farm of about 140 ha was a mixed

dairy, maize and vegetable farm. The farm is situated on a water source, with equiped boreholes and the potential to irrigate 70 ha (Joubert, 2003). The farm had a fully equiped dairy, with Friesland (Holstein) cows, and centre pivots with which 56 ha could be irrigated. All these were taken over by the 55 farmers for whom the farm was bought. They came from diverse backgrounds and work experience, but no one was really a farmer. According to the information obtained by Joubert (2003) it took them four years to go bankrupt. Ironically the farm was sold to a White farmer (Joubert) again after they went bankrupt. Joubert's assessment is that they did not really want to farm or did not have adequate funds to get started, or both. The large number of farmers involved, led to so much internal strife that nothing could get off the ground. No maintainence of equipment was done. The dairy consequently ground to a standstill. The cows could not be milked and were simply let out on the pastures, from where they were sold or slaughtered. The centre pivots were never used for irrigation. The farmers did not make use of the free expertise available from fertilizer and pesticide companies. They also did not seek advice from their neighbours. After they left the farm, they dispersed – apparently back to their previous professions. Joubert believes that ***it is a big pity that this case did not work, because the new farmers had everything in their favour:*** Good soil; water for irrigation; irrigation equipment; a fully equiped dairy; dairy cows; excellent location close to Pretoria-Johannesburg-Vereeniging for marketing of vegetables grown under irrigation and milk. Joubert believes that the big value would have been in the contribution to food production that the development could have made. He believes that (apart from lack of funds) the following probably played the the main roles in the demise of the project:

- ***Too many owners with too many opinions, thus paralysing decision-making and management***. Successful farming requires the right thing to be done at the right time, and often quick decision-making and action. Any delay could sometimes be disastrous. This is one of the major differences between farming and running a factory or shop. (Joubert believes that if they appointed a manager it might have worked.)
- ***The farm was simply too small to provide an acceptable livelihood to so many households***. After subtracting the areas required for 55 homes and the dairy, sheds, roads, etc. there would probably have been barely two hectares of land available per family.

Having just started off, Joubert planted maize during the past (2002/03) season and, despite the fact that he planted very late, harvested an average of 4.65 $t.ha^{-1}$ under the centre pivot and dryland combined, getting a gross income of nearly R500 000.

It is important to carefully note all the factors that led to the downfall of the group at Rietvallei, because they run like a dark thread through all reports and information from cases where large (or even relatively small) groups together acquired land. The Rietvallei group were, in fact, a very decent group who did not commit certain serious actions reported for other cases. For example, they did not vandalise or steal the dairy equipment, centre pivot accessories, etc. to sell it for cheap scrap – as has happened in various cases. The latter is serious, because it means that in such cases millions of rands must be spent simply to restore the infrastructure again, which otherwise could have been used to develop a farm further.

From various interviews and reports it became clear that ***internal conflict and strife*** is a major general problem throughout group projects. Aggravating factors appear to be:

- ***The larger the group***, the bigger the conflict potential.
- ***The more diverse the group***, the bigger the conflict potential. Even in land restitution cases, where groups have been removed as recently as in the 1960s it is no longer a homogeneous group that returns. According to Moloi, Dieltiens & Munnik (1997) *"**many** land reform beneficiary communities face a geographically scattered membership, with differing levels of education, skills and power."*

  Example 1: In the case of Elandskloof near Citrusdal, the first settled land restitution case, the original "flagship" of land restitution, the beneficiaries ranged from uneducated farm workers to people who had migrated to urban areas, some of whom had obtained formal education and professional employment, and serious tensions developed between the two groups (Moloi *et al.*, 1997). Furthermore: *"It seems clear that when communities (especially communities that have been scattered as a result of apartheid) gain an asset, the possibility exists that different interests will emerge in competition with each other. This results in high levels of conflict."*

  Example 2: In a case in Northwest Province a "Transvaal (sic) group" and a "Free State group" could not agree on how to do things, because they did it differently where they came from (Loots, 2003). It is quite possible that both groups were wrong regarding how things should be done in the new area.
- ***Any frustration***, e.g. delays in meeting expectations or realization that the available land cannot provide a reasonable livelihood, ***can raise the level of conflict to "debilitating levels"***, to borrow a phrase from Moloi *et al*. (1997).

The ***small amounts of money made available per household for purchasing land*** under the SLAG programme for land restitution have two consequences:

- A large number of households perforce have to pool their grants in order to put enough money together to purchase a farm. As indicated above, this increases the conflict potential and paralyses farm management.
- The area of land available per family is too small to provide a decent standard of living and to enable generating of funds that would enable a household to expand its farming activities.

The decision to make such small amounts of money available per family reveals a total lack of appreciation of the cost to develop land for intensive agriculture or of the very large areas required to provide a decent livelihood from an extensive grazing system in an arid area (and everything inbetween). Senior officials of the Department of Land Affairs keep on complaining that white commercial farmers are charging far too high prices for land. The question is whether they realise that the following are a few of the development costs of land for some intensive farming enterprises, and note that these do ***not*** include the price of the land itself:

- About four years ago I was told that the cost of developing an apple orchard under high density planting in the Koue Bokkeveld was about R80 000 per hectare.

- According to Bezuidenhout (2003) the cost for developing grape vineyards along the Lower Orange River (Upington) ranges between R160 000 and R210 000 per hectare.
- An "inexpensive" one is the development of macadamia nut orchards in the Levubu area, which costs only R25 000 to R28 000 per hectare (Schoeman, 2003).

By adding the price (value) of the land itself, plus on-farm infrastructure, to these figures one can see that a farmer cannot sell developed farmland under these types of crops for low prices. And it must be kept in mind that when you establish these types of orchards or vineyards they come into full bearing only after a number of years – in the case of older macadamia cultivars only after ***nine*** years, for example (Schoeman, 2003).

One can also imagine the magnitude of the losses if such farms are settled with people who do not have the knowledge or experience to manage such highly sophisticated enterprises and the farms go to waste. To re-establish them would cost many millions of rands – money that could have been employed usefully for other development. Just three *examples* should suffice to paint the picture:

- According to an official of the Northern Cape Department of Agriculture three grape farms along the Lower Orange River were not so long ago handed to six youths (two per farm). But they had nothing, *"not even a wheelbarrow or a spade"* and arrived there with *"just the clothes on their bodies."* They probably also have no experience of how to manage such an enterprise, where quality is of the essence to compete on a highly competitive market. According to the official they have not done anything and weeds have taken over the vineyards. Just imagine the loss if those vineyards should die due to lack of proper irrigation during a normal hot, dry Upington summer.
- According to Tooley (2003) the very productive banana farm on which he grew up in Limpopo Province was bought out under a land restitution claim, and now there is nothing left of it. ***Looking at this, one can understand why an organization like Agri-SA is so worried about the fact that almost the whole banana growing region below eastern escarpment is presently under land claims***.
- The most disconcerting example is probably that of the MamaThola claim in the Levubu area, for which Tooley (2003) provided the following information: The claim involved a total of 14 farms, which were handed over in 2000. They were all *"extremely productive"* sub-tropical fruit farms, producing either mangoes, litchis, avocadoes, bananas or papayas. *The farms used to employ approximately 1 500 people.* When the farms were handed back to the *"clan"*, young persons, mostly men who were living and working in Gauteng set themselves up as a committee. They *"had no experience as farmers and the rest is history, fertilizer or any other inputs were just not applied, the committee paid themselves about R30 000* ***per month*** *and so all the money went to paying the committee and the labour and inputs were ignored."*

  I wanted to interview representatives from the MamaThola community to get an idea of what their expectations were and what they saw as the reasons for the collapse of their farming. Despite all his efforts Tooley could not succeed in setting up a meeting for me, getting the impression that he was banging his head against a wall there.

Seeing what has happened with this claim, it must be very traumatic for other Levubu farmers whose farms are under claim now to visualize that the nice farms which they have built up could possibly within a few years after handing over go the same route as the farms under the MamaThola claim. Furthermore, the fate of the families of the thousands of farm workers who are losing their jobs in the process cannot be ignored.

Tooley (2003) pointed out that the farmers whose farms were bought out *"made a lot of money"*, since the total value of the expropriation was about R40 million. But is that "a lot of money" for 14 extremely productive farms producing high value export crops, seen against the following perspective?:

- An amount of R40 million for 14 farms means an average of R2.9 million per farm.
- When small scale farmers 2-3 years ago had to be expropriated in the basin area of the new Maguga dam in Swaziland, some individuals with small irrigated fruit orchards received compensation of about one million rand.
- The Boyes Company committed R28 million as "starting fund" to get the Zebediela citrus estate up and running again after it collapsed. (This will be discussed in more detail when looking at joint ventures.)
- Perhaps out of line, but mind-boggling: The Boschendal wine estate was recently sold for over R300 million. But this probably included cellars full of valuable wines.

High value intensive agriculture can certainly not be run on "small change" – and have ***very high*** management demands to succeed.

The balance sheet for these intensive agriculture examples (especially the Levubu ones) would be:

- The sharp decline in production (in the one case to zero) means a ***sharp decrease in water use efficiency***.
- ***The rural poverty effect is negative***. Large numbers of farm workers have lost their jobs and due to the low (or no) yields the people on the farms have little or no income, which is aggravated by the "skimming off" of such large amounts by the committee members from Gauteng.

In the case of ***extensive grazing***, especially in arid areas, the cost of land per hectare is low, but the income per hectare is also very low and consequently a large area is needed per household if a decent living is to be made from farming. According to information from an agricultural official of the Northern Cape province the possibility to settle two emerging farmers near Carnarvon was considered. It was found that they would need thousands of hectares each (he had a figure of 4 000 ha each in mind, but was not sure). He also pointed out that Government would have had to donate all livestock that they would require start farming, ***free*** to them, otherwise they would not be able to start. In Namaqualand a number of new farmers pooled their R15 0000 grants to purchase farms. They became totally disillusioned when they discovered that they had no funds to buy livestock with and the farms have now become *"rural squatter camps"*.

The 600 families taking over the 2 000 ha farm near Hendrina, mentioned earlier, decided that because the input costs and risks for maize farming were so high (as they believed), they were going to practise cattle farming. If it is a good farm for the area, the carrying capacity will be about 3.5 ha per large stock unit (Rethman, 2002), which means that each of the 600 families could keep ***one*** head of cattle. They will probably keep a lot more cattle (Rethman, 2002), in the process seriously degrading the farm – as has happened elsewhere in the same province (Van der Merwe, 2003).

Tooley (2003) believes that *"government has learned some really hard lessons when it comes to restitution, MamaThola is a prime example."* Yet, restitution seems to steam on, with continuous news of new claims that have been settled "successfully" and the land handed over to the claimants. The pattern of groups consisting of large numbers of households receiving limited areas of land does not seem to have changed. For example, a land claim settlement involving handing back 20 farms to ***1 000 households*** (probably 6 000 to 7000 people) in northern KwaZulu-Natal was recently finalized and the land handed over. From past experience the conflict potential should be enormous, with such a huge number of households involved. The potential for economic survival will depend on the quality and production potential of the land, the capital available for production funding and the management capabilities of the farmers. The background picture did not look promising, because it looked like degraded rangeland, e.g. based on the huge number of termite mounds – usually a sign of severe rangeland degradation.

Highly productive sub-tropical fruit farms at Burgershall have also just been handed over to the Giba community. Again it involves a large number of households (500), elevating the conflict potential, on a relatively small area of land (1 645 ha, or 3.3 ha per family). Because of the high income nature of the crops, this could perhaps provide an acceptable level of income if production levels and crop quality are maintained at required levels. ***The important point is that the farmers will not be on their own. Two strategic partners have been drawn in*** to avoid the previous types of problems, like those at MamaThola. Looking at the purchase price of just over R29 million, the following is seen:

- At just under R18 000 per hectare it sounds to me like a bargain for the purchaser.
- Under the old R15 000 grant per household system nearly 2 000 households would have had to club together to buy the land.

The above 3.3 ha per family is much, when considering the recent purchasing of a 94 ha farm, but with only 27 ha under deciduous fruit and citrus orchards, by 100 "shareholders" near Villiersdorp (according to a newspaper report). This means ***0.27 ha*** of orchard ***per shareholder***. In addition each shareholder must work 100 days per year ***without pay***, to contribute his/her "sweat capital" under LRAD rules (according to the report).

3.12.7 Positive and negative aspects of LRAD

Cross & Aliber (2003) extensively discuss the positive and negative aspects of LRAD and I will thus not repeat it here. I will just list, not even really discuss, a few of the key points.

Positive aspects of LRAD discussed by Cross & Aliber (2003) include:

- *"The flexibility of LRAD's grant system"* with the result that it *"is being accessed by a wide range of clients who differ in terms of aspirations, resources, and agricultural and entrepreneurial expertise."*
- The grant system makes *"family-farm type projects"* possible. One of the perceived advantages of this type of project is that it reduces the potential for in-fighting and management problems relative to group projects.
- It assists relatively well-off Black entrepreneurs in becoming commercial farmers.

Negative aspects of LRAD discussed by Cross & Aliber (2003) include:

- The fact that it assists in the establishment of family-farm projects and enables individual well-off entrepreneurs to move into commercial farming is at the same time negative. In some cases the beneficiaries are so well-off to start with that it is a question whether they deserve the level of government support that they are able to access under LRAD. In some cases they might have been able to move into farming without any LRAD support. The family-farm and individual projects help to redress the racial imbalance of land ownership, but the cost for government is high relative to the number of beneficiaries. The unemployed and poorest of the poor cannot access much funds.
- Where well-off entrepreneurs are involved, they often do not intend to leave their present occupation to farm full-time and absentee farming arises. These are especially entrepreneurs owning businesses in towns or cities.
- In extreme cases it was found that LRAD projects which from the outside appeared to be individual agricultural projects or family-farm type projects *"are in fact projects where the applicant's objective is related more to gaining the prestige associated with owning land than with economic needs. This is possible where the applicant is so well-off that he can afford to choose not to use the land productively."* Or as someone put it: *"You get people that want to use it to have a house on the escarpment and one in the city."*

3.12.8 "External" managers

In almost all cases the people receiving land under the land reform have no experience or knowledge of how to manage such developed, often sophisticated farms. As indicated earlier, it is also impossible for a large group to handle the day-to-day management of a farm. To overcome this problem managers are sometimes appointed to manage the farm(s) for a group. This can lead to conflict between group members or between the group and management, e.g. because the manager is white (Moloi *et al*., 1997) or because the manager is receiving a salary and the members of the group benefit only in "kind" and not in cash (Harman, 2003). The latter is an interesting case, because in his example the *group members have to* ***buy produce produced on their farm***, but at discount prices, compared with market prices.Their only benefit is that they get farm produce at discount prices, amounting to a benefit of between R1 and R1 500 per annum. The cash generated by the internal produce sales and external sales of surpluses is used to pay the salaries of the manager and labourers and for development of the farm.

The latter is not the only interesting type of arrangement. In the LRAD report of Cross & Aliber (2003) there are examples of different types of "interesting" arrangements, not always related to management, though.

According to Bezuidenhout (2003) three groups received apple farms at about the same time in a certain area in the Western Cape, but only one succeeded, viz. where an experienced manager was appointed.

3.12.9 Mentorships

Another way of mitigating the problem of lack of farming experience amongst the new farmers, is by means of mentorships. This is where a specific experienced commercial farmer acts as "guardian" for a specific new farmer or group of farmers. Grain-SA for example has a mentorship programme, with Cois Harman specifically looking at it. Harman (2003) made some very clear statements regarding the ***requirements for successful mentorships***, including:

- A mentorship succeeds only if it involves only giving advice, guidance and skills training. *The mentor must* ***never do things for*** *his protégé. Doing things for the protégé is the surest road to failure.* ***The mentor must just guide him towards self development and independence*** *(Van Zyl, 2003).* This was repeatedly stated by Harman, emphasising its importance. Guiding new farmers to independent decision-making is a slow and frustrating process (Van Zyl, 2003) and very few succeed (perhaps 1-2%), but it must be honoured to achieve farmer development.
- Related to the above is that the emerging farmer must accept responsibility for his farming.
- A mentor is not appointed by some organisation. He must be acceptable to the emerging farmer(s). He can take the intiative to invite them for advice and guidance.
- Emerging farmers must have the confidence to approach a nearby experienced farmer for advice and guidance. An important aspect is to go and observe how the mentor does a certain thing.

According to De Jager (2003) there are sometimes problems with an emerging farmer after some time no longer seeking advice from a mentor or not really implementing his advice. He reckons that it may be necessary to charge some fee for the services of a mentor. (Many years ago we often discussed it that commercial farmers were not using advice from the Department of Agriculture properly because they received it free and that they might be motivated to use it better if they had to pay for it.) Buso (2003) in his commonage study also concluded: *"Clearly there is a need for a formal arrangement by all stakeholders of the commonage to use the existing* ***expertise*** *of the commercial farmers for the benefit of emerging farmers. It would consequently be in the interest of stakeholders to work out* ***some form of compensation*** *for commercial farmers who assist emerging farmers."*

The concept of mentorship should not be seen as an insult to emerging farmers. The concept is also known in America, where even a *"farm apprenticeship"* programme was suggested for new farmers (Enshayan, Stinner & Stinner, 1992).

3.12.10 Joint ventures/Strategic partnerships

Due to the destructive experiences at projects like MamaThola, DLA has apparently decided that in future settlement of land restitution claims will be made on condition that external experienced agricultural management consultants are involved as strategic partners.

Thus, in the Burgershall claim finalised in November 2003, the land claims commissioner made it a condition for the finalisation of the claim that the Giba community ***must*** for the first few years operate in cooperation with the Boyes Group and South African Farm Management as strategic partners. This is on paper an excellent move by DLA, because it will ensure that the orchards are not destroyed and/or the farm infrastructure not vandalised. Two aspects regarding the way in which DLA handled this are interesting:

- DLA apparently decided on which management consultants to appoint. It appears as if the claimants were apparently not consulted and had no say in regard to their appointment. This would be a totally top-down action and identical to the way that management consultants were appointed for the old homeland agricultural development projects.

  In the new democracy one would expect that after DLA had rightfully determined that management consultants must be made part of the project, they would on a level basis consult with the beneficiaries regarding which consultants to appoint and make a combined decision on it.

- I got the impression, but hopefully I am wrong, that certain groups are the preferred consultants for *several* projects. Again, it resembles the total dominance of one specific consultancy group in the former homelands. These statements are not a reflection on the competency of these groups, but I doubt whether it would be good to put certain groups in a situation where they virtually have a monopoly. An important question is whether the management partnership for the project was solicited by open advertised tender for which all competent and interested management consultancy groups, or even commercial farmers whose farms have recently been bought out, could compete.

Two other aspects regarding the above arrangement should be noted:

- As indicated earlier, the old homeland projects were excessively capital intensive. In a case like Burgershall it is already a well developed farm and very little, if any, additional capital expenditures will be required. In addition, the management consultants will probably have to invest production capital, which should ensure that expenditures are kept within limits. This should prevent excessive capital investment.
- As indicated earlier, the management consultants in the homelands were supposed to do farmer training/development on the projects, but this was never done. One would hope that in the new projects, like Burgershall, this is done and that DLA or the national or provincial department of agriculture have systems in place to monitor whether this is actually done – and done properly.

The very special case of Zebediela needs some further elaboration here: As indicated earlier, the local community was removed in about 1916 and a big private citrus estate, reputedly the largest in the world, was developed there. In the homeland era the South African government bought it out and made it part of the Lebowa homeland to bolster the economy of that homeland. It was managed as an estate of the Lebowa Development Corporation. After the change of regime in 1994 things changed radically for the worst at the estate. Apart from a prolonged drought for a number of years, the development corporation was disbanded and the Limpopo government did not take over its responsibilities in terms of funding, etc. for such projects. Extremely serious were the labour strikes that took place during 1994 to 1999 (intermittently), initially about management and later about wages. The most devastating was when such a strike took place during the harvest season, destroying the estate's whole income for that year. Later there was no money for fertilizers and pesticides anymore. According to Boyes (2003) there was by 2000/2001 no management and no money anymore and the estate collapsed. Trees started suffering and some died. Because the remaining "managers" did not know how to trim down trees to get them growing again, they removed some trees and cut others down too much. In 2002, the Limpopo government entered into a contract with the Boyes group to lease and manage the estate for 15 years. As indicated earlier, the Boyes Group invested R28 million "starting fund" to get the estate going again. For the rest of the period this will be used as a "rolling" yearly production fund. Thus, it is a once-off investment that will not be withdrawn before the end of the period.

An important development happened at Zebediela in early November 2003, when the Bjatlabi community received it back under a land claim. It became a joint venture, between the Boyes group (staying on as strategic management partner), the community and the excisting staff of the estate.

According to Boyes (2003) it has been agreed that the division of dividends (profits?) from the estate will be as follows:

35% to the community – who are organised as a "Community Property Association".
2% to the chiefs of the area.
15% to the staff of the estate.
48% to the Boyes group.

Management will be the responsibility of the Boyes group, but community members will become involved in it progressively. The Boyes group intend to identify promising youngsters from the community and arrange for them to be trained at universities and colleges (Boyes, 2003). The Limpopo Department of Agriculture will be approached for bursaries for such students. The Boyes group will stay involved for the contracted 15 years if necessary, but may withdraw earlier if the community is ready and capable to take over the management. ***It would be very important to monitor the progress of the Zebediela arrangements to ascertain whether it could serve as a blueprint for other cases.***

In his study on municipal commonages, Buso (2003) found a case where "*emerging crop farmers co-operate with a commercial farmer because the commercial farmer has got all the necessary machinery to plough big fields.* ***The agreement is that the commercial farmer gets 85% while the emerging farmers get 15% of the total***

produce." He concluded that although the emerging farmers complain about the small percentage that they get, *"it is better than nothing."* This may sound grossly lopsided, but after subtracting the production costs incurred by the commercial farmer, it may well be close to a 50/50 division of income.

Because of the production capital and management deficiencies of emerging farmers it could at this stage in many cases prossibly be wise to employ a joint venture strategy. It must be assured that this is not perpetuated *ad infinitum,* as the trend seems to be throughout Africa, but that "human capital" building is promoted so as ***to ensure that within reasonable time a lot of land will not only be in the hands of Blacks, but that there will actually be Black commercial farmers managing that land.***

Mini & Randela (2003) *"found that farm workers increasingly enter into commercial agriculture through some form of partnership or joint venture, or group partnerships with private investors or white commercial farmers. They share capital and technical expertise and get access to the market. Preliminary findings indicate that joint ventures contribute towards a broader vision of agrarian reform in South Africa."* My impression is that joint ventures between the workers of a specific farm and the commercial farmer who used to be the sole owner of that farm tend to be successful, particularly in the wine industry in the Western Cape, but a top farmer in the area sounded very sceptical when I made this point. I believe some of the important reasons for success could be:

- Both components of the partnership know the farm and the appropriate farming operations and practices well.
- Both components of the partnership have developed an attachment to and love for the farm through all the work and effort they have put into it and would hate to see it being degraded.
- The management expertise, with not only knowledge of the enterprise, but with intimate knowledge of the specific farm, is retained.
- My childhood experience on a fruit farm in the Western Cape was that the farmer and his family would work shoulder-to-shoulder with the farm workers and their families and it became almost like one big family looking after each other.
- If the farmer ploughs back the money which he receives from DLA for the share of the farm workers (or part of it) into further development that may be needed to improve the infrastructure or competitive basis of the farm, it could be highly beneficial to both components of the joint venture

3.12.11 Some comments by Raath of Agri-SA

Near the end of August 2003 I had a personal interview with Raath, Opperman and Van der Merwe of Agri-Sa and subsequently received an e-mail from Raath (2003) with the following important points below. (The italics are translations by me from Raath's Afrikaans e-mail. The normal letters are comments by me.):

1. *At top policy level (Pres. Mbeki, Min. Didiza, etc.) there is ample understanding of what is required to make a success of South Africa's agriculture and land reform. There are also good policies and programmes (like the Sector Plan, restitution and LRAD) in place.*

2. *There is, however, a gap in the outline of the vision on adequate land reform. The 30% target is very vague* (this has since been cleared up) *and as far as I know there is no business plan with budgets. Budget funds are thus inadequate and the divided control with provincial governments make the system very slow."* The latter is a general complaint. See also Cross & Aliber (2003).

3. *The ability of the management of the Departments of Agriculture and Land Affairs, as well as the ARC and Land Bank to develop and implement these policies and programmes coordinated and harmoniously, in cooperation with the private sector (especially organised agriculture), falls far short.* Cross & Aliber (2003) discuss the break-up of the agreement between DLA and the Land Bank in regard to LRAD and the reasons for it. *The discipline required to manage diaries and priorities and operate a true partnership approach with open communication lines does not exist.*

4. *The trend to allow transformation (and affirmative action at staff level) dominate everything and in addition appoint only persons from the present inner circle in management positions is very contra-productive for delivery.*

5. ***The biggest challenge is probably to*** *spontaneously and calculated* (sounds to me like a contradiction***!) identify the right individuals with entrepreneurial potential and then to empower and support them***. He refers to persons who have the potential to become successful commercial farmers.

3.12.12 The Russian route

The following is put together from discussions with Dr. Alexander Makeev, Director of Russia's Foundation for Agrarian Development Research, during a WRB meeting in Moscow in 1996 and brief extracts from a fairly long recent e-mail message from him (Makeev, 2003): After the fall of communism in Russia, the country entered into a major agricultural reform programme in 1992. The idea was to re-organise the former collective farms (state cooperatives) into small-scale private farms. Each former cooperative member got a share (on paper) and could claim to get a piece of land. In 1996, the main point made was that they got the land, but they did not have the capital to buy inputs or management skills to manage the farms (under the old system they just had to follow orders) and thus could not get started. (One of the similarities with much of the South African land reform situation.) In the end most of the new farmers were former leaders (directors, chief executives, etc.) of the cooperatives, *"who had good management skills (and) took the best land and cheap machinery."* **They ran into problems, however, because of *"a new tax policy, lack of market infrastructure, disparity of prices (and) lack of (an) efficient tariff policy (to) protect domestic products, etc."*** In the end *"(i)t was becoming clear that private farmers cannot contribute considerably to the Russian food economy."*

When I asked Makeev how they solved the problems, his unexpected reply was (Makeev, 2003): *"The land is going to be purchased by rich companies (not farmers), that will either exploit rural residents or hire strangers."* He explained that big companies which benefited from the privatisation of state property early in Perestroika started looking for new investment opportunities and agriculture became

an attractive option after Russian food producers got more protection in the domestic market since 1998. *"They were able to invest considerable funds. Like InterRoss (Potanin's pool) invested 300mln dollars. All oil companies started to invest money into land. They started to lobby new legal acts on agricultural land turnover. Current Russian land code was adopted two years ago. This year (January 10) the latest act allowed to sell agricultural land on the condition that the owner continues effective use of it."* Foreign companies may also invest in agriculture, but may not hold more than 50% of the shares in a venture, but *"that of course can be overcome by different ways."*

Makeev (2003) sees the outcome as quite grim: Nobody knows what will happen with the shares that entitled cooperative members to a piece of land, but could not utilise due to lack of operational capital and management skills, but *"they will probably be somehow forced to sell or lend it to private companies."* Furthermore: *"The new owners (appoint) their own managers and hire most prospective workers.* ***Of course, they do not care what will happen with the social and economic situation in rural areas as a whole.*** *The state does not pay enough attention to these items. I put exploit* (in the first e-mail), *because you can always get cheap workers from distant places, where the situation is even worse than in a given place, e.g. hot spots in Caucasus, Middle Asia, Moldavia, China, etc. So, instead of restoring the farming system, destroyed by the revolution in 1917,* ***we risk to put the land out of our own rural residents forever****."*

This type of situation will hopefully not develop in South Africa, but if the land handed over to small-scale farmers under the land reform system is not used productively ***soon***, government may in future be tempted, or even economically forced, into the "Russian" route. In South Africa any such dominance by rich companies, especially foreign-based ones, may also put the present good commercial farmers of the country out of production.

3.13 RESEARCH, EXTENSION AND TRAINING

Appropriate and relevant research, extension and training are key requirements for optimising the efficiency with which basic natural agricultural resources are used, effective alleviation of rural poverty, enhancing food security, ensuring sustainable resource utilization and remaining competitive in international markets. ***Note that the emphasis is on appropriate and relevant.***

South Africa's natural agricultural resources, especially soils and climate, differ so widely from those in Europe and North America that technologies and approaches developed there cannot be simply applied here. In some cases technologies developed there, can be used after the necessary changes to adapt them to local conditions. In some cases they are totally inapplicable and appropriate technologies must be developed locally. Even within South Africa the differences between regions are so large that technology transfer cannot be done blindly before local adaptations are made. In technology transfer not only natural resource factors must be considered, but also economic, socio-economic and cultural differences.

Basically this means that South Africa needs a strong agricultural research setup that can conduct the required research. It also means that training must be done locally by

experts with a strong local background and knowledge, preferably South Africans who have an intimate knowledge of the country. We must, of course, interact with international scientists and visit overseas institutions. Two of the most important reasons for the latter are:

- To gain first hand knowledge of their situations and the differences between them and South Africa, so as to not blindly follow new developments that may be totally inappropriate for our situation.
- To explain the South African situation regarding natural resources, socio-economic situations, etc. very clearly to them ***and to make them understand very clearly that they cannot make meaningful contributions to our situation if they refuse to acknowledge these differences.*** The overseas scientists should be made to understand clearly that we local scientists understand our resources and situations ***much better*** than they do. Unfortunately many scientists from developed countries are very arrogant and believe they know everything and try to "overpower" the scientists from developing countries by creating the impression that the latter do not understand things properly.

Regarding the latter, Danckwerts (1977) went so far as to state, with reference to agricultural development in less developed areas: *"The challenge to Western specialists who wish to assist in the cause of development is that, regardless of their competence in their own environment, they must accept that they are incompetent and ineffectual in the quite different underdevelopment in which they hope to contribute. They must take the trouble to study and become thoroughly conversant with this situation if they are to be effective. If they are not prepared to acquire the necessary understanding, it would be better if they stayed at home in their own familiar environment where they will not create unnecessary confusion and hamper the cause of development."*

3.13.1 Agricultural research in South Africa

Despite perennial problems with lack of funding and loss of researchers to the (non-research) private sector, South Africa had a history of high quality agricultural research that was internationally recognised. The latter was mainly due to the nature of the university training and education in agriculture, which will be explained later.

For many decades this research concentrated practically exclusively on the commercial farming sector. When the "homelands" started gaining "self governing" status it became clear that agricultural development of the traditional rural areas would be very important and that this needed a different type of research. Several institutions became involved in the latter research, but the main impetus undoubtedly came from the very dynamic Faculty of Agriculture at the University of Fort Hare. This was greatly boosted by the establishment of the by now well-known Agricultural and Rural Development Research Institute (ARDRI) at the University. ARDRI and the Faculty conducted research not only in the Ciskei and Transkei, but throughout all the homelands and in several commercial farming areas in various parts of South Africa. The research was supported by liberal funding from various sources, e.g. the Water Research Commission, the Anglo American Chairman's Fund, the Department of Cooperation and Development, etc.

Up to about 1974 the organization of "public" agricultural research in the country (specifically "White" South Africa) was simple and well-organised. There was only a national department of agriculture (although its actual name changed periodically) and no provincial departments. The country was divided into a number of "regions", which were demarcated according to agro-ecological boundaries and not according to provincial boundaries. Thus the "Highveld Region" included the maize producing areas of the southern Transvaal and the northern Free State and the "Free State Region" included the drier southern Free State and the Cape Province north of the Orange River, including the major irrigation schemes of the central parts of the country. Each region had its own research institute(s) and extension service. Where there was a faculty of agriculture at a university, this faculty was part of the region in which it was situated and the staff of the faculties were employed by the Department of Agriculture and fell under the administration of the director of the region. There were also a number of independent specialized institutes which did not fall under the regions.

The first breaking up in these arrangements came in about 1974 when the faculties of agriculture were removed from the Department of Agriculture and transferred to the universities of which they formed part. One of the main negative consequences of this separation was that there was no longer straightforward simple sharing of experimental farms and other research facilities. The separation was brought about by a few silly administrative rules and some stupid decisions taken in enforcing these, that made it uncomfortable for university staff to operate under the administration of the Department of Agriculture. I believe the administrative problems could have been sorted out without removing the faculties of agriculture from the Department of Agriculture and that it would have been better if they remained in the Department. The way that the "New York State College of Agriculture and Life Sciences" (i.e. Faculty of Agriculture) at Cornell University (a ***private*** university) operates as part of the New York State Department of Agriculture, including the use of state vehicles, close cooperation with field officers, etc. further convinced me that South Africa could have taken a better route.

The second big split came when the Agricultural Research Council (ARC) was created. The specialized agricultural research institutes now no longer fall directly under the Department of Agriculture, but under a parastatal organisation (ARC), with the Department of Agriculture as its "mother" department, providing most of its funding. The general regional research institutes continued operating under their regions within the Department of Agriculture. My personal "feeling" is that the ARC was probably established mainly because the researchers believed that it would lead to better salaries and working conditions. Furthermore, they would be eligible for obtaining additional research funding from outside the Department of Agriculture. The situation of the ARC institutes has progressively deteriorated, however, especially during the last few years. Two of the various factors responsible for this situation include:

a. The Department of Agriculture has steadily reduced its relative financial support (as percentage of the required budget) to the ARC institutes. The institutes are burdened with increasing negative budgets each year. They have to find outside funding to make up these deficits.

This has several negative effects, including *inter alia*:

- Senior staff at the institutes have to spend most (sometimes almost all) of their time negotiating for outside funding, instead of having time to do the work that they should actually be doing. The vast majority of real scientists/researchers do not have any aptitude (or skills) for this. It is very frustrating to them and lowers their morale.
- A side-effect of the senior scientists being so tied up with soliciting funding is that there is totally inadequate scientific leadership for young scientists, a very frustrating situation for the latter. I have first hand knowledge of this from several complaints by former students about it. They understand the dilemma of their seniors and don't blame them for the situation.
- An ***extremely serious new development within the ARC*** is that senior staff have to apply for their own present posts *de novo* and that the new appointments (if they are appointed again) will be for two year contract periods only. Such situation does not offer any job security and no competent person who has a family and who is right in his mind can be expected to apply for such a post. This would mean that ***a wealth of experience of agricultural research in the specific South African conditions could be lost*** – to the detriment of the country. The possibilities are high that they will be replaced by inexperienced and/or incompetent persons. There are also ***real dangers*** that foreigners with little or no grasp of the South African situation, similar to the ***"uhuru hoppers"***, so-called "experts" who "hopped" from one African country to the other as they became independent, leaving destruction behind them as far as they go, may be appointed. Agricultural research, especially agricultural development research, is a long-term process if anything meaningful is to be achieved. It also takes newcomers long to grasp its essence (Laker, 1981). Two-year appointments are meaningless against this background. ***The insecurity of tenure at senior level will also make a career in the ARC an unattractive option for young scientists and good candidates, who can easily find jobs elsewhere, will not consider the ARC as an option or will not study agriculture at all.***
- A very serious negative effect is that in order to obtain adequate funding to balance their books, institutes perforce have to engage in consultancies (e.g. resource survey consultancies) and short-term superficial research for private enterprises. Meanwhile there is only limited time left for proper in-depth research.
- In order to try to balance their books, an institute like the Institute for Soil, Climate and Water has started selling data, e.g. soil maps and reports, that were collected with taxpayer money to state-related institutions like universities and provincial departments of agriculture. This has led to controversy and even antagonism in some cases. The latter will be addressed again later.
- An extremely serious negative consequence of the reduced state funding to the institutes is that they started competing with each other for the same sources of outside funding. Even more serious is that they started competing with universities for the same sources of funding. This has lately led to a situation that the former good relationships

between researchers at ARC institutes and lecturers/researchers are breaking down and that they are increasingly viewing each other as competitors and not as cooperators in research.

b. Perceived management problems at top (head office) level. Effects of these include:
    - Some agricultural enterprises which used to provide substantial research funding to institutes, even in the old days when they were part of the Department of Agriculture, have apparently started to withdraw their research funding.
    - Unsympathetic handling of staff, which is lowering their morale. Directors of institutes struggle to get appointments through and approved. Youngsters are frustrated by the way their appointments are handled. Salaries have declined relative to other sectors, even compared with people in the Department of Agriculture. Youngsters do not get time off to complete M or D degrees, they simply have to battle it out inbetween heavy commitments to various projects. Their study fees are also no longer paid by the ARC. One of the biggest tragedies is *the **utter frustration** of bright and dedicated young **Black** scientists*, highly respected by their senior colleagues for their capabilities and attitudes, caused (according to these youngsters) by top management. Unfortunately this has led to people with the potential to become programme leaders to resign and seek employment elsewhere. I know first hand what I am talking about because I had to listen to the frustrations of such (Black) ex-students more than once.

(Note: These are perceptions gained from interactions with ARC staff. It is always possible that a perception may be flawed.)

A third major change, with serious implications, occurred at the change of regime in 1994. Instead of just having a national Department of Agriculture, separate provincial departments of agriculture were created, which no longer resorted under the national Department of Agriculture. The agro-ecologically based regions, which cut across provincial boundaries, were scrapped. The divisions of responsibility and lines of communication between the national department and the provincial departments do not seem to be clear. A case in point is the question of resource conservation and the LandCare programmes. The impression is that research is mainly the domain of the national Department of Agriculture, with the ARC as one of its main “arms”, whereas extension and agricultural development fall under the provincial departments. The question is how good the two-way communication between the provincial departments and the national department (including the ARC) is regarding the research needs of the provinces and the feedback of research data to the provinces – more particularly to the extension officers and farmers.

Some provinces after 1994 inherited the research institutes of the former agricultural regions (at their former head offices). In some of these quite positive research programmes continued, especially research aimed at small-farmer development. In other cases it seems that very little was done since 1994, mainly due to lack of research funding. In some cases new initiatives seem to be starting up. In some cases ARC researchers stationed at the provincial institutes have continued active research, mainly with funding from the WRC and the National Department of Agriculture.

Unfortunately there seems to have been very little interaction and poor communication between these ARC researchers and the provinces in which they were stationed, at least in some cases, not due to the fault of the ARC researchers. A few provinces inherited only outlying experiment stations of the former regions and no real research institutes/headquarters. On the other hand the Eastern Cape Province inherited two regional research institutes/headquarters, viz. Dohne and Grootfontein. It is a pity that Grootfontein falls just narrowly outside the boundary of the Northern Cape Province, since it has historically been the research centre for extensive grazing systems in the arid areas, which fall mainly in the Northern Cape.

Agricultural research at ***universities*** has suffered from various changes that took place since the mid-1970s. Transferring of the faculties of agriculture from the Department of Agriculture deprived them of their main source of research funding up to that stage. Initially the Department was not even willing to make research funding available for officers that were seconded to the universities for master's degrees. As far as I know even now faculties of agriculture at universities receive very little, if any, research funding from the national and provincial departments of agriculture. Fortunately, establishment of the Water Research Commission in the late 1970s made liberal research funding available to universities and in a certain sense relieved the situation. Although the WRC stretched the research topics that they funded as wide as they could without stepping outside their mandate, research in some university departments became quite unbalanced. I was once asked whether certain research would not be much more important than that which I was doing. I agreed that I also considered it to be more important and would have loved to do it, but that one can only do the research for which you can get funding.

I believe that the establishment of the Foundation for Research Development (FRD), now the National Research Foundation (NRF), and especially their approaches towards research and researcher evaluation, was a blow to agricultural research in South Africa, particularly at universities and tended to steer it in a wrong direction. Dissemination of agricultural research data was particularly also steered in a wrong direction. Agricultural development research especially was viewed negatively. In one of their first newsletters the FRD stated that there were a number of researchers that did a lot of development research that were disappointed that they were not rated suitable for funding, but that the FRD wanted to make it clear that this research did not count. At one stage one of South Africa's top soil scientists, who made major contributions to agriculture in this country via his field of research, was rated as unfundable by the FRD at a stage when he was internationally recognised and crowned as South Africa's agricultural researcher of the year. Needless to say that he, as far as I know, never again even applied for FRD evaluation.

After originally being rated unfundable, I was eventually rated barely fundable (close to the bottom of the scale) by the FRD/NRF. One of the last feedbacks from them stated: "Professor Laker has undoubtedly done valuable work for the country, but he must realise that to get a higher rating he must specialise." I am not saying the statement about my contribution to the country is necessarily correct, but I believe that if it was correct this should have weighed heaviest, or amongst the heaviest, during the evaluation. ***Most importantly the situation should be changed such that young agricultural researchers/lecturers will work within a milieu in which their contributions to research that benefit the country will be one of the most important***

factors considered in their evaluation as scientists. Only then can they be motivated to do what is really required, and to do it well, instead of perforce resorting to gimmick research that will give them high ratings (if the above approach is not adopted). ***South Africa cannot afford that the following situation that I described many years ago (Laker, 1988), and prevails perhaps even stronger at the moment, continue any longer.*** It is freely translated from my Afrikaans paper. *"Agriculture"* can be substituted for *"development"*. The first paragraph is based upon a paper of Casey & Barker (1982):

> *"An important demand on the researcher who wishes to make a real contribution to development, is that he/she must be an unselfish idealist who is prepared to make great sacrifices in regard to his/her career as scientist. This is because he/she operates in a scientific environment in which the structure strongly favours narrow highly specialised researchers.*
>
> *The latter has never anywhere been more true than at the present moment in South Africa. Academics at universities are especially in a crush ("drukgang") which forces them to do short term specialised research that will give them the largest number of publications in basic international journals in the shortest possible time. If he/she does not do it, it handicaps his/her chances of recognition and promotion and to acquire research funding."*

Unfortunately the ARC apparently follows the NRF model for the evaluation of researchers that wish to become "specialist scientists". From discussions with dedicated idealist young ARC researchers it became clear that they are sitting with a big dilemma: On the one hand they want to do the research that is really needed, and which they are doing, but on the other hand they need to work towards promotion, in order to be able to provide a good livelihood for their families and at the moment these two are in conflict.

In their brilliant publication, which should be studied by everyone involved in agricultural development research, Casey & Barker (1982) very clearly stated that:

> ***"Until the research community can demonstrate its ability to change and be flexible, it will not be in a position to be of any use."***

Just before the international congress of the international Association for Farming Systems Research-Extension (AFSR-E) in Pretoria in November 1998, the ARC arranged an international workshop for Farming Systems researchers from several Southern and East African countries. I was asked to present the two introductory key discussion papers for the workshop. This was probably because I tried to promote FSR-E in South Africa since 1978 and was chairman of the steering committee that facilitated the establishment of the Southern African Association for Farming Systems Research-Extension. As requested, one of the papers addressed *"Institutionalisation of Farming Systems Research-Extension in South Africa"*. My argument was that the present fragmentation of agricultural research and extension was seriously hampering agricultural research and extension in the country. I pleaded for a total revamping of the agricultural research and extension structure in the country, so as to achieve much better coordination. In a different sense, I already in Laker (1988) pleaded for better coordination of agricultural development research in the country and made certain proposals.

Finally, I wish to state categorically that ***it is absolutely essential that South Africa must have a vibrant and dynamic agricultural research setup of the highest quality.*** Specific aspects required to ensure that the research will bring about optimum efficiency of natural resource use, effective alleviation of rural proverty, food security and competitiveness in the export markets, include *inter alia* the following:

- The research institutions should be manned by ***South African*** bred and trained ***agricultural*** scientists, irrespective of race, colour, creed, sex, etc., etc. ***Foreign scientists*** (irrespective of how smart they may look on paper) should be appointed ***only*** if there is absolutely no suitable South African candidate available. ***South Africans*** (or foreigners) ***with non-agricultural degrees*** (e.g. in environmental sciences or pure sciences) should be appointed ***only*** if ***no*** suitable South African (or foreigner) with an appropriate degree in ***agriculture*** is available.
- The fragmentation of agricultural research and extension must urgently be addressed and a solid coordinated agricultural research and extension structure must be created.
- The problems hampering the efficiency of the ARC as "flagship" agricultural research body must be addressed and solved ***very urgently***.
- Research aimed at addressing the peculiar research needs of small-scale developing farmers must be pursued very actively in a coordinated way. However, *this must **not** be done at the expense of research required by commercial farmers*. It must be kept in mind that there are also growing numbers of Black commercial farmers and that the research needs of emerging farmers also more closely resemble those of commercial farmers than those of subsistence farmers.

3.13.2 Extension

Research is meaningless and a waste of funds, manpower and time if its findings cannot be effectively transferred to farmers and are not adopted by them. Farmers cannot adopt research findings that are not realistic, appropriate and relevant to their specific situations, however. Classically the role of an extension service is (or should be) to provide the two-way link between farmers and researchers. Often extension officers believe it is their role to provide technical advice to farmers, however. Since they are not experts in the various fields, this usually leads to general recipes being given to farmers, which are often far from what is actually required in a specific case and inefficient.

It is not appropriate to give a comprehensive outline of past extension and advisory services (public and private) in South Africa here, but in trying to look at optimising of the efficiency of natural resource use and at effective alleviation of rural poverty, a few aspects need to be looked at, especially regarding public sector involvement. Up to 1994 government extension service setups were relatively simple and straightforward:

> The South African Department of Agriculture (under its different names over the years) provided the extension service to the (white) commercial farmers. The service was organised within the different agro-ecological regions. The extension officers worked not only with individual farmers, but also through farmer study groups and district farmers' associations. They had BSc(Agric) degrees, usually broad, general degrees in a combination of Crop Science and Livestock Science,

and post-graduate qualifications in Agricultural Extension. They could draw on direct specialist backup from the researchers in their regions – which until about 1974 also included the academic staff in the faculties of agriculture.

For the small-scale Black farmers each homeland had its own extension service. The extension personnel in the field were persons with diplomas from the various agricultural colleges in the homelands. Because these officers dealt with farmers with low literacy levels, it was in theory better to have people with diplomas rather than graduates as officers at ground level in the field. Small-scale farmers that wanted advice on how to improve their enterprises complained that these officers had too little specific knowledge, e.g. about vegetable production, to be able to advise them. These officers also did not have the backup of subject matter specialists upon whom they could call for specialist advice when required. These extension services had various serious problems, as was reported in numerous surveys and investigations into them.

As far as I could ascertain, after 1994 extension became the responsibility of the different provincial departments of agriculture. The different homeland and RSA extension services that existed within a province were amalgamated. With it the separate services to commercial and small-scale farmers also disappeared. Although I tried very hard to obtain information, it was impossible to gain an indication of how the extension services operate at present and how efficient they are. A major problem is that agriculture in South Africa is in such a state of flux at the moment, with so many quite abnormal situations, that various approaches to agricultural extension are required at the same time and that "normal" approaches are hardly applicable. In many cases some kind of farmer training approach is probably required rather than an extension/technology transfer approach, especially where dealing with land reform. Even in traditional rural areas practices introduced during the homeland era, such as state run tractor services, production "packages", etc., have eroded or undermined indigenous practices and knowledge to such an extent that classical farming systems research-extension approaches are hardly appropriate in many cases. Steyn (2003), for example has noticed this in the former Transkei.

One of the main weak points regarding agricultural extension in South Africa lies in the lack of proper collation, analysis ***and integration*** of research data and the synthesis of ***useful*** information from these analyses. Several pleas have been made for these, amongst others at WRC sponsored workshops, but mostly to no avail. The overall reason is that there is no incentive for researchers and academics to become involved in this. In fact, there are several disincentives which make it unattractive for them to devote time to this.

Some aspects that need serious and urgent attention include:

- Researchers in agricultural fields ***MUST*** be encouraged to publish their findings, ***especially their best and most useful findings***, in ***South African*** scientific journals, such as the South African Journal for Plant and Soil, Water SA, etc. Note that I deliberately use that word ***"must"*** and ***not*** the weaker term *"should"*. In fact, I firmly believe that agricultural researchers who do not publish their best and most useful results in local journals, should be penalised by withholding future research funding from them.

The reasoning behind the above viewpoint is very simple and straightforward: South Africa (and its neighbours) has unique situations and problems in regard to natural agricultural resources and aspects like socio-economic and cultural conditions that require special research if optimal use of primary resources, alleviation of rural poverty, food security, etc. is to be achieved. ***This research must be of the highest quality and scientific integrity.*** In order to derive optimum benefits from South Africa's limited research funding, ***the findings of this research must be available freely and as quickly as possible*** to other researchers, subject matter specialists, extension officers and farmers ***in the country.*** In order to be freely and quickly accessible it is essential that it must be presented at ***local*** congresses and published in ***local*** scientific journals. ***All*** members of the Soil Science Society of South Africa, the South African Society for Crop Production and the South African Weed Science Society, for example, automatically receive copies of the South African Journal for Plant and Soil the moment that it is published.

For many decades publication of South African research data in foreign journals was not such a big problem, because all agricultural libraries at local research institutes and universities subscribed to most of the prominent journals. Thus the data were freely available everywhere. With the weakening of the rand and the sharp rise in the cost of overseas publications, this has changed dramatically, however. Availability of publications in electronic format and computerised literature searches are supposed to have overcome these problems, but in practice the fact is that availability of information in this format is far from complete and searches are not so straightforward.

A major stumbling block is again the attitude started by the FRD and taken over by the NRF and now also by the ARC, viz. that with a view to promotion and recognition, South African scientists (including agricultural scientists) ***must*** publish their research findings in prominent overseas journals. As I was writing this, I received a phone call from an ARC researcher for advice regarding rounding off of a paper for an American journal, because "as you know for our own future we have to publish there". At the same time local journals are branded as "inferior" by the FRD/NRF, taking the attitude that one cannot get much credit for papers published in them. This is to the detriment of the country. I believe that it would, in fact, be better for South Africa if an attitude is rather adopted that ***we should boost our own scientific publications*** and make them the best in the world, ***because that would*** (a) boost our research quality further and (b) as indicated earlier, ***vastly increase the practical impact of our research in the country***. Also in this regard we should become ***"proudly South African"***! If deemed necessary, local journals can be encouraged to involve more overseas referees, just as the overseas journals make use of South African reviewers for papers submitted to them.

I discussed the above under extension and not under research, because in the end it affects how accessible data is and how efficiently it is used in practice.

- A possibly even bigger problem is that there is, from the side of the State, basically ***no incentive*** in South Africa for researchers, academics, etc. ***to publish*** their ***findings in digested semi-popular format*** in which it could be

understood and used by extension officers and farmers, i.e ***to facilitate efficient technology implementation and transfer***. They get no credit for this, nor government subsidies or research support in recognition of such outputs, and would do their careers only harm by "wasting" their time on this.

Useful journals for such technology transfer, included ones like *Glen Agric, Dohne Agric, Die Landbouer* (for Vaalharts irrigation scheme), *Ciskei Journal for Rural Development* (which carried excellent papers on agricultural research findings, especially from academics in the Faculty of Agriculture at the University of Fort Hare), etc., etc. I do not know which of these types of journals are still being published at present. When publication of *Farming in South Africa* was terminated more than 30 years ago, I considered it to be a real tragedy, because it contained extremely useful articles. These journals provide(d) vehicles for the following:

i. Research data that are also published in high level scientific journals are published in a format that is comprehensible for "practitioners", such as extension officers, well-educated farmers, etc.
ii. ***Useful*** research data or information from qualitative studies that are such that they are not geared or fit for publication in high level "scientific" journals.
iii. Brief down-to-earth reviews of information on important topics.

A special ***positive*** situation exists in the Western (and Northern) Cape deciduous fruit, dried fruit and wine industries. For many decades researchers, especially from Infruitec, have been, and still are, publishing useful research results as soon as they became available in the *Deciduous Fruit Grower*. These are not superficial "news" reports, but actual papers on research data. The importance is that the papers are published in such a style, e.g. with photographs illustrating treatment responses complementing presentation of factual findings, that can easily be understood by practitioners reading them. It is also attractive and pleasant to read. An important feature is that each paper is published parallel in both Afrikaans and English. The importance of language, including using the correct "dialect", "jargon" or "slang" will be highlighted a little bit further. It has always been beneficial for the researchers to publish in this journal, because it enhanced their chances to obtain research funding from the Deciduous Fruit Board. It is a straightforward synergy: Because the deciduous fruit industry benefit from the research data made available in useful form, it is worthwhile supporting such research. In the 1960s Dr. Piet Marais, then Head of the Radio-isotope Section at what was then called the Research Insitute for Fruit and Fruit Technology, would periodically instruct his researchers to publish new results in the *Deciduous Fruit Grower* because he wanted to apply for further (or new) research funding.

A similar synergy exists in the wine industry, where researchers from Nietvoorbij (and the University of Stellenbosch) publish results not only in scientific journals like the *South African Journal for Enology and Viticulture* and the *South African Journal for Plant and Soil*, but also in the semi-popular *Wynboer/Wineland.* In turn Winetech provides research funding. There are probably also other such examples, e.g. in the sugar industry.

Internationally ***journals catering for publication of important "qualitative" data*** and information are not uncommon. These are very important for developing agriculture situations. An example is the international journal *The Land*. My students and I have

published some papers in it, including the benchmark research of Lunga Maswana on community-based soil conservation, done at Madliki in the Eastern Cape, ***which could serve as model for successful community-based soil conservation elsewhere in the country***. Unfortunately, I doubt whether more than two or three South Africans have read this paper, due to lack of access to it. The facts are that (a) there was no South African journal in which it could be published and (b) that universities receive no State subsidies for papers published in *The Land*. Within the context of the topic of this report, the extremely useful type of information conveyed in an "in-country" ***semi-popular*** journal like the ***Journal of Soil & Water Conservation***, published in the USA, sets an example that should be copied.

Also important in ***South Africa*** has always been the publication of ***semi-popular "bulletins"*** on specific important topics. Furthermore, ***straightforward practical bulletins and pamphlets*** with farm planning or management guidelines were published. The majority of these were prepared and published by the Department of Agriculture. Other bodies, e.g. cooperatives, the Fertilizer Society of South Africa, etc., also published such materials, however. ***The need for such publications has become even more important at present than it was in the past.*** They are ***urgently*** needed by extension officers, advisors and "facilitators", as well as by commercial farmers, especially new entrants into commercial farming, and emerging farmers. ***It definitely must be the responsibility of the National Department of Agriculture (DoA) to provide the funding for the preparation and publication of required bulletins and pamphlets. It is inconceivable that they could try to back out of this responsibility.*** *The DoA* ***must*** *draw heavily on scientists of the ARC* in the preparation of such bulletins and pamphlets, but should also involve other knowledgeable scientists with a talent for writing clearly and simply and/or with specific expert knowledge on a specific topic or of a specific geographic area. Publication of such bulletins and pamphlets is not a once-off occasion. It should continue as new information becomes available and new needs arise.

One of the striking aspects when I visited some of the top agricultural faculties and other world renowned research institutes in the ***USA*** and had discussions with some of the world's top soil scientists, was the ***very simple straightforward bulletins and pamphlets*** that had been written by them or some of their colleagues that they made available to me. This is one of their big strengths. Even scientists that publish exceptionally highflight papers that one can hardly understand in international scientific journals also have their feet right on the ground and publish simple, clear practical papers and pamphlets. The most effective of these are often just a few pages, even as little as four. It is interesting that some of their local bulletins that they quote as references in high level international publications are, in fact, quite simple semi-popular publications.

Language is an extremely important factor determining the efficiency of information/ technology transfer. This is true for both the written and spoken word. ***It is a factor that has probably not received enough attention in South Africa.*** It is not good enough to say that the English (or Afrikaans) of certain people is good enough to read and understand it and consequently it is adequate to write a pamphlet or present a talk at a farmers' day in English. It is unlikely that a farmer (or anyone else) who understands some English, but is not fluent in it, will take the trouble to read something that is published in English. Then I am not even talking about those people

who have very limited English vocabularies. Experience at overseas international congresses and at the University of Fort Hare has shown that people who are not absolutely fluent in English, even ones with good knowledge of the language, find "textbook" Oxford English the most difficult to understand. The pure Oxford English speaker uses "fancy" words and terms that the readers/listeners often do not know the meaning of and it is also difficult to follow what the speakers are saying. People who write a simple, clear English and also use simple terms when speaking, and speak slowly are much better understood – even if their command of English is quite poor.

Equally important is to adapt to the dialect, jargon or slang of different groups. During presentation of his paper, but not included in the written paper, Thomasson (1981) remarked that extension pamphlets for small-scale farmers in Texas had good success among White farmers, but failed among Black farmers. Studies showed that this was simply because the Black farmers of the area have a different "slang" from the White farmers. When the pamphlets were "translated" into the "slang" of the Black farmers, using the appropriate terms, they were as effective as they were among the White farmers. Thomasson (1981) quotes studies that have found that the small-scale farmers of Jamaica have their own specific terminologies in regard to various aspects of soil erosion and soil conservation. To have success, anyone going to work in Jamaica must learn these terms very quickly. Also in South Africa there are various variations of English between different population groups and between different regions, which should be taken into account. At a LandCare meeting in Johannesburg someone asked a delegate why he spoke such strange English. His reply was: "I am a Tswana, I speak Tswenglish, just like you speak Afrenglish." To some extent it could help to use the new Oxford dictionary of South African English rather than the classical British version.

Of course, ***by far the best will be to communicate with farmers (or groups of farmers) in their own home language as far as possible***. I have stressed this already some 20 years ago while I was at the University of Fort Hare. But also in this regard one must be careful not to generalise within a language or group of languages. In Afrikaans there are major differences between different regions. When I started working in the Highveld region in Potchefstroom I quickly found that my colleagues did not have a clue what I was talking about when I was using certain "well-known, standard" terms that I grew up with in the Western Cape. Some Western Cape terms are just totally unknown in the former Transvaal areas, but this is the least dangerous situation. It is also not dangerous where different terms are used for the same thing. The real problems are where the same term has different meanings in different areas. I am not sure under which of the three it fits in, but the following is a classical example of a serious terminological misunderstanding:

> A person in Bloemfontein enquired from an Afrikaans farmer what his secret was for his beautiful fruit orchard. The farmer's reply was that one must apply enough "sout" ("salt"). The Bloemfontein person upon his return to Bloemfontein promptly went and bought a lot of sodium chloride (probably an animal lick type) and applied it to the peach tree in his garden. He could not understand why the tree soon afterwards died. Of course, with "sout" the older Western Cape farmers meant nitrogen fertilizer – in the old days usually ammonium sulphate. Some years ago I also overheard an Eastern Cape citrus farmer saying to a labourer that the trees were starting to look a bit yellow and that they had to apply some "sout" the next week – again meaning nitrogen fertilizer.

I am no expert on the indigenous "African" languages of South Africa, but I am under the impression that there are also important dialect differences in some areas that need to be considered if efficient technology transfer is to be achieved. It will probably be important to consider especially local agricultural terminologies. In the 1960s a missionary pointed out to us that there are, for example, major differences between the dialect in East Pondoland and the standard Xhosa that they were taught in the language school near Umtata and that one has to make major adaptations to ensure that phrases are not used in totally incorrect contexts. I believe that the statements of Thomasson (1981) regarding presentation of resource inventories and land use planning are equally valid for agricultural extension and development in the traditional rural areas (former homelands), especially the deep rural areas, of South Africa. ***What it amounts to is that to be maximally effective the extension officers with college diplomas, who work directly with the farmers, should in each case have the same cultural background as the farmers that he/she is serving and should speak the local dialect.*** They should also serve as important interfaces between the farmers and the scientists/researchers whose *"personal, ethnic and/or cultural backgrounds may not correspond to that of the people ultimately involved"*. In a seminar at Cornell University, Robert Chambers stressed that, especially in deep rural areas, anthropologists may have as important, or even more important, roles to play in agricultural development than extension officers. Thomasson (1981) also stressed the importance of involving anthropologists and psychologists (and one could add rural sociologists) as interfaces. At the University of Fort Hare we took the step some 20 or more years ago to appoint an anthropologist as lecturer in the Department of Agricultural Extension. He subsequently also obtained post-graduate qualifications in Agricultural Extension, which is possible the ideal combination.

The late Prof. R. du T. Burger, former Head of the Department of Soil Science at the then University of the Orange Free State, stressed that if one was invited to address farmers at a farmers' day in a district/area which you have not visited before, it was critically important to conduct a field visit together with some farmers before presenting your talk. Apart from acquainting oneself better with the natural resources of the area, the very important objective of such field visit was ***to listen to the farmers and pick up their jargon and terminologies so that one could use these during your talk.*** Furthermore, it was the opportunity to determine the knowledge and views of the farmers regarding specific aspects and how they differed from your own views. I later concluded that the ideal was a sequence of a field visit with a small number of farmers (and local extension officers), followed by the talk and immediately thereafter a field demonstration and/or a field visit with a larger group of farmers.

The key point is that it is important for researchers, subject matter specialists, advisors, etc. to get into the field with farmers as much and as often as possible. There are numerous publications stressing the importance of periodic "field walks" with farmers in the case of small-scale farming in less developed areas. Such field walks are certainly critically important in developing agriculture. There seems to be an underestimation of their value and too little attention to field visits/walks in the case of commercial agriculture, however. I am convinced that the frequent field walks that we researchers had together with the local extension officer and groups of interested farmers greatly speeded up the solving of the zinc deficiency problems in maize in the Northwestern Free State in the early 1960s.

I am convinced that ***the biggest value from field walks*** *in the present-day South Africa* ***will be gained by emerging farmers and new entrants into commercial farming*** *with limited experience of commercial farming practices.* During field visits/walks discussions between farmers are also stimulated, thus promoting farmer-to-farmer extension. The biggest value could be the knowledge gained by emerging and new farmers from experienced commercial farmers in the field. This is much more efficient than to listen to talks or advice given in a lecture room or meeting, although workshops during which farmers share their experiences are also important (Wichelns & Cone, 1992).

Farmer-to-farmer technology and information transfer has for probably at least 20-30 years been recognised as very important in small-scale developing agriculture. There are numerous publications on this, e.g. IFAD (1992a,b). Farmers can learn much from each other within communities and within their own region. IFAD (1992a,b) has shown that farmers from one region can also sometimes gain valuable information on farming practices from similar type farmers in another region in the same country, or even from farmers in a neighbouring or nearby country. We have given far too little attention to the latter two approaches in South Africa. Unfortunately former great opportunities no longer exist due to the demise of the irrigation shemes in the former homelands. I have always felt that small-scale irrigators from the former Ciskei and Transkei (and other areas) could learn a lot from the innovative and successful small-scale irrigators on some of the schemes in the former Venda and Gazankulu. If the latter are now going to be "voluntarily forced" into uniform "straight-jacket" growing of industrial crops, like cotton, according to fixed systems prescribed by joint venture partners, such opportunity will not develop again.

In regard to ***irrigation*** especially South African small-scale farmers could gain extremely valuable information from ***international exchange visits*** to some other southern African countries like Zambia and Swaziland. In the case of Zambia a lot could be learnt from the successful implementation of clay pots as water saving irrigation technique. At the same time the implementation of the three different types of treadle pumps can be investigated. In Swaziland the highly successful irrigation systems of individual small-scale fruit and vegetable growers in the Komati river basin near Piggs Peak should be investigated. Unfortunately, some of the best of these farmers have been translocated elsewhere because of the building of the Maguga dam, but there should still be good examples. The farmers should be accompanied by South African researchers and extension officers, who also need to learn from the Zambian and Swazi experiences so as to facilitate introduction of these technologies in South Africa.

Farmer-to-farmer technology and information transfer is often viewed simply in relation to small-scale traditional farmers. Its importance in modern commercial farming also is increasingly recognised, even in the USA, with probably the world's most sophisticated agriculture (Enshayan *et al*., 1992). Enshayan *et al.* (1992) point out that for "*most of history"* agriculture consisted of "*older, experienced farmers passing on their knowledge and techniques to younger farmers."* With the fast technological developments during the last 30 to 40 years this technology and information transfer system has come under severe stress and has been seriously disrupted. "*With modern agricultural science and technology, and its corresponding*

compartementalized approach, we seem to have ignored this knowledge gained by experience and years of trial and error" (Enshayan *et al*., 1992). They further point out, I believe referring especially to the new generation of scientists of the computer modelling age rather than knowing how to use farming equipment, that: *"Most of us have been trained in the tradition that views farmers as passive recipients of university* (and one could add research institute) *generated information – a top-down, one-way, university-to-farmer transfer. The result is a tremendous incapacity to observe, listen, and learn from farmers."*

In their excellent (semi-popular!!) paper, quoting a number of very important publications, Enshayan *et al*. (1992) further expand on the above as follows: *"Extension (and agricultural universities) must completely change their orientation from this center of knowledge filtering down, to turn it the other way round."* The top-down model *"should be transformed to include farmer-to-university* (and one should add farmer-to-research institute and farmer-to-department of agriculture), *farmer-to-farmer, and farmer-to-consumer partnerships as central elements of healthy agricultural education, research, and service."* The key element is to involve the different groups as equal partners, rather than to argue whether "bottom-up" is better than "top-down". None of the two approaches will probably be as efficient as a partnership approach in technology and knowledge transfer. To integrate the best of the two approaches to technology/knowledge transfer and the best contributions of the two main types of agricultural knowledge ***"creative dialogue and collaboration** is needed"* (Enshayan *et al*., 1992). They describe the two main types of agricultural knowledge as being:

a. Farmer-based knowledge, comprising long-term knowledge accumulated through practical farming experience and familiarity with the land. It is by nature holistic in perspective, i.e. it perforce has to take into consideration and integrate all factors impacting on the farming system.
b. University-based knowledge (with which one should include research institute-based knowledge), consisting of more specific or component, research knowledge obtained from statistical research in test plots and/or under controlled conditions and supported by laboratory work. This knowledge is reductionistic and compartmentalized and to be useful its successful integration into a farming system must be proven in practical farming situations.

Some key assumptions made in Ohio included (Enshayan *et al*., 1992):

- *"Farmers are innovators.*
- *We, as educators, can learn from farmers' innovations and can help farmers as co-learners."*

In Ohio, the university staff acted as ***facilitators*** for farmer-to-farmer (and farmer-to-university) technology and information transfer/exchange (Enshayan *et al*., 1992). The main activities consisted of workshops during winter, the "off season", at which invited "mentor" farmers explained their farming practices and philosophies. The winter workshops were followed by summer (in season) farm tours at (not just "to") a number of selected farms. Subsequently workshops on specific farming practices were also arranged. Non-technical workshops were also organised to address topics such as farm policy and agricultural politics, farm enterprise diversification, land tenure and the future of rural communities. *"It is our belief that politics, sociology, human*

values, and traditions are as much a part of agriculture as cover crops and soil chemistry equations." (Enshayan *et al*., 1992). It is important to keep in mind that these are not workshops held by academics or researchers about farmers or workshops at which learned people address farmers, but workshops at which farmers are central and the active participants.

In the commercial farming sector of South Africa good ward extension officers in reality acted as facilitators of exchange of technologies and information between farmers and between researchers and farmers, although the term "facilitator" was not used. These extension officers played key roles in the organisation of study groups and district level farmer associations, which were the vehicles through which farmer-to-farmer and researcher-to-farmer interactions were facilitated. Regular so-called "farmers days" were, *inter alia*, important events. In order for the successful integration of emerging farmers and new entrants (under land restitution/land redistribution), the maintainence of a system of motivated well-qualified (graduated) ward extension officers, study groups and district level farmer associations is absolutely essential. The graduated extension officers should be supported by officers with diplomas in agricultural extension.

In the case of subsistence farmers and other small-scale farmers, especially in traditional rural areas, it would be more efficient to organise extension facilitation at community level, rather than as study groups or district level farmer associations. ***Overall the excellent review of Smith (2003) should be studied in-depth by all who are involved as facilitators/extensionists/trainers in small-farmer agriculture in South Africa.***

"Anyone who works with farmers, in almost any capacity, can be a facilitator for farmer-to-farmer exchange of innovations and farming traditions" (Enshayan *et al*., 1992). This statement is true, but in my opinion only as long as it is done in a coordinated way. When different "facilitators" become involved in an uncoordinated way it will frustrate, and often confuse, farmers and can lead to very negative outcomes and farmer attitudes. This is probably more so in the case of small-scale farmers, with low levels of education, than in the case of commercial farmers.

In the above regard the 2002/2003 research and technology report of the ARC-Institute for Soil, Climate and Water (ARC-ISCW, 2003) gives a ***very encouraging*** picture of research/extension/farmer training being done in a coordinated way by various ARC institutes, universities, donor organizations, private enterprise, and provincial government departments, all working together and not separate from each other or against each other. Most importantly the local communities and farmers are involved as equal partners in the process. Terms like "farmer-managed and researcher-led trials", "farmer-led trials", "leader farmers" being trained in "farmer-to-farmer extension and communication skills", leader farmers being trained as "facilitators" and development of "socially acceptable agricultural systems" all bode well. Very positive is the fact that the researchers spend a lot of time in the field – to acquaint themselves with the resources and the people of the different areas. From the ARC-ISCW annual research and technology report, and discussions with some of the researchers, there are some problems and matters for concern in these programmes that need to be addressed, however. Of some of these the researchers are aware and would like to see them sorted out, e.g. the far too short term for the LandCare

projects. Agricultural development in deep rural areas is a slow process and short term projects can eventually do more harm than good. *There are, however, also a few very important basic adjustments that I believe would be necessary to ensure that these projects actually go the correct way.* This is not meant as a negative comment, but should be seen as saying that the good platform that has been established by these keen researchers should be strengthened where necessary to improve its impact and chances of long-term success. The provincial governments which have committed themselves to cooperation in these ARC-ISCW-led projects, viz. Mpumalanga, KwaZulu-Natal, the Eastern Cape and Free State, should also be be highly commended.

It is important to note that the fairly young (and young) researchers, White and Black, involved in these projects are ***scientists whose heads "were turned the right way" when they were students*** so that they understand how to approach the required types of research/extension/training to consider both the scientific/technological side and the human side. It is just a pity that the ARC has lost a few wonderful young Black scientists that could have been key role players to strengthen these teams, due to the problems in the ARC, as indicated earlier.

It has been stressed that both the scientific/technical and human side must be considered in agricultural advice/extension. This is important for both developing and highly developed commercial agriculture. Since there has often been a tendency to concentrate only on the technical side and to ignore the human side, there has often developed a counter-reaction to underplay the scientific/technical side and to consider the human side as far more important. This has been a big mistake and has led to big disasters, also in South Africa. The fact is that the two sides are equally important and both must be considered equally and correctly.

Top class specialists are required for scientifically/technologically correct and site/case specific recommendations. Blanket recommendations made by generalists are just simply not acceptable, because they do not give optimum utilization of natural resources like water and land and even less so of scarce economic resources (Laker, In press). This is where well-meaning NGO's often falter, because they often do not have the required scientific expertise or their expertise is for the inappropriate high latitude northern hemisphere continents.

A major problem is the incapacity of scientists to accept realities proven in well-conducted experiments and/or found as consistent patterns in practical farming situations, if these do not correspond with what they believe from their theories and hypotheses. This is a form of typical "academic sclerosis", a term that was coined by a Cornell University professor for scientists who are not able to adapt to the realities in the field. Some of these have been mentioned in previous sections and will not be repeated here. There are several other South African examples, *inter alia* in the irrigation field, that could be cited.

An interesting case in terms of reality and terminology is that of "Leader farmer No. 4" of Magusheni in the Bizana LandCare project, where his yield with his own "Farmer practice" was nearly 3.5 $t.ha^{-1}$, compared with less than 2.5 $t.ha^{-1}$ for the "Best practice" (ARC-ISCW, 2003). This means that the yield for the "farmer" practice is about ***43% higher*** than that for the "best" practice. Results for only a small

selection of leader farmers are given for the two areas, Magusheni and Nikwe, but the differences between the two areas and the inconsistencies in the differences between the "farmer" and "best" practices within each area are striking. In some cases the "best" practice is ***far better*** than the "farmer" practice, in the case mentioned above the "best" practice was ***greatly inferior*** and in some cases the difference was very little. Unfortunately I did not have the opportunity to study the complete progress report, but it would be important to see whether the reasons for the differences are outlined and how future trials and recommendations will be based on an understanding of the reasons for these major differences. It will also be important to find out whether a single "best" practice was pre-determined on theoretical grounds and to what extent the farmers were involved in the pre-selection or development of such practice. In-depth analyses of these results and lessons learnt from them will be ***invaluable*** for future advisory work in the areas.

Another major quite common error in extension is the aiming for unrealistically high target yields. This includes aspects such as:

- Aiming for maximum yield instead of aiming for maximum returns on inputs, which is invariably at yields considerably below the maximum (Pesek, 1975).
- Using "best farmer potential", or even experimental potential, as norm, instead of scaling down according to the capability, experience and economic resources of the specific farmer.
- Over-estimating the potential of the land.
- Basing recommendations on what is achieved on a specific soil in the odd abnormal year that occurs only once in five or ten years, instead of looking at its long-term potential. This is the: "Yes, but what if?" syndrome that is often exploited by marketers of inputs, to the demise of farmers.
- Being misled by inflated claims of what yields farmers "generally" or easily" achieve. This is ***very*** common.

3.13.3 Education and training

Appropriate, high quality education and training of different types and at different levels ***are absolute prerequisites for successful agriculture*** that is internationally competitive on the one hand and provide for maximal alleviation of rural poverty and food security on the other hand.

Fortunately, I have had a range of experiences in this field on which I can draw. Amongst others these include the following:

a. From barely school going age virtually each December holiday right through my primary and secondary school and undergraduate university years, I worked, as part of the "extended family", on my one uncle's fruit farm near Tulbagh. Occasionally it also included working at other times of the year on the farm. Except for my university years this was not work in the sense of being employed and paid for it. It was simply part of one's duty and responsibility as part of the family. This was real learning from the older people and "learning by doing", which is the most efficient way of learning something (Smith, 2003). It involved a variety of tasks and "graduating" through different tasks as one grew up and became stronger and gained experience.

b. I matriculated at a rural school where Agriculture was one of the optional matric subjects. The school was in a town (Ceres), which was the business centre of a district dominated by intensive high-value agriculture. A significant proportion of the pupils came from farms and after school also went farming. Thus having this option available at the school made a lot of sense. The school had its own small farm where the pupils received practical training.
c. I had the privilege to do my undergraduate studies in a system that combined comprehensive in-depth basic sciences with down-to-earth practical education and training that enabled one to walk out straight into a work situation to manage a farm or conduct research and/or advise farmers. This will be discussed in Section 3.13.4.1.
d. I lectured for 35 years in the faculties of agriculture at three different South African universities with three different backgrounds and approaches. This included a most fascinating and valuable 12.5 years at the University of Fort Hare. The sequence UOFS→Fort Hare→UP was very fortunate. As a result of my UOFS and Fort Hare experiences I started, while still at Fort Hare, a drive for the institution of diversified ("specialised") post-graduate programmes for persons with BAgric degrees. This culminated in the establishment of the Post-Graduate School for Agriculture and Rural Development at the University of Pretoria. This will also be discussed in Section 3.14.4.1.
e. At Fort Hare I was also involved with the training of students taking the BPed(Agric) degree or HSTD(Agric) diploma with a view to becoming ***Agriculture teachers*** at ***high schools***. I was, *inter alia*, responsible for coordination of the Agriculture Method course and presented certain sections of the course. In the process I became well-acquainted with the high school Agriculture curricula and the handbooks for them. Some comments on these will follow later. I also had to attend test (criticism) lessons of some students at schools in the vicinity of Alice and got to know the situations at these schools. Because of this interaction with the Faculty of Education, I was at one stage also requested to review the Agriculture modules taught at ***primary school*** level in the then Transkei.
f. I never studied or taught at any agricultural college, but I have had some contacts or interactions with examples of these. There were two distinctly different types of colleges with totally different objectives and roles, viz.
    - The agricultural colleges in and for the White commercial farming sector. Their role was the theoretical and hands-on training of prospective ***farmers*** – or farm managers. Where I started my career in the Department of Agriculture in Potchefstroom the college was on the same terrain as the research institute and colleagues at the Institute were the lecturers at the college.

      At a later stage (I think early 1970s) Dr. D.M. Joubert, at that stage at the Department of Agriculture, was appointed as commission to investigate the ***possibility to link the colleges of agriculture with agricultural faculties***. I was member of a two-man committee appointed by the Dean of the Faculty of Agriculture at the UOFS to draft a submission to the commission on behalf of the Faculty.

    - The agricultural colleges in and/or for the homeland small-scale agricultural sector. Their role was the training of diplomate extension

officers for the homelands. I had real interaction with only one of these, viz. Fort Cox in the former Ciskei. Most importantly, I was in the early 1980s member of a small commission appointed by the then President of the Ciskei to investigate agricultural training in Ciskei and to draft proposals for its upgrading. According to the terms of reference the main focus had to be on Fort Cox, but we also had to look at Phandulwazi Agricultural High School and the Debe Nek farmer training centre.

g. At one stage, probably in the early 1980s, I made an in-depth study of a report on a study tour conducted at that time to Europe (and I think also America) by Prof. H.A. Louw, at the time Dean of the Faculty of Agriculture at the University of Stellenbosch. He investigated different approaches to university level agricultural education/training at various universities in different countries and made some very important findings and recommendations. There was especially a finding on a French system that I thought would be highly applicable to the South African situation. Unfortunately it seems as if nobody in decision-making positions ever studied the report and/or reacted to it. The significance of the report will be discussed in Section 3.13.3.1.

3.13.3.1 Agricultural education and training at universities

Appropriate high quality university ***education and training*** in agriculture is an absolute prerequite for maintaining a healthy agricultural sector on a sustainable basis and to promote efficient natural resource use and alleviation of rural poverty. The emphasis is on both *"education"* and *"training"*.

- ***Training*** refers to gaining knowledge of scientific facts and to understand scientific principles and processes and how to use these in the development of technologies and practices.
- ***Education*** refers to the development of important attitudes and life skills. It involves development of certain ethics: An ethic of honesty – in research; in advisory work to farmers; resisting bribery and corruption; A work ethic – e.g. willingness to work through the night without complaints when a specific type of research requires it or if an urgent submission of report has to be finalised, etc.

  Education also refers to aspects such as the importance of accepting that the human aspects of agriculture are as important as the scientific/technical aspects and must be understood and honoured. It also involves an understanding that one's own field is very important and that one must be a top expert in your field, ***but*** that it can never be viewed in isolation, it must be merged with other fields into a holistic picture to make a useful contribution.

  Finally, education also means that graduates must be made to realise that there is not such a thing as ***a*** "state of the art" in agriculture. What works best varies tremendously between different cases.

Lecturing staff have to accept responsibility for both training and education of their students, i.e. for equiping them with the required scientific knowledge and technical skills as well as with the correct attitudes and life skills and approaches. A faculty of agriculture has to deliver "complete products".

South Africa's agricultural faculties in general have a proud record of producing high caliber graduates that have proven themselves by means of excellent performances in post-graduate studies at overseas universities and by the demand for them for posts at overseas universities and research institutions. ***There is reason for major concern regarding the situation in which agricultural education/training at South African universities finds itself at the moment, however, and it needs to be addressed very urgently.*** Some of the problems started many years ago and were identified and highlighted at those times, but nobody took any notice of them and nothing was done to solve them. Other extremely serious ones originated over time during the last twelve or so years. Comprehensive discussions on these cannot be given here, but it is necessary to highlight a few of the most important ones:

a. Degrees in agriculture are offered at too many South African universities. The consequence is a lot of small units with generally tiny little departments, which are far below "critical mass" in terms of lecturing staff and almost all strugging to survive. Regarding the priliferation of agricultural faculties in the then homelands, we at the University of Fort Hare recognised the problems some 25 years ago and spoke out against it. Graven and Steyn outlined it in an unpublished paper at some symposium, the details of which are no longer available at present. I highlighted it in an interview published in the *Daily Dispatched* in which I called the proliferation of agricultural faculties ***"sabotage"*** of tertiary agricultural education in South Africa.

   Regarding this, I later wrote in Laker (1981):

   "The situation is further complicated by the recent introduction of courses in agriculture at the Universities of the North and Bophuthatswana. Unless some miracle happens, it is quite possible that we will end up with three small faculties of agriculture, each with a small number of staff, duplicating one another's administrative and lecturing duties and none having time for research, involvement in development or the presentation of special courses.

   The possible consequences are so serious for agricultural development in Southern Africa that the author believes that all the relevant authorities should have a serious and critical look at the future of tertiary agricultural education for the developing areas of Southern Africa. *The author believes the answer lies in the establishment, somewhere in South Africa,of a single AGUNSA (Agricultural University of South Africa), analogous to MEDUNSA. Such university should have a large lecturing and research staff. Research stations which are run jointly by the university and each local* (meaning homeland) *government should in addition be established in each developing state. The creation of a second agricultural university, or a second campus for the university, or a faculty of agriculture elsewhere, should not be contemplated before the university has 3 000 to 4 000 students."*

   It is noteworthy that we at Fort Hare did not use these arguments to protect ourselves. Despite the fact that we had some excellent staff and good research farms, we never suggested that Fort Hare should be retained as the only

faculty. In fact, we made it clear that if we had to close down in order for a new entity to be established then elsewhere, we would accept the decision. We propagated that, if politically necessary, a "neutral" site outside the homelands, e.g. somewhere on the southeastern Transvaal Highveld, should be used for the establishment of such agricultural university.

Unfortunately, the miracle did not happen and faculties of agriculture were established at the University of the North and the University of Bophuthatswana. The situation became even worse with the establishment of a faculty of agriculture at the University of Venda and the introduction of courses in agriculture at the University of Zululand.

The concept of an "agricultural university" is not a "pie in the sky" idea. Such universities are well-known in Europe, for example. Two examples are the Horticultural University in Hannover, Germany, and the Agricultural University (*Universität für Bodenkultur*) in Vienna, Austria. In the present South African situation one does not have to look at the establishment of an "Agricultural University" any longer, however, but at amalgamation and consolidation of agricultural faculties across "Historically White" and "Historically Black" universities. ***This type of development would also be a logical follow-up step to the present process of merging of universities.***

b. At the "Historically White" faculties of agriculture the transfer of the faculties from under the auspices of the Department of Agriculture to the autonomy of the universities (and falling under the Department of National Education) had major impacts. Firstly, there was no longer common sharing of experimental farms, research facilities and expensive equipment with the research institutes in their former regions of which they were part. Access to these became a matter of personal friendships with researchers at the institutes and mutual goodwill. The lecturing staff also no longer had access to the use of government garage vehicles, not only for transport to distant research stations for research purposes, but also for transport to farmers' days and visits to farms where their advice was sought. Most importantly, it affected the availability of state transport for student field practicals and excursions. Research funding for master's students seconded by the Department of Agriculture to study full-time also became an issue. Previously the Department of Agriculture simply funded them because both the students and the faculties fell under the auspices of the Department. While the faculties were part of the Department of Agriculture researchers from the regional research institutes could be drawn in to present limited numbers of lectures on specialised topics within their fields of expertise or to help out in the absence of a lecturer due to illness or sabbatical leave, etc. at no additional cost. After the transfer of the faculties this was no longer a virtually automatic option. After the establishment of the ARC, scientists from their institutes helped out where they could, but with the weakening of the financial situation of the ARC the institutes perforce had to start charging faculties substantial fees to hire out their scientists to the faculties. With the weakening of the financial situation of especially small university departments they could often not afford these fees, putting very heavy burdens on the lecturing staff.

c. Because rationalization/merging/amalgamation of Faculties of Agriculture, and with it merging of say two or three small Departments of Soil Science, for example, did not take place ***between*** universities a different route was taken ***within*** universities. This route was the merging of a number of small departments in a Faculty of Agriculture into larger conglomerate departments. From my own experience, and I suspect it is very much the same elsewhere, this is having a very negative effect on agricultural education/training. Once a conglomeration has been formed, the usual thing to happen, is that they are told that they have too many courses, the number of courses must be reduced. Since the conglomeration consists of what used to be three or four different majors, the reduction in the number of courses can reach a point where just a very general degree is offered, with no real strong major. It becomes worse when a specific speciality is pressurised to drop an essential supporting basic science from its curriculum or to lower the level at which it is required in the curriculum. For example, in the past Chemistry III (or its later full semester equivalents) used to be compulsory for all students majoring in Soil Science. This was later at some universities reduced to Chemistry II equivalent. In some conglomerate departments there appears to be drives from the non-Soil Science sections to lower the Chemistry requirement even further so as to facilitate the creation of a generalised curriculum. Then one must rather stop pretending that you are offering something like Soil Science as major. The other consequence of the creation of these conglomerates is that the lecturing staff numbers and structures in the individual fields of the conglomerate become so limited and at such low post levels that they are in any case hardly, or not at all, able to offer a proper major. Furthermore, their capacity to offer proper post-graduate education/training is seriously compromised. ***In about 1988 Prof. J.J. Human***, then Professor of Agronomy at the UOFS, at an agriculture symposium of the Suid-Afrikaanse Akademie vir Wetenskap en Kuns ***warned against the false impression that "critical masses", in terms of staff numbers, etc., could be created by lumping conglomerates of different fields together.***

It is true that world famous overseas universities also have conglomerate departments, but the whole setup is totally different. Thus, when I was at Cornell University as post-doctoral associate in 1977 its Department of Agronomy included Agronomy, Soil Science, Plant Breeding and Agro-meteorology, but the Department had ***35*** professors, all with at least a PhD, of whom ***17*** were professors in Soil Science.

Mergers between agricultural faculties and other faculties have perhaps not had as big effects as merging of departments, but in some cases I believe the efffects have been significant. It depends on the type of merger. At Stellenbosch the Faculties of Agriculture and Forestry were merged. I don't believe this will have significant effect on agriculture, because Forestry was a much smaller faculty and, like agriculture, deals with the growing and production of plant products. I am very sceptical about the merging of Faculties of Science ("Natural Sciences') and Agriculture at some universities. The approaches required from Faculties of Agriculture to play a meaningful role in the way that they have to, are just too different from the approaches in the Natural Sciences.

In the interest of agriculture in South Africa, in order to optimise the efficiency of resource utilization, reduce rural poverty and promote food security, ***reduction of the number of agricultural faculties is urgently required***. It should be done in the form of merging of existing faculties across universities, pooling their staff and facilities. It should not be simply closing some faculties and leaving the rest with their limited manpower and facilities. This is the only route by means of which a start can be made towards creating units that attain meaningful "critical masses", so as to be effective in the roles required from them. The within university merging of departments has not alleviated any problem, it has in the main aggravated the problems. The ideal would be to have a few Faculties of Agriculture *per se*, although the Stellenbosch Faculty of Agriculture and Forestry is acceptable and Faculties of Agriculture and Environmental Sciences could make sense, ***provided*** that Agriculture is not overshadowed/dominated by Environmental Sciences and loses its focus.

With the present radical changes in the South African university sector taking place, the time is ripe to bring about the changes now. It must be done in a ***sensible*** way, however, so that it does not end up doing more harm than good. With all universities now open to all students and homelands (and homeland policies) belonging to the past, there is no need to bother about "Historically Black" and "Historically White" universities in the process. One should look at the relative strengths and facilities of the present faculties and their historical "influence spheres", both geographical and in terms of specific fields of expertise/excellence. It is not appropriate to go into details here, although I have some clear ideas in my own mind in this regard.

At the same time forging of formal official links between the new consolidated faculties of agriculture and the ARC and National Department of Agriculture ***must*** be pursued. An environment must be created in which there are no official, "red tape" obstacles to cooperation between faculties of agriculture and ARC institutes and in which collaboration will be more beneficial to both than competition – to the benefit of the country. ***A special discussion on these aspects and the consolidation of faculties of agriculture, looking at the Californian example will be given in Section 3.13.3.5.***

It is absolutely essential that each faculty of agriculture (or "school of agriculture" within a composite faculty) must periodically do an evaluation of the usefulness and relevance of its curricula, i.e. does it deliver "products" (graduates) that fulfill the needs of the "market" or "clients"? Whenever changes, especially major changes, are made, these should be the criteria that dictate what the new curricula should look like. ***If*** rationalization/merging/amalgamation of faculties of agriculture is done, these should also be the guidelines dictating the structure of its curricula, the contents of its courses and the way the courses are presented. ***In the case of evaluation of the usefulness and relevance of existing curricula and courses, the evaluation must be done by the "clients" (the employers or people making use of the services of the graduates) and the "products" (the graduates)***. In the case of consideration of the development of new curricula and/or courses what is needed in the market should dictate the compilation of the curriculum or course. Quoting a number of publications on it, Enshayan *et al*. (1992), referring to universities, stated that there was *"a strong move towards farmers setting the agricultural research* ***and education*** *agenda."*

Demand guided the development of curricula and courses at the new Faculty of Agriculture at the UOFS in the late 1950s and their revision thereafter. A new innovation was the introduction of a three-year BAgric degree for the training of "practitioners" in addition to the normal BScAgric degrees for researchers. The BAgric started as a general degree, but based on needs identification and requests from industry, a limited number of specializations were developed. One of the roles envisaged for them, viz. to become extension officers in the Department of Agriculture, failed, because (a) under the influence of other bodies the Department refused to appoint them and (b) the University of Pretoria, the only one offering training in Agricultural Extension, refused to accept them for the BInstAgrar(Hons) and M degrees in Agricultural Extension. The graduates did not have problems finding employment, because they were easily appointed in private agricultural industries and were popular candidates for Biology teaching posts in schools. Unfortunately, the specialized BAgric degrees were later replaced by a single degree in Agricultural Management, totally dominated by Agricultural Economics and with very limited courses in Agronomy, etc. in the curriculum (Du Preez, 2004). This was similar to the situation in Agricultural Management degrees offered at a number of other universities. The Agricultural Management degree at the UOFS was not popular and in about 2000 seven specialised BAgric degrees were re-introduced. Although these all still had a "management" tag, the majority of the courses in them were no longer Agricultural Economics courses (Du Preez, 2004).

When the Faculty of Agriculture at the University of Fort Hare was established in the early 1970s it was also decided to introduce both BScAgric and BAgric degrees. There were different BScAgric options as majors, but just one general BAgric. One of the reasons for creating the BAgric degree was that there were good candidates who were interested in studying agriculture and could make valuable contributions in the homelands, but who did not have the required matric mathematics and science to qualify for admission to the BScAgric degree. Over the years the BAgric students included ones that were absolutely ***brilliant***. The most outstanding case was Struben Ramane, who could not register for a BScAgric degree because he matriculated at a rural school in Venda that did not offer mathematics. He obtained his BAgric with distinction, after which his sponsors appointed him at Rhodes Fruit Farms near Franschhoek. They wanted him to get higher training in fruit production. Because of his academic background he could not get permission to register for a higher degree in Pomology ("fruit science") at the University of Stellenbosch. They eventually allowed him to register for "non-degree" purposes. The irony is that according to feedback that I got at the time, he apparently obtained the highest marks in the class. I last heard from him many years ago when I received a letter from him from New Zealand, where he was then studying for a post-graduate diploma in Horticultural Science at one of their universities. I elaborated on this, to set the scene for the discussions in the next paragraph.

There existed no possibility for post-graduate training for BAgric graduates in South Africa, except in Extension (at the University of Fort Hare) or Farm Management (e.g. at the University of Natal). From feedback from both the employment market and BAgric graduates from the University of Fort Hare, it became clear that there was a great need for further post-graduate training of BAgric graduates in specific fields. Specific cases, like that of Struben Ramane, further accentuated this. In addition, BAgric graduates could get admission and successfully complete post-graduate

degrees or diplomas at overseas universities. While at Cornell University as post-doctoral associate in 1977 I became acquainted with their "Master of Professional Studies" (MPS) programme in various fields of agriculture, for example. Before I left Fort Hare, I got one BAgric graduate into this programme, who successfully completed it. My colleagues and I at Fort Hare were of the opinion that we could give these students post-graduate training that was more appropriate and more valuable for their work situation, because we knew South Africa's resources and situation so much better. It was really a very unfortunate situation that they perforce had to go to one of the many well-known overseas universities at which they could gain admission for post-graduate studies.

In view of the above I started a drive towards getting post-graduate degrees for BAgric graduates introduced at the University of Fort Hare when I was Dean of the Faculty of Agriculture in 1985-86. All the necessary motivations and documents were drawn up and were approved without a hitch at the different levels (faculty, senate, council) at the University. The Department of National Education bluntly refused to approve it, however. When I arrived at the University of Pretoria in 1987 I started probing this again. I suspected it would be very difficult, because the Faculty of Agriculture at the University of Pretoria for many years was vehemently against the concept of BAgric degrees and even very derogatory about it. Fortunately Prof. Robin Barnard was quite easily convinced about the merits of it and he convinced Prof. Theuns Erasmus, then Dean of the Faculty of Agriculture. Prof. Erasmus then appointed a small committee, with myself as chairman, to draft a proposal. Eventually a proposal was accepted at the University. Introduction of different specialized post-graduate options for persons with BAgric degrees was "smuggled through" under the banner of the BInstAgrar(Hons) and higher degrees, which already existed at the University for the training of extension officers. The Post-Graduate School for Agriculture and Rural Development was established and the rest is history. It immediately drew large numbers of students, not only from South Africa, but also from the rest of Africa. An unexpected and important development was that some good students with specialized BScAgric degrees, including White students, elected to do their post-graduate studies in the "InstAgrar" stream rather than in the "Sc" stream. They are now doing excellent work in developing agriculture in South Africa. Somewhat similar post-graduate degrees have also been introduced at the Universities of Natal and the Free State and the University of the Free State is also offering post-graduate degrees in Sustainable Agriculture. Ironically such types of post-graduate training have not been introduced at "Historically Black Universities", which should really be at the forefront of this type of training, as far as I know.

It should be kept clearly in mind that the post-BAgric or InstAgrar training is not intended to produce the more basic type of researcher that the BScAgric stream caters for. They are intended to be practioners or "subject matter specialists". In discussions that Dr. Henry Obeng, then Director of the Soil Institute of Ghana, had with me at Cornell University in 1977, he stressed the importance of subject matter specialists in agriculture and handed me a draft document that he prepared on this. He pointed out that where agriculture succeeded there was always a strong component of subject matter specialists, including in the USA. The subject matter specialist forms the link between the researcher and the extension officer. This is especially important in developing agriculture where farmers have a low level of school education and extension officers have only diplomas. This groups the farmers and extension officers

close enough together to be effective, but the gap between the extension officer and the researcher is too big. Henry Obeng pointed out that for successful agriculture ***all four links*** in the following chain ***must be strong***:

Researcher←→Subject matter specialist←→Extension officer←→ Farmer

It is essential that the Faculties of Agriculture must produce researchers, subject matter specialists (and extension officers) in the required fields of specialisation/ expertise. For a long time the problem was that far too few graduates were produced in the more specialised directions like soil science, plant pathology, entomology, etc. The bulk of the students graduated with a relatively general Crop Science (Agronomy)/Livestock Science combination. There are still too few graduates being produced in some of the specialised directions, but a new major concern is the extremely small number of students graduating with Agronomy as major at present. In at least one case at a major Faculty of Agriculture only two BScAgric graduates majored in Agronomy in a recent year. At the University of Pretoria amalgamation of Horticultural Science with Crop Science, led to a sharp decline in Horticultural Science – both in regard to senior lecturing staff and in regard to student numbers. In view of the importance of Horticultural Science for the tropical and sub-tropical crop industries in especially Mpumalanga and Limpopo Province, not only in terms of export earnings, but especially in terms of employment and thus combating rural poverty, one can only hope that production of high quality graduates in Horticultural Science will soon increase sharply at the Universities of Pretoria, the North and Venda. These are but two examples of several such retrogressions that have recently occurred or are occurring at the moment and that need ***urgent*** attention.

One also needs to identify special requirements and cater for them. At the University of Fort Hare a need for training in ***Land Use Planning*** was identified as a priority in view of the agricultural development that was required in the traditional Black areas. It was introduced as a strong multi-disciplinary course in the final year of the BAgric and most of the BScAgric programmes. Lecturers from various fields participated in the development and presentation of the course, in a well-structured, integrated way. It is rounded off with a project in Land Use Planning. The theoretical course is still somewhat acceptable, but the projects have deteriorated very badly and very serious attention will have to be given to this by the University. (I may add that the present coordinator of the course and projects is not to be blamed for the situation, and is greatly concerned about it.) At the University of Pretoria Land Use Planning was introduced as one of the options in the Post-Graduate School for Agriculture and Rural Development. It was one of the more popular options, attracting significant numbers of students (Black and White) from South Africa and various other African countries. The problem is that presently it is handled by one junior staff member, who does not yet even have a PhD degree, only, limiting the post-graduate training capacity seriously. When it comes to an aspect like optimising water use efficiency, proper land suitability evaluation and land use planning is an absolutely key requirement. ***Thus revitalisation of training in agricultural Land Use Planning in South African Faculties of Agriculture should urgently receive very high priority***.

A matter of ***great concern*** has always been ***the lack of graduates with specialisation in irrigation*** sciences/technologies. The lack of specialised irrigation extensionists/ advisors has been of particular concern. The University of the Free State had a good

BAgric degree in Irrigation Science and some very good students obtained this degree. They could have played an important role, but since they had BAgric degrees the Department of Agriculture refused to appoint them and the University of Pretoria refused to enroll them for post-graduate degrees in Agricultural Extension. For a time the irrigation degrees "disappeared" while only the general B degree in Agricultural Management was offered. Since the re-introduction of specialised BAgric degrees in about 2000, Irrigation Management is one of the options again (Du Preez, 2004). In addition to the three-year BAgric degree in Irrigation Management, the University of the Free State also now has a four-year BScAgric degree in Irrigation Science. The curricula of these degrees cover the whole spectrum of fields relevant to irrigation planning and management, including several courses in soil science, land suitability evaluation for irrigation, crop production, irrigation engineering (covering all types of irrigation systems, irrigation system design, etc.), agro-climatology, agricultural economics, etc. ***Thus there is now a system in place for the training of irrigation specialists.*** Enough candidates must just be found to take these degrees, bursaries must be made available and the necessary posts most be created and the graduates (irrespective of colour, race, gender, religion, etc.) appointed in those posts. A major concern that I have regarding the new irrigation degrees at the University of the Free State is that, according to Du Preez (2004), there is not much difference between the ***admission requirements*** for the two degrees. ***This possibly eliminates some very useful candidates from admission to the BAgric degree.*** The implication of this is explained below. This is, of course the case for all present BAgric degrees at the UFS.

The question of admission requirements for entry into study for different degrees is a tricky, and often hotly debated, one. It is becoming more complicated with the present increase in question marks about the standards of the matric certificates that students obtain. Universities will in future undoubtedly increasingly make use of their own internal entrance tests/examinations as guidelines for admission of students. Meanwhile there has over the last 15 years or so been a tendency at universities in the country to progressively increase their admission requirements, especially for the science degrees, including agriculture. In some cases the present requirements are sky high. In at least one case students are not admitted to the BScAgric degree if they did not have ***both*** Mathematics and Science at higher grade in matric (and obtained certain minmum symbols). If the student took one of them on standard grade he/she is not admitted, even if he/she got a distinction for it. It is important to find the correct balance: One does not do anyone any favour, least of all the student, by admitting someone who has very little chance to succeed. On the other hand, it is unfair and does not help the country to exclude candidates that might have had a fair chance to succeed.

The BAgric degrees at Fort Hare, BInstAgrar at the University of Pretoria and original BAgric at the University of the Free State opened up new opportunities for students who did not qualify for admission to BScAgric studies, to obtain qualifications in agriculture. On the one hand it created opportunities for potentially good candidates from rural schools where the required subjects were not offered, as was the case for the already mentioned brilliant Struben Ramane. In other cases candidates had very low Swedish ratings (or M counts) because of poor symbols in one or two subjects because of poor teaching – or even no teacher for that subject.

A special example was Margareth Schoeman, a Black (not "Coloured") girl in the first BInstAgrar group at the University of Pretoria. According to her M count she ***did not even qualify for admission to BInstAgrar studies***. The minimum requirement for admission to BScAgric was "miles" higher. I was guardian lecturer for the BInstAgrar students and the Dean (Prof. Johan van Zyl) made an arrangement that I could consider cases like Margareth and recommend whether the student should be given conditional admission or not. I had an interview with Margareth and saw that she was something special and that her matric results were no reflection of her intelligence and capabilities and recommended that she be admitted. The rest is history and could serve as an inspiration for others: She obtained her BInstAgrar in Plant Protection ***with distinction*** and received the award for the best final year student in Plant Pathology, ***outperforming the BScAgric students*** who came into the University with M counts more than double hers. Because of the existence of the Post-Graduate School for Agriculture and Rural Development, she could proceed with post graduate studies, obtaining both her honours and masters degrees in Plant Pathology with distinction. She was lucky to slot in just at the right time. A year earlier the BInstAgrar was not yet offered and she would not have been able to take a degree in agriculture at the University of Pretoria. A year or two after she started, the admission requirement for the BInstAgrar was raised to such an extent that her M count would have been so far below it that I would not have been able to get a motivation through for conditional admission for her.

On the other hand the BInstAgrar also opened up new opportunities for candidates from good schools who are either interested in playing a role in agricultural development or made wrong subject choices, e.g not taking both Mathematics and Science at higher grade. The latter included, for example, a candidate from one of Pretoria's top "White" schools. This specific student was after completion of his BInstAgrar in Livestock production actually admitted to do **BSc**(Hons) and **MSc** degrees in Wildlife Management, in which he performed well. In another important example Reckson Mulidzi made such an important ***international breakthrough*** in his MInstAgrar research that within less than two years after he obtained the degree he was made a member of the (eight person) ***international scientific advisory committee*** for an international symposium that will be held in ***Spain*** later in 2004.

I mention these few examples, representing a selection from the spectrum of different scenarios in the realities of the BAgric/BInstAgrar programmes, because there are so few people that are really aware of the realities. Also these should dispell the scepticisms about the inherent qualities and usefulness of these degrees. I agree that these are examples of the cream, but there have been other equally brilliant ones also, and there have been ***numerous*** above average and good successful ones. For the future of agriculture in the country it will be a dark day if BAgric/BInstAgrar programmes should be terminated or if admission requirements are made so high and or of such a nature that people like Struben Ramane, Margareth Schoeman and others like them cannot be admitted.

On the other hand one cannot just throw it open for anyone. You don't do the student a favour and waste the money of the country by allowing people that do not have the potential to have a good chance of completing their degrees successfully. Very simple aptitude tests, provided that they are not based on school syllabi, could be a useful screening mechanism. From my personal experience, I believe the development of

intuitive evaluation to use during a brief personal interview could be the best screening in borderline cases. Within a few minutes one can get an indication of whether a person is special (like Margareth Schoeman) or a dud (even if that person is somewhat above the minimum M count line for admission).

One should also look at other admission criteria, apart from matric results. At Fort Hare I, for example, found that the vast majority of students who did well at agricultural colleges and then came to the University were successful, and in some cases brilliant, in their BAgric studies, despite in some cases having had very poor matric results. In one case a student who had a matric Swedish rating of only 19, much lower than the minimum requirement of 27, but obtained his agricultural college diploma with distinction, also got distinctions at university right from the first semester of his first year. Agricultural college performance could, probably should, thus be used in some cases to over-ride matric results as admission criterion.

Universities can go a long way towards improving the rate of success by careful planning of the first year courses for BAgric or BInstAgrar degrees and much attention to their presentation. These should include what one can call "functional mathematics", i.e. the mathematics that they will need in their further courses and especially in their work situation. Similarly, physics and chemistry courses for them should cover those physical and chemical principles and processes that they will need to understand their further courses and will be relevant to understanding processes that they can be expected to encounter in their work situation. The same applies to introductory biology courses. Apart from concentrating on relevant topics, the use of examples from the agricultural field will greatly improve the usefulness of these courses. ***Experience at Fort Hare and the UFS has shown that such courses are presented best by lecturers from within agricultural fields***. At the UFS it has apparently been noticed that the students coming through these courses which concentrate on an understanding of the role of ***relevant*** chemical, physical and biological principles in real life situations often have a better grasp of subsequent more advanced courses in these fields, where these students are in classes together with others coming through the more highly theoretical pure science stream (Du Preez, 2004). We are not talking here about "bridging" courses, but simply about ***appropriate*** introductory courses. At the University of Pretoria a practical English course, specifically designed for BInstAgrar students, is a compulsory part of the first year curriculum for BInstAgrar students. The importance of such course became clear when comparing these students in advanced courses with those coming from other universities where they did not have such course.

The agriculture courses at the Tshwane University of Technology (TUT) open the door even for students ***without matric exemption*** to obtain degrees in agriculture, even M and D degrees. Admission is subject to a certain minimum Swedish rating, but a quite low one, and an internal test, but which is not yet strictly applied because it has not been validated yet (Van Averbeke, 2004). Students can exit at different levels: After one year a National Certificate in Agriculture can be obtained, after two years a National Higher Certificate in Agriculture and after three years a National Diploma in Agriculture. One of the options for the National Diploma is Agricultural Development and Extension. The first two years are normal academic years. The third year is an important concept. This is an in-service experiential year. In order to be admitted to it a student must be employed in a work situation. During this time the student must

attain proficiency in a range of skills through the work situation. At least six skills out of a selection of twelve must be mastered. The TUT enters into an agreement with the student's employer, who also serves as his mentor, regarding which skills he/she has to master. Any student who has obtained a National Diploma in Agriculture at TUT is eligible to register for a fourth year, upon successful completion of which he/she then receives a BTech degree. Simply a pass in the National Diploma is accepted for admission to the degree year. Students with diplomas from agricultural colleges may also register for the BTech degree (and obtain it after one year study), provided that they pass a set of admission tests. The agriculture training at TUT is presently for a very "diffuse market" (Van Averbeke, 2004) and not targeted at any specific employment market. The third, experiential, year will prepare a specific student for a specific market, however.

The possibility of ***different exit levels*** should also be investigated for agricultural training ***at the academic universities***. In this case it should be almost a reverse of the situation at the TUT, i.e. students register for degree studies, but those who struggle and are probably not going to obtain their degrees could then be allowed to exit with a diploma after two years (for example). It would prevent total waste of such students. This is a type of strategy that Prof. H.A. Louw found in France during his study of agricultural education systems at European universities. ***A careful study of his report is appropriate at this point.*** With good communication and proper mutual planning one can foresee that one could possibly get an agreement that such students could be admitted to the third year for a National Diploma in Agriculture at the TUT.

The agriculture curricula at the "academic" universities must be a suitable mix of in-depth basic science courses and practical training. The latter is required *inter alia* to acquaint students with farming practices. Regarding university education in general the late Prof. Mike de Vries, former Vice-Chancellor of the University of Stellenbosch, said that the ideal is that a graduate must be able to do a job the day he/she steps out of the university, but must also understand the basic principles well enough to be able to adapt to new developments. One could probably add to the latter that they must also be able to develop new technologies. This approach is probably even more true for agriculture than for any other field. In my student days at the University of Stellenbosch our training was such that at the end of my second year I could step onto my uncle's farm to manage it when he had to go to hospital at a time of year that I have never been on the farm before. Based purely on my university training during that year I could manage it successfully and save the harvest by identifying and solving a tricky problem. But from a basic science point we also had as co-major the full chemistry that BSc students majoring in chemistry had and all the plant physiology that students majoring in Botany had. It was compulsory for all the agriculture students to work at least one summer holiday on an approved farm before the start of your final year and to write a critical report on the farm and its management. Even now it is for the students majoring in Oenology at the University of Stellenbosch compulsory to work in a cellar during harvest time before the commencement of their final year.

At American universities there are different types of hands-on training from which we can learn. At Utah State University in Logan each undergraduate agriculture student is given a small patch of land on which he/she ***must*** grow any crop(s) of his/her choice. He/she may dispose of the produce in whaever way he/she wants – eat it, sell it for

pocket money, whatever. A special professor is dedicated to supervise the course. At another university the final year agricultural economics students have to manage a university farm. They have to take the management decisions, etc. In the Philippines the President of Central Luzon State University went a step further by inviting a farmer who had developed a highly successful aquaculture system to replicate it on the university farm. Enshayan *et al*. (1992) further states: *"The farmer, who had four years of formal schooling, was awarded adjunct professor status and conducted seminars for faculty and students."*

With South Africa's limited agricultural resources and its huge differences from Europe and America ***it is essential that top-grade candidates must be enticed to study agriculture***. In the 1950s there were some of us that were in the top ten in our provinces in matric who studied agriculture. All those that I know of became university professors and played big roles in agriculture in South Africa. In order to achieve this ***the image of agriculture must firstly be improved*** – and especially that of the ARC as main employer of agricultural researchers in the country. Secondly, ***bursaries*** must be made available to enable these candidates to study agriculture. Traditionally, the state has been the main source of bursaries for undergraduate studies in agriculture. Until a few years ago the ARC provided quite a number of bursaries annually, and they were good bursaries. ***If*** (note *"if"*) my information is correct, this has changed drastically for the worse since 2000. According to the information there was in 2000 still 20 undergaduate ARC bursaries available, but the decision was that bursaries may be awarded only to Black students. In the end there were only eight suitable Black applicants and only eight bursaries were awarded. One can accept a decision to give preference to Black students, but to exclude other students after all the suitable Black candidates have received bursaries is something that the country certainly cannot afford. Furthermore, the ARC apparently dictated to the bursary holders to which universities they had to go. According to my information (if it is correct) no further undergraduate bursaries have been awarded by the ARC after 2000. If this is true, then it is not clear where the future ARC researchers are supposed to come from.

Researchers, especially those that will hopefully one day become research leaders, should have at least M degrees, and preferably doctorates. In the past the Department of Agriculture was the main sponsor of masters degree studies. The "rule" was that BScAgric graduates who had government bursaries had to go and work in their institutes or regions for one year, after which they were seconded back ***fulltime*** with full salary for two years to a university to do their masters degree. This was the most efficient way to ensure that they complete their degrees, and complete them in the shortest possible time. Nowadays the young ARC researchers have to do their masters studies inbetween their fulltime work. Because of their very full programmes, because they have to do so many projects so that their institutes can survive financially, this is a big battle and it takes long for them to complete their degrees. Furthermore, they have to find their own private funding to pay their university tuition fees. The recent announcement by the National Research Foundation (NRF) that they are going to award a large number of bursaries for post-graduate studies in agriculture must be welcomed, ***provided that it is handled correctly***. Correct and efficient handling of the bursaries should include at least the following:

a. In view of what has been stressed repeatedly before it is ***imperative*** that ***all*** the bursaries must all be awarded for study at ***South African*** universities.

b. All, or the vast majority, of the bursaries ***must*** be awarded for study in ***Faculties of Agriculture or in actual agricultural fields/disciplines*** in composite faculties. ***If*** any of the bursaries are awarded in pure natural science fields/disciplines ***these should be absolutely minimal***.
c. In the present South African situation, and knowing the approach of the NRF, preference will be given to awarding of bursaries to candidates from a specific group. Giving such ***preference could be accepted, but confining*** of the ***bursaries to only one group would be totally unacceptable***, because it will not be in the best interest of the future of the country.
d. ***I firmly believe in the principle that it is the prerogative of any post-graduate student to choose the university and department and in particular the specific supervisor/promoter under whose guidance he/she wants to do his/her M or D studies.*** To me this principle is not negotiable and ***bodies which award bursaries should not dictate to students in this regard***. In the end it backfires in any case. A few years ago the NRF made about six M and D bursaries available for Black students in a specific field at a specific university. No students wanted to take up the bursaries. The eligible students in that field wanted to study at another university, for good reasons, but they could not access the bursaries because they wanted to go to the "wrong" university. The outcome was that the bursaries were not taken up and the students who could have used them if the restrictions had not been imposed, had to try to obtain funding elsewhere. It did cause serious financial stresses for most of them.

3.13.3.2 Diploma training at agricultural colleges

As indicated earlier, there used to be two types of agricultural colleges, with different mandates, in South Africa, viz.

- The colleges falling under the Department of Agriculture and whose mandate used to be the training of ***farmers***, specifically White commercial farmers.
- The colleges falling under the South African government department (with its continuously changing names) responsible for the homelands and related areas and/or under the different homeland governments and whose mandate was the training of ***agricultural extension*** officers for the small-farmers of the homelands.

The ***diploma training for farmers*** combined theoretical instruction with hands-on practical training in farming technologies and practices. The practical training included aspects like artificial insemination of cattle, setting of planters, maintenance of tractors, wool classing, etc. Furthermore, at the college farms the students had to do the types of work that on a farm would normally be done by the farm workers, including things like operating milking machines, feeding animals and even cleaning out the manure from stables. Such "action training" is very important, because without it they would not one day be able to demonstrate to their farm workers how to do something correctly or be able to judge whether a farm worker is doing a job correctly and/or wasting time or not.

The colleges were in different agro-ecological regions and each college provided special training in aspects related to the main enterprise(s) of the region. Thus the Grootfontein Agricultural College at Middelburg in the Karoo focused on training in

smallstock farming. Elsenburg near Stellenbosch has always had a course in wine cellar technology. These are only two examples. Students from outside a specific agricultural region, who were interested in the specialised training of the college in that region, could enroll at that college.

The colleges were on the same terrain as the research institute for the specific agricultural region. The colleges were integral parts of their particular regional setups and were closely integrated with the research institutes of the regions. While the Faculties of Agriculture were still part of the Department of Agriculture until 1974, the three colleges that were in the regions where the faculties were, to some extent had relationships with the faculties. These were Cedara/University of Natal (Natal Region), Glen/University of the Orange Free State (Free State Region) and Elsenburg/University of Stellenbosch (Winter Rainfall Region). The relationship between Elsenburg and the University of Stellenbosch in particular was a very close interactive one. Elsenburg was, in fact, known as *The Stellenbosch-Elsenburg Agricultural College* ***of the University of Stellenbosch***.

Diploma level training of people towards equiping them with the knowledge and skills to become commercial farmers is presently more urgently needed than ever. Although it is still needed for "White" commercial farmers it is especially needed for new entrants into commercial farming, including people from amongst the emerging farming sector. ***It is most urgently needed for representatives from groups to which highly developed commercial farms are allocated under land restitution or land redistribution***. Persons with agricultural college diplomas are, of course, also well-qualified to become farm managers or foremen on commercial farms.

I am not sure exactly how many agricultural colleges there were for the ***diploma level training of extension officers for the small-scale farmers*** of the homelands, but there were at least six. I presume they all still exist. They are all situated in remote rural areas and all are on college farms on which students can gain practical experience. Training of large numbers of such extension officers is still required. In the past their training left a lot to be desired and their approach in their work situation was often wrong. One of the problems pointed out by small-scale farmers that they had to serve, was their ***lack of technical know-how*** to give the necessary advice. In the middle 1980s I partipated in an informal survey in Mdantsane, then the second biggest township in South Africa. A characteristic of Mdantsane is its urban agriculture. People of Mdantsane complained that the extension officers did not know enough about vegetable production, the type of agriculture that they were practising, to advise them properly. Diploma level extension officers can certainly not be expected to be high-flight experts in a certain field, but it is clear that they each need at least a limited degree of specialisation in the main field that their farmers are involved in.

A serious consequence of the inadequate technical knowledge of diploma level extension officers was that they blindly recommended technology packages that were designed for their areas. Worldwide the fact that small-scale farmers often did not adopt technology packages was ascribed to the ignorance of the farmers and that improved extension methodologies would solve the problem (Smith, 2003). In the 1990s the conclusion was reached that the problem in most cases was not the farmer or the extension methodology *per se,* but the inappropriate technologies that the small-scale resource-poor farmers were expected to adopt (Smith, 2003). A major

problem for the diploma level extension officers in the homelands was the practically total lack of subject matter specialist backup for them. Such posts and specialists simply did not exist in the homeland departments of agriculture.

The homeland extension officers apparently also had an attitude and approach problem in the sense that one got the impression that they did not see the small-scale farmers as the decision-makers. There sometimes seemed to be a tendency to think that they had to take the decisions and the farmers just had to implement them. This is, of course, an important aspect that will have to be addressed in their future training. They will have to be trained in the skills to actually be facilitators and to work in partnership with the farmers.

What Smith (2003) says about the training of trainers of farmers, should be equally, or even more so, true for the training of extension officers: *"They need to go through the experience of carrying out out all cultivation practices themselves – essentially to become farmers themselves in order to build respect for farmers and enhance their own self-confidence in their interaction with experienced farmers."*

3.13.3.3 Agriculture as subject in schools

I don't know what the present situation is, but agriculture used to be a subject at all Black rural schools. Some attention was given to it at primary school level. At junior high school level, i.e. in Grades 8 and 9 (Standards 6 and 7), it used to be compulsory, becoming an elective at senior high school level (Grades 10, 11 and 12).

When I was asked to draw up some proposal for agriculture in ***primary schools*** in Transkei in about the late 1970s/early 1980s, I proposed that it should be more an ***awareness programme*** to cultivate an understanding of climate and seasons and of man's dependence on agriculture for food, etc. One specific proposal was that in a certain grade a big calender should be made and put up on the classroom wall. The children should then be divided into small groups. Each week a specific group should be responsible for filling in their climate observations each day, some of it for the previous day: Was it hot or cold? Was there frost? Did the sun shine or was it cloudy? Did it rain? Did it rain much? Did the wind blow? Was it strong? Did it hail? Etc., etc. Another calender could be concerned with a recording of agricultural activities that they observed. Eventually the significance of the matching between the climate calender and the agricultural activity calender should be stressed. This type of approach would fit in perfectly with the present Outcomes Based Education (OBE) system, much better than with the system that existed at the time. In OBE, learners at the moment have to complete climate tables for about four consecutive weeks each year. I believe that a full year calender, and as a large wall mounted poster, will illustrate the concept of seasons and their importance much better than short term tables in the working file of each learner alone. Furthermore, I believe actual observations by learners in their own area will be much more valuable than recording what is reported on television. This will especially be so in rural areas where learners walk to and from school.

The ideal is that at ***high school*** level Agriculture should comprise ***both theoretical and hands-on practical training***. For just about all the schools it would be impossible to have a school farm. For most it would not even be possible to have a school garden

close to the school, because many schools are situated on rocky hills or in other sites which do not have the potential to establish a successful garden. I don't know whether they have improved, but in the past I was very upset with the high school agriculture syllabi. In my opinion they were not well-structured and contained too much high-flight theory instead of concentrating on relevant topics at an appropriate level. In some cases topics were included that, especially at the level required in the syllabus, would quite frankly be impossible to understand or master by someone without at least an introductory level university course in Chemistry. I don't know whether they have been substantially improved, but the school agriculture handbooks in my view in the past left a lot to be desired.

There are presently apparently drives to establish vegetable gardens at all (or most) schools to produce some food for the surrounding community and as demonstration plots for the communities. Where the resources (soil, climate, etc.) are suitable for successful establishment of a school garden, this is an excellent idea. To gain the maximum impact from it, *it is **absolutely** imperative that the **pupils must** do all the work in the school gardens*, even in the case of primary schools, and must not just be spectators. The same should be the case when grass has to be planted on new sports fields for a school, or where existing fields are replanted. This was the way that it worked when I was at school. It is very important for establishing a work ethic and an ethic of having to do your part as member of a community, instead of becoming a parasite for whom others must do the work.

3.13.3.4 Farmer training

At no point in the history of South Africa was there a more urgent need for ***proper and appropriate*** farmer training than at the moment. It poses a major challenge because of the huge diversity in types of farmers that have to be catered for. There are major differences in terms of levels of education, farming experience, economic, social and cultural backgrounds and environments in which they have to operate, etc.

It is important for everyone involved in agricultural research, extension and farmer training to realise that the divisions between research, extension and farmer training have largely disappeared and that to be effective they very much have to merge with each other. It is often quite difficult for old style researchers and extensionists to grasp and/or adapt to this. "Old style researchers" do not necessarily mean old ones. They are often very young ones, just out of university, who have been trained in a system with the attitude of: "Graduates are the only clever ones who know best. We must just get the ignorant farmers to adopt and implement our new findings and technologies." The young ones may actually be the ones finding it most difficult to change from this attitude, because they are still at the age where they tend to believe they know everything. On the other hand dynamic young ones whose heads have been turned the right way during their university education or early in their careers and who intensively study new international publications on farming systems research and new approaches to extension and farmer training, are making very valuable contributions in South Africa at the moment. Several of them are at the ARC-Institute for Soil, Climate and Water, for example.

With a view to a discussion on farmer training, farmers in South Africa can perhaps best be grouped into five main groups, but with wide diversity within each group. These are:

a. Traditional small-scale farmers, including subsistence farmers.
b. Home garden and small-scale foodplot vegetable growers.
c. Emerging farmers and small-scale commercial farmers.
d. Medium to large scale commercial farmers
e. Land restitution/land redistribution "farmers".

In the ***traditional small-scale farming areas***, mainly with rainfed cropping, farming systems research-extension approaches, integrated with hands-on "action training" of farmers, should be used. The new approach is for the trainers to be development facilitators rather than instructors (Smith, 2003). Although much of this is seen as new, many of the basic principles were established long ago. Thus Hernandez in 1977 already stressed the importance of starting from identifying what the farmers do, how they do it and why they do it (Laker, 1978a). Furthermore, the emphasis is now on helping people to learn, not on teaching them "what they need to know" (Smith, 2003). One strategy for this is the *"Farmer Field School"* (FFS) approach, for which FAO (2000) gives an outline of the characteristics and principles and which is discussed by Smith (2003). It should be kept in mind that Farmer Field Schools are not in fact schools in the formal sense of the word and does not involve actual teaching. It is a totally "non-formal" learning process, with the whole emphasis on "learning by doing". I believe one should actually drop the term "school" totally, because it creates a wrong impression. The purpose of this approach, according to FAO (2000) is that of *"creating a learning environment in which farmers can master and apply specific land management skills.* ***The emphasis is on empowering farmers to implement their own decisions in their own fields."*** The fields of the participating farmers constitute the actual learning place (FAO, 2000).

FAO (2000) spells out the roles of *"extension workers"* and *"scientists/subject matter specialists"* in the above learning process very clearly:

- The role of the ***extension worker*** is that of a facilitator, who *"takes a back seat role, only offering help and guidance when asked to do so. Presentations during group meetings are the work of the farmers not the extension worker. The extension worker may take part in in the subsequent discussion sessions but as a contributor, rather than leader."*
- *"The role of* ***scientists and subject matter specialists*** *is to provide backstopping support to the members of the FFS and in so doing learn to work in a consultative capacity of farmers. Instead of lecturing to farmers their role is that of colleagues and advisers who can be consulted for advice on solving specific problems, and who can serve as a source for new ideas and/or information on locally unknown technologies."*

Not even knowing at that stage of these FFS statements or an FFS approach, the description above for what extension workers and scientists/subject matter specialists should do, it is exactly what Lunga Maswana did in her very successful facilitation of problem solving in and by the Madliki community (Maswana, 2001; Maswana & Laker, 2001).

Because the FFS type of approach amounts to "action" research/extension/training throughout communities and it spans whole growing seasons, its cost to a government in terms of salaries, transport, etc. for extension workers (and scientists) are very high. Much of it has to be done in very remote areas. Its strength is that its findings *"are always consistent with local conditions"*. This is very important. In order to reduce the load on researchers the ISCW researchers launching such types of programmes in remote areas, like East Pondoland, took a route of doing "farmer-led" FFS type work together with "leader farmers". Activities also, *inter alia*, included "farmer forum meetings" and "participatory monitoring and evaluation". During the process leader farmers are also trained to be facilitators within their communities. The fact that within these remote "deep rural" traditional tribal areas in some cases leader farmers had increases in maize yields from as low as 0.1 $t.ha^{-1}$ to 2.0 $t.ha^{-1}$ or 1.5 $t.ha^{-1}$ to almost 4 $t.ha^{-1}$ is very promising in terms of what can be achieved within such type of community setup, without changing its basic structure. The success of Maswana (2001) at Madliki was also achieved at community level, within a traditional tribal structure context.

The rural communities have ***strong cultural traditions*** that should be respected if any progress is to be achieved (De Lange, Adendorff & Crosby, 2000; Maswana, 2001; Maswana & Laker, 2001) ***In this regard it is wise to consider each group as unique and not to generalise*** (De Lange *et al*., 2000). Also in this regard it is important for the facilitator to *"**listen well to inputs that relate to the cultural values**"* (Maswana & Laker, 2001).

In the case of ***foodplot and home garden vegetable producers*** training/facilitation will have to include improved water management as highest priority. These should include attention to both water harvesting and improving irrigation efficiency. In these small intensive production systems techniques and approaches can be used that cannot be used for crops grown on a large field scale, e.g. grain crops. ***Improved water management on its own will not give optimum water use efficiency***, however, if other practices, like good soil fertility management, proper weed control, etc. are not also in place.

In private conversations, H.J. Smith mentioned that the ***training given to small-scale farmers*** (probably especially to foodplot and home garden vegetable producers) ***by some individuals/bodies is absolutely "hair raising"***. According to Adendorff some is "more than hair raising". Such *ad hoc* training by persons or organisations who do not have the background or know-how to do it correctly, should somehow be blocked. They do not only create confusion and damage the credibility of trainers, but also cause much harm for the people that they are supposed to be helping. Different types of errors are made by them: Some have never studied the principles of appropriate small-farmer training/facilitation approaches. Others do not have the technical/ scientific background to give appropriate advice regarding the site-specific feasibilities of specific technologies. Others just advocate general recipes that have been developed under totally different environments. Often it is a combination of all these. The only solution would be to provide proper training for these well-meaning, but ignorant, trainers/facilitators. ***"Training of trainers"*** is thus essential for successful small-farmer development (Smith, 2003; De Lange *et al*., 2000). I believe it is imperative for the Department of Agriculture/ARC to provide the necessary training opportunities for persons/organisations that wish to become involved in this

type of farmer training. Provincial governments should also give strong support. FAO (2000) emphasises that: "*Political support, appropriate policies and assured sources of funding to train facilitators are essential*."

Having ***properly trained*** persons employed and funded by non-government organisations and bodies, involved as trainers of farmers, will lessen the burden on the National and Provincial governments. It is very important that Government should be in control of the training of these trainers, however.

The trainers of trainers must be SOUTH AFRICANS

- Who know the local resources, conditions and people.
- Who have studied the latest approaches thoroughly.
- Who have extensive field experience in developing areas and communities ***in the country.***
- Who have proven success track records.

First and foremost in this category of suitable "*trainers of trainers*" one would think of Hendrik Smith of the ARC-ISCW and some other young ISCW scientists ("White" and "Black") with collaborative experience in this field, Lunga Maswana from the Eastern Cape Department of Environmental Affairs, who is also highly regarded by her former ARC-ISCW colleagues (a "must"), and people like Marna de Lange, Johan Adendorff and Charles Crosby, to set the process in motion.

Training for ***emerging and small-scale commercial farmers*** should have a lot in common with the FFS type of approach (De Lange *et al.*, 2000). Thus for these farmers the trainers must also be people with an appropriate background and approach. The latter is extremely important for small-scale commercial irrigation farmers on the schemes that are being revitalised at the moment. For them the FFS principles that ***farmers must learn to master and apply specific management skills*** and that ***the emphasis must be on empowering them to implement their own decisions on their own fields*** are particularly relevant. If this is not done, then the schemes are bound to become prescriptive consultant-managed setups again, with the "farmers" again being no more than "glorified labourers", as in the homeland days. Learning from successful, wise peer farmers will be extremely valuable for these farmers. Examples of such peers would be the farmer at Nwanedzi, mentioned by Du Plessis & Van der Stoep (2001) or some of the innovative farmers that used to be at Middle Letaba (if they can be found again). Amongst the many aspects that emerging and small-scale farmers must obtain skills in, are:

- ***Marketing*** of their produce, including what to grow, when to plant it to catch the market at the most profitable time, etc.
- ***Labour management*** and having to cope with the present rigid and restrictive labour laws, which are not "agriculture friendly", and interference by labour unions. Recent results by Van Averbeke and his co-workers in a provisional progress report on a study in an area in Limpopo province showed that small-scale farmers who employed permanent, full-time labourers had very low benefit/cost ratios and profits. Those who employed only casual labourers ("piece workers") did much better.

Medium to large scale commercial farmers need training in the more basic principles of "scientific" farming, as well as appropriate farming technologies and practices.

These would necessarily include college training, but also learning from successful experienced farmers, as earlier indicated. Mentorship becomes very important, especially for new entrants, as indicated earlier. In a well-established family setup, a father is often (perhaps even usually) the best mentor that his son(s) can have. Adaptations have to be made ***judiciously*** to keep in line with new developments, but radical "quantum leaps" to modernise more often than not lead to economic/financial disasters and bankruptcy. The wiser old experienced, more conservative head, can counteract this. It is often good for such youngster to go and work (as foreman or assistant manager) on a top farm with successful management for gaining experience, especially in regard to decision-making, before embarking on his/her own. This is also advisable for new entrants into commercial farming in South Africa. Referring to Ohio state, Enshayan *et al*. (1992) mentioned the possibility of *"a statewide farm apprenticeship program for new and/or young farmers-to-be to work with more experienced, innovative farmers"*.

It is interesting to note that the present diploma programmes of the Elsenburg Agricultural College near Stellenbosch is doing exactly this: A student is at the college for one year for theoretical training. Thereafter he/she must work on an approved farm in his/her preferred field of specialization as a foreman/assistant manager for two years. Thereafter he/she must write a comprehensive report on this work. If the report is approved, the student receives the diploma. This is "apprenticeship" as good as one can hope to get.

Regarding extension, the importance of dynamic study groups and district farmers' associations was mentioned (See Section 3.13.2). These could be very important forums where farmers can learn from each other, if handled correctly. New farmers can also learn a lot from top farmers in the groups during discussion sessions of these organisations. In addition to technical factors, crop management, marketing, etc. commercial farmers also have to increasingly acquaint themselves with the implications of politics (international and national), especially agricultural politics, for their farming operations, as stressed by Enshayan et al. (1992). They advocate workshops providing training to farmers in these. A major change that commercial farmers presently have to learn to adapt to in South Africa is the new labour laws, which are not agriculture friendly and the new phenomenon of labour unrest on farms. When these cropped up in America some 25 years ago, it was easy for them to virtually overnight mechanise operations that were previously unthinkable. Farming operations were converted over a wide front to family operations with little or no hired labour. ***Training in how to handle the new difficult labour situations should be a high priority***.

The most difficult and complex farmer training will be the training ***of land redistribution/land restitution "farmers"***. I put "farmers" in inverted commas, because it is clear that many of the people acquiring farms under these programmes don't actually want to be farmers and have no intentions to learn how to become commercial farmers. The problem is that a large proportion of them have no farming background, in any case not of commercial farming or any training in agriculture. Meanwhile they are overnight taking posession of highly developed modern commercial farms, many of which are growing highly sophisticated high value export crops. In the case of grain farming, or other annual crop farming, the mentorship approach of Harman (2003) seems to be the only way that farmers could in the short

term learn to farm. On the high value perennial crop farms, it seems that involving experienced managers may be the only way to avoid destruction of the farms. The ideal would be for the community to nominate a few community members to work with such manager, in order to become trained in the farming practices, and especially in decision-making. As a longer term policy, members from each such community should be sent to college and/or university for training and then return to play leading management and decision-making roles at the farm of that community. This will be elaborated further in Chapter 5.

3.13.3.5 Lessons from California

One can argue that California, being the fifth richest state in the whole world and having such immense fertile valleys, cannot really have any significance in regard to agricultural education and training in South Africa. Certain things are certainly way out of line for the South African situation, but others are worthwhile to note.

What I give here is a summary of a comprehensive explanation that I obtained from the world-famous Dr. Donald R. Nielsen, retired Professor of Soil Science from the University of California Davis:

> The California Master Plan of Higher Education recognizes three types of higher education supported by state funding. These do not include the private colleges and universities.
>
> ***At the top is the University of California (UC)*** with its 10 campuses. (Last that I knew, the 10 campuses had a total of just over 250 000 students.) Only students in the top 12.5% graduating from high school are eligible to enroll directly into the UC system. (Others can get in via other means, as will be explained later.)
>
> Until about 30 or so years ago agriculture was offered at several of these campuses, but it was then rationalised to being offered at only three (Davis, Riverside and Berkeley). ***Agricultural education at these three UC campuses is totally integrated with agricultural research and extension in the state.*** Thus the Division of Agriculture of the UC system has its own Vice-President (=Vice-Rector) for the entire state. He is also Director of the California Agricultural Experiment Station, as well as Director of Cooperative Extension, in which capacities he is responsible for about a dozen experiment stations located throughout the state in selected soil and climate conditions where experiments are conducted by researchers and extensionists. This integration is also reflected by the three different types of *"academic appointments"* ***within*** the Colleges (= faculties) of Agriculture in the UC system, viz:
>
> i. Instruction and Research (I & R) appointments in a college at a particular campus, i.e. the lecturing staff. *"The I portion is that of the highest educational instruction in the state, reflecting cutting edge education supported by up-to-date research. The R portion is that needed to be at the cutting edge of research in your discipline."*
> ii. Organized Research (OR) appointments within the California Agricultural Experiment Station. The research at the California Agricultural Experiment Station should *"help the quality of teaching within the University, but its prime focus is to improve agriculture and* ***rural***

America. *"* Persons in these posts have a 100% task to conduct cutting edge research.

iv. Cooperative Extension (CE) appointments within the state-wide Division of Agriculture, whose task is *"to conduct applied research, interact with those having I & R and OR appointments, to extend knowledge out to the public of California, primarily, but not exclusively, for agriculturists."*

Although it is for all above three types of *"academicians"* important to publish, they also have to excell in other defined areas, such as university and public service, professional activity and (for the lecturing posts) teaching. According to Don Nielsen: *"I've been on many, many review committees that have denied promotion even though the person had a marvellous publication record."*

The next tier is the California State University system, also with a number of campuses. Many of these institutions teach agriculture. The next 25% of students graduating from California high schools, i.e. those between 12.5 and 37.5% from the top of the list, may register at these institutions. At these institutions all academic faculty have I (100% instruction = teaching) appointments with no time allowed specifically for independent research. These academics are judged primarily on their teaching and not on any research that they do in their own time. Although these posts are sometimes called "teach or perish" posts, teaching alone will not get one promoted, you must also excel in two additional fields, viz. university and public service, and professional activity (towards which own time research may count).

The third tier is the California Community Colleges, which offer two-year *"degree"* programs. Agricultural subjects are taught in most of these community colleges. *"Regardless of a person's academic achievement in high school, any person graduating from high school in the state is allowed acceptance into a community college."*

In view of what I wrote earlier regarding my experiences at Fort Hare and at the University of Pretoria regarding student's whose high school performances belied their true potential and the need to give them opportunities on the basis of good college and university performances, the follow remarks by Don Nielsen should be studied very seriously:

*"**The process of articulation is well managed between all of the above three kinds of institutions**. In other words, it is well known which particular course taken at a particular community college will count towards credit when a person transfers to another community college, to any one of the particular California State Universities, or to any one of the campuses of the University of California. Or, similarly, which courses are allowed to be transferred from one of the particular California State Universities to any one of the campuses of the University of California.*

*In summary, any person graduating from high school can attend any community college. Upon making a **required high level** grade point average in a community college program of articulated courses, the person can transfer and be admitted to any particular campus of the California State University system or the University of California. Similarly, a person not in the top 1 out*

of 8 (12.5%) *high school graduates but in the next 2 out of 8 can be admitted into the California State University system, and if the person makes the* ***required high level*** *grade point average in the California State University system program, the person can transfer and be admitted into the University of California."*

The significance is that persons with poor high school performances, not even qualifying for admission to the California State University system, can gain admission even to the top tier "cutting edge" University of California on the basis of good performances at a community college. Or those just outside the top 1/8 can do it via good performances in the California State University system.

Finally, four critically important principles to highlight from Don Nielsen's communications are:

- The total integration of top-tier agricultural education and state-wide research and extension under one umbrella, ensuring interaction between lecturers, researchers and extensionists.
- That the prime focus is *"to improve agriculture and rural* ***America****"*. ***Our prime focus must be on improving South African agriculture and rural South Africa.*** We must once and for all get away from the syndrome that a South African agricultural researcher or professor will only get a high rating if he/she publishes overseas and try to impress and please the Americans and other northern rich country scientists. My own experience was that you get high international recognition by doing good work in and for your country. Unfortunately it did not lead to local recognition and proper research funding.
- That scientific publication is important, but there are other tasks that are equally important and may not be neglected in a drive towards publishing at all costs.
- In South Africa there should be even more than in California a system that will allow students to move up to higher tier tertiary education systems on the basis of top performances at institutions like colleges. ***Conditions for transferring and upgrading must be articulated well.*** A "free for all" will do nobody any favour, least of all students that have not been able to prove themselves.

CHAPTER 4

PROPOSED GENERAL STRATEGY FOR OPTIMISING THE EFFICIENT USE OF PRIMARY WATER AND LAND RESOURCES FOR EFFECTIVE ALLEVIATION OF RURAL POVERTY, WITH SPECIAL REFERENCE TO IRRIGATED AND RAINFED CROPPING FOR SUBSISTENCE FARMING COMMUNITIES AND EMERGING COMMERCIAL FARMERS

4.1 INTRODUCTION

As indicated earlier, the objective here is to just propose a general strategy and not to discuss or describe detailed practices, etc. to implement. It is attempted to keep discussions as straightforward and as brief as possible, with a view at the audience for which it is intended. Those who wish to have more background information on specific aspects are referred to the relevant sections in Chapter 3.

Land restitution and land redistribution are discussed in Chapter 5.

4.2 HOLISTIC APPROACH REQUIRED

Optimising the efficiency with which primary natural resources are used, firstly requires a holistic approach. Thus, this must be the overall principle guiding the strategy. Although correct understanding of scientific principles and implementation of appropriate technologies are critically important, these alone will not give success. Social, cultural, socio-economic, political and various other factors must also be considered. Non-agricultural factors are often more decisive than farming practices.

Various facets forming components of such holistic approach are dealt with in the following sections.

4.3 ENSURE POLITICAL COMMITMENT

Ensuring the required political commitment is the most critical step in any strategy aimed at agricultural development. Without such commitment is is extremely difficult, if not impossible, to bring about the development that is needed for optimising natural resource use and alleviating rural poverty.

Political commitment is required from both the government side and opposition side. Both the ***national and provincial governments*** should be made to realise and accept their responsibilities regarding the following (and many more not mentioned here):

- Creating conditions that are conducive to the creation of the maximum possible employment opportunities in fields outside agriculture (industries, etc.) so as to relieve the pressure on the land.
- Creating social, socio-economic and legal conditions that will enhance stability in rural areas that will be conducive to successful farming, e.g. reduction of crime (especially theft), labour laws that are fair, but not restrictive, etc.
- Creating and maintaining the physical infrastructure and support services required in rural areas for sustaining successful, profitable agriculture.

- Creating and maintaining the necessary agricultural research, extension and education/training structures and facilities to both promote agricultural development, especially in the small-scale farming sector, and maintain effectiveness of commercial agriculture in regard to providing national food security and remaining internationally competitive.

Opposition politicians have equally big responsibilities. On the one hand it is their responsibility to ensure that government fulfils its responsibilities. On the other hand it is their responsibility to refrain from involving themselves in anything that would hamper agricultural development and/or the effectiveness of commercial agriculture. Negative actions by them could be due to ignorance or deliberate for short-term political gain, to the detriment of rural populations, and especially the rural poor.

Extra-parliamentary bodies, e.g. agricultural unions, labour unions or pressure groups can likewise have either positive impacts or very negative, even destructive, impacts, to the detriment of especially the rural poor.

4.4 ENSURE THAT POLITICIANS, OPINION-FORMERS, PRESSURE GROUPS, THE MEDIA AND THE PUBLIC KNOW *AND ACCEPT* THE REALITIES REGARDING SOUTH AFRICA'S LAND AND WATER RESOURCES AND THEIR GEOGRAPHIC DISTRIBUTION

The biggest potential for drastically improving the efficiency of the use of water and land is in former homeland areas with moderate to high (amongst the best in the country) potential for dryland or irrigated cropping. Some of these areas can become the food baskets of the country. As indicated in Chapter 3, these areas have consistently been portrayed as useless areas with little or no potential to which some population groups have been confined to become destitute. As stated earlier, this has been an effective propaganda tool against apartheid. The problem is that people have been so indoctrinated and brainwashed with this idea that it is now very difficult, even virtually impossible, to "debrief" them to accept the realities and to throw in their weight behind strategies and efforts to unlock this potential, to the benefit of the poor rural populations in the areas. They seem to have developed a total "brain blockage" in this regard.

A key facet in a strategy to bring about optimum resource use, alleviate rural poverty and promote food security must be to urgently find a way to break this "brain blockage" about the agricultural potential of significant parts of the former homelands. Unless politicians, opinion-formers and pressure groups convince themselves of the potential of these areas, no meaningful urgent steps to develop them will be made or supported.

At a course for senior defence force officers, one asked me why is it that Vaalharts is on the good soils and Taung (the Black irrigation sheme neighbouring it) was put on inferior soils. I pointed out to him that we once had a series of experiments on farms including both Vaalharts and Taung and that basically the soils were identical. Under good management Taung has the potential to perform just like Vaalharts. He responded by: "How are you going to convince me?" My response was: "Get someone to sponsor our expenses (for transport, etc.) and I will go and show you."

The latter made me realise that ***the only strategy to break the brain blockage would be to take some influential people in key positions on field trips*** to at least a few of these areas. The condition should be that those on the field trip should be willing to visit remote areas and to spend time to actually look in soil pits and not just superficially on the surface. Comparisons at adjoining places like Vaalharts and Taung, or Levubu and nearby underdeveloped (or undeveloped) areas in the former Venda, with similar or higher potential than Levubu, would be important. Very significant would also be visits to sites where the ARC-ISCW researchers have had successes in Mpumalanga, and especially in Lusikisiki and Bizana in the Eastern Cape, because this will prove the potential of the areas by means of what has been achieved even by some traditional small-scale farmers with improved farming practices (and in some cases even with their own practices). Such visit(s) should be conducted together with the researchers involved. Various other areas, including some abandoned irrigation schemes, with inherently high potential would also be important to visit, especially where these are not on present revitalisation programmes. Keiskammahoek, for example, comes to mind. *Bodies that should seriously consider organising and sponsoring such field visits are the* ***Water Research Commission*** *and the* ***Public Support Services division of the ARC.***

Influential people like the Reverend Makhenkesi Stofile, at the time of the compilation of this report premier of the Eastern Cape, who is, for example, aware and convinced of the agricultural potential of the former homeland areas of the Eastern Cape, especially East Pondoland, ***and is keen to develop it***, could play a decisive role to help others in key positions to believe and accept the reality that there are significant areas with high agricultural potential in the former homelands, ***and of the importance for the well-being of the rural population that these be developed urgently***.

4.5 STRIVE TOWARDS REDUCING THE NUMBER OF SUBSISTENCE FARMERS TO THE ABSOLUTE MINIMUM ACHIEVABLE AND TOWARDS OPTIMISING RESOURCE USE EFFICIENCY IN THE REMAINING SUBSISTENCE FARMING SECTOR

As pointed out in Chapter 3, resource use efficiency is very poor under subsistence farming, both in terms of production per unit water and production per unit land. This is especially the case for high potential land with high rainfall and soils with good physical properties, but low plant nutrient levels and availability. Apart from poor resource use efficiency, it also leads to serious land degradation. Importantly, it also does not offer a proper standard of living to subsistence farming families or the opportunity to improve the quality of their livelihood.

In the quest of optimising resource use efficiency and alleviating rural poverty it is thus imperative to implement strategies ***to reduce the number of subsistence farmers drastically and to improve the resource use efficiency of the remaining subsistence farmers***. In order to reduce the number of subsistence farmers, ***there must be a strategy to draw them away from the land***. (Note: To draw them away, ***not*** to remove them.) This can only be done by creating employment opportunities for them elsewhere. ***Drawing them to towns and cities without equiping them with the skills required for jobs that are available, will be futile***, however, and cause them and their families to end up in worse circumstances than they had as subsistence farmers

(Laker, 1981). At the moment many of them flock to towns and cities in any case, where most of them end up unemployed, living in squatter camps.

The ARC-ISCW programmes in provinces like Mpumalanga and the Eastern Cape have proven that, ***provided that the potential of the land is high enough***, yields (and thus resource use efficiency) can be improved in subsistence farming situations. Many years ago Adendorff proved the same at Phokoane. In reality these farmers transformed from being subsistence farmers to being small-scale commercial farmers with surpluses to sell. But it is not possible if there are too many subsistence farmers and the individual patches of land are too small. The Phokoane success collapsed when close guidance was no longer possible. The ARC-ISCW programmes have not been in situations where the farmers had to continue on their own, and thus the sustainability has not yet been tested. Strategies to ensure sustainability of improved farming in these types of situations should be studied and developed.

4.6 PROMOTE AND STIMULATE INTEGRATED RURAL DEVELOPMENT

As outlined in Chapter 3, probably the most efficient way to create jobs that would draw people from dependence on the land for their livelihoods and at the same time create markets for farm produce close to the farms, is by means of integrated rural development. An example of such an area between the White Kei river and Butterworth, for which proposals were drawn up about 20 years ago was mentioned. A comprehensive guideline proposal for the former Ciskei was also developed by Page (1982a,b). Since these were based on sound surveys and approaches, their principles are still valid. Thus they can at least serve as starting points that will save a lot of time and money when considering such developments.

According to reports there is a new drive towards promoting the shift of certain types of industries to “coastal areas”. Since such strategy would have a major positive impact regarding improving resource use efficiency in agriculture and alleviation of rural poverty in areas like the former Ciskei and Transkei, it must be supported strongly – provided that it is done correctly. I know that there are numerous factors to consider, but water is undoubtedly one of the most important key factors, especially in a South African context. The Western Cape coastal areas do not offer opportunities for expansion, due to water scarcity. The same is the case for the southwestern part of the Eastern Cape, south of the Keiskamma river. The Fish river, Sundays river, Nelson Mandela metropole, etc. are, in fact, dependent on water supplementation from the Orange river. With the diversion of a large percentage of water from the Orange river system to Gauteng the potential for increased supplementation from this source is limited. From (and including) the Keiskamma river basin northeastwards through the Eastern Cape there is, however, abundant water available that presently is hugely underutilized and these areas should be targeted in a strategy for integrated development, including the establishment of light industries. There are a number of major tarred roads and railways that could serve as development axes. These are also the areas with substantial potential for the development of Black farmers, in view of the inherent moderate to high quality of significant areas of the land.

For this strategy to be effective in drawing as many people away from dependence on the land it is imperative to promote labour intensive industries. Labour intensive

industries can be attracted ***only*** if it is ensured that the labour is affordable, productive and reliable.

The Eastern Cape also has tremendous tourism potential which in the former Transkei is greatly undeveloped. Everybody has heard about the tourism potential of the Transkei's Wild Coast. Not many people are probably aware of the exceptional tourism potential further inland, however, including the mountains, indigenous forests and whole series of beautiful waterfalls, like the Magwa, Tsitsa, Tina and Mzimvubu falls – and the attractive areas to walk through to get to them. Tourism development will benefit agricultural development in the area in at least three ways:

a. By creating employment that draws excess people away from being dependent on the land.
b. By promoting the development and maintenance of physical infrastructure, like roads, that greatly will benefit agriculture in the areas also. Infrastructural development is also a benefit that agriculture derives from the development of industries in an area.
c. By creating additional local markets for locally produced agricultural products.

The former Transkei is used as example for this strategy, because it is so ideal for its successful application, but the possibilities for it in other areas in the country should also be investigated. In most other areas water scarcity most probably will be a serious limiting factor, however.

4.7 ENSURE THAT ALL UNUSED OR UNDERUTILISED AGRICULTURAL LAND WITH DRYLAND CROPPING OR IRRIGATION POTENTIAL IN THE FORMER HOMELANDS AND STATE LAND ELSEWHERE IS BROUGHT INTO PRODUCTIVE USE

There is a lot of unused or underutilised agricultural land in several of the homelands, as outlined in Chapter 3. Some of these have high dryland cropping or irrigation potential and/or adequate to abundant water for irrigation. Some of this land used to be highly productive commercial farms before being bought out and incorpoated into the homelands for the purpose of homeland "consolidation". Furthermore, there are a number of former small farmer irrigation schemes with ***high*** potential that are in disuse due to the collapse of the water supply infrastructures of the schemes after 1994, and which are for some inexplicable reason not in the list of schemes that are presently being revitalised. Because nothing is basically presently being produced on the neglected bought out farms and the collapsed irrigation schemes their resource use efficiency and their contribution to alleviation of rural poverty is zero. They offer the ideal settings for the settlement of emerging Black farmers, because here they can start from scratch and gradually learn the different important requirements for successful commercial farming as they progress stepwise.

As an integral part of a strategy to improve resource use efficiency and alleviate rural poverty, the situation regarding land lying idle because it has been abandoned by people who moved to cities or elsewhere and which is not being used by others ***who need land*** should receive urgent attention. The reasons why the land is not being occupied and/or used should be established, so that appropriate procedures for enabling others to use the land can be developed and implemented. Note that *this does*

not refer to cropland that has been abandoned, usually due to some form of serious soil degradation, *by people **still** living in the area* where the land is.

Before farmers are settled on the neglected land, disused irrigation schemes or abandoned land, it is essential that detailed resource surveys, appropriate land suitability evaluations and land use planning are done. It is imperative that the final land use planning be completed in consultation with the new farmer(s).

4.8 ENSURE THAT PROPER LAND USE PLANNING IS DONE, BASED UPON APPROPRIATE HIGH QUALITY RESOURCE SURVEYS AND LAND SUITABILITY EVALUATION

Optimisation of resource use is not possible without proper land use planning, based on appropriate high quality resource surveys and land suitability evaluation. With appropriate surveys is meant surveys at the required level of detail and during which the required information for a specific purpose has been collected. It is generally important, but especially for emerging commercial farmers, because they cannot afford to suffer losses due to cultivating non-arable land or implementing inappropriate technologies. It is also very important for irrigation development, including to enable selection of appropriate irrigation systems and technologies. I recently reviewed this for South Africa (Laker, 2003b), and will not discuss it in detail here. See also Chapter 3.

It is very important to exercise quality control over resource surveying, land suitability evaluation systems and land use planning approaches and practices in the country. In order to ensure this, it is essential that where tenders for these are given out to private companies, appropriate terms of reference are drafted and quality checks are made before the end products are accepted and final payments are made. To achieve this, terms of reference must be drafted or checked by appropriate independent experts, who must also make the final quality checks. Unfortunately, terms of reference are often drafted by people without the necessary knowledge. In worst case scenarios consultants actually draw up their own terms of reference. The terms of reference that have been drafted for the resource and land suitability evaluations for the revitalisation of irrigation schemes in the Eastern Cape are a matter for serious concern.

The ARC-Institute for Soil, Climate and Water is South Africa's "national resource centre". The data of all soil, land type, etc. surveys that have been conducted under the auspices of the South African Department of Agriculture over the past almost 100 years are stored and available here. The former homelands contracted private consultants to conduct resource surveys, land suitability evaluations and land use planning for them. ***It is extremely important to task the ARC-ISCW to urgently trace copies of these and other resource survey reports***, to check and amend them where necessary (because some have flaws) and to feed them into the national resource base. These surveys were made at great cost and should not be ignored or lost. ***It should also be made a legal condition that copies of all data and reports of FUTURE agricultural-related natural resource surveys done by private consultants for the South African national government, or a provincial government, with government funding MUST be submitted to the ARC-ISCW for inclusion in the country's***

resource data base, so that it can be extracted for future use where and when required.

In fact, I believe that there should be a stipulation in the laws of the country that all natural resource surveys in fields within the expertise of the ARC-ISCW required by the national and provincial governments and paid for with government funding MUST be tasked to the ARC-ISCW. It is unthinkable that such contracts are given to private consultants. As an important part of the ARC's Public Support Services division, the ARC-ISCW is the country's obvious institution to be responsible for collecting and storing the country's resource data and information. ***It is, of course, imperative that government must provide the ARC-ISCW with the necessary means in terms of manpower, funding, equipment, etc. to fulfil this role efficiently.***

There are some disconcerting trends that could seriously hamper optimisation of resource use effifiency. I have already referred to my concern regarding the terms of reference for the data collection for the revitalisation of the Eastern Cape irrigation schemes. In addition there is a very important stipulation missing, viz. that the consultants should have been instructed to first of all collect all available resource data and information and use this as basis to start from. In some cases it should not even be necessary to conduct new surveys at great cost. It is a normal acceptable strategy in resource surveying that you don't start a survey without first collecting and studying all available data, maps, etc.

A second, more permanent source of concern is the aversion of the Departments of Agriculture of one or two provinces towards the ARC-ISCW. In the case of Gauteng it sometimes appears to be hardly less than open antagonism from the provincial government's side. The latter statement is not based on hearsay, but on personal experience. This is not in the interest of optimising resource use efficiency in the province. In the ultimate case the province contracted private consultants without agricultural training, expertise or experience to compile an "Agricultural Potential Atlas" (APA) for the province, while the ISCW had not long before done the surveys that collected the data needed for such APA in virtually the whole of Gauteng and had the experienced experts that could compile the APA.

The aversion of Gauteng towards the ISCW stems from something that has for a long time been bothering myself also seriously and needs to be sorted out as soon as possible: The resource information, data, maps, etc. available at the ISCW have been collected and compiled with government funding and are, therefore, national assets that should be available free of charge (except perhaps for costs of making copies) to provinces for planning purposes, universities for teaching purposes, etc. But this is not the case. If someone, even a province, wants a copy of a report or map, or just some data, they have to pay the ISCW substantial amounts to obtain it. I agree with the Gauteng people that this is an unacceptable principle. On the other hand there are at least two valid reasons why the ISCW is charging even universities and consultants doing work for provinces substantial amounts for the data, maps, etc., viz.:

- It has been found in the past that bodies often sold data, maps, etc., which they received free of charge from the ISCW, to their clients. Due to such misuse of data, the ISCW is, of course, entitled to sell the data instead of making it available free of charge. One must, however, distinguish between selling of the data that was received as such (which would be illegal and unacceptable)

and charging fees for work done during using the data for new interpretations, planning, etc. (which would be totally legal and acceptable).

- The ISCW is receiving totally inadequate funding from government and selling the data, maps, etc. is a way of making money that is needed to keep the Institute functioning.

It is very important to urgently find some strategy by means of which the data, maps, etc. can be made available free or at low cost to enable the use thereof in the best interest of the country, while at the same time providing protection against its misuse – and providing adequate state funding to maintain the institute functioning. It is also very important to ensure good relationships and cooperation between the ISCW (and all other ARC institutes) and ***all*** provincial governments.

The awarding of the contract for the Gauteng APA was unfortunate not only because it was awarded to a private consultant instead of tasking the ISCW to do it, but perhaps even more so because it was awarded to environmental consultants. I had discussions with them and I came to the conclusion that these graduates in Zoology and Botany were good environmentalists and excellent persons, but that they knew very little about agriculture and did not really understand what would be required. *If optimum resource use is to be achieved, then* ***somehow a strategy should be found*** *to make decision-makers understand that there is a* ***huge*** *difference between agriculture and environmental sciences and that* ***agriculturists should be employed to do agricultural land suitability evaluations and land use planning***. In the same vein it is equally unfortunate and ***unacceptable*** that in recent advertisements of posts for ***agricultural*** land use planners in the Gauteng provincial government it was specified that applicants should have degrees in environmental sciences.

The above principles should of course not only be kept in mind in Gauteng, but right through all provincial gorvernments, as well as the national government.

4.9 ENSURE THAT APPROPRIATE TECHNOLOGIES AND FARMING PRACTICES ARE RECOMMENDED, ADOPTED AND APPLIED CORRECTLY

This appears to be so obvious that one would think that it should not even be necessary to include this as a strategy to improve resource use efficiency. Yet, the truth is that widespread failure to appreciate it and implement it is a major obstacle towards attaining optimum resource use efficiency and alleviating rural poverty.

A major problem is the failure to realise the importance of site-specific requirements and thus to generalise and to use “recipes”. Furthermore, scientists often look only at the technical side, e.g. the climate, soil, etc., forgetting the importance of non-technical factors. Details will not be discussed here. It has been addressed in Chapter 3 and several publications quoted there.

An extremely serious problem is that people, including researchers and extensionists, often have a perception that a specific practice should give good results under certain circumstances and therefore advocate it, despite the fact that research has proven that in the field it does not work under those circumstances and often actually gave negative results compared with conventional practices. Examples are the ***realities*** of

the findings regarding practices like minimum and zero tillage and water harvesting, as discussed in Chapter 3. On the other hand, the fact that a practice does not work under certain circumstances does not mean that it should be rejected everywhere. There may be other conditions under which it may be very successful.

Adaptation of practices like planting densities, planting dates and especially fertiliser application rates to climatic and soil conditions, and to non-technical factors, is extremely important for optimising resource use efficiency (Chapter 3 and Laker, In press).

Proper selection of appropriate irrigation technologies for specific conditions need urgent attention. On the one hand more attention should be given to the performance of specific types of systems under specific climatic and soil conditions. On the other hand economic factors, management capablities of farmers and other non-technical conditions should also be taken into consideration. It is amazing to find that people who should know much better, still recommend drip irrigation on coarse sandy soils, centre pivots on soils with extremely low infiltration rates, micro-sprinklers on soils where furrow irrigation would be the only means to get water into the soil, etc., etc. These are discussed in Chapter 3, together with giving a series of references. A problem is that there often seems to be an unwillingness to accept and acknowledge that there are conditions under which surface irrigation systems, especially furrow irrigation, are more efficient than micro-irrigation or big overhead systems. For small-scale farmers who do not have big capital resources, surface systems also have major advantages from a cost perspective. Especially where women are the irrigators the user-friendliness of a system must also be considered (Chapter 3 and De Lange, 1994).

Although Prof. Alan Bennie has built the concept of "***frequent deficit irrigation***", after starting the season on a full profile, very nicely into his BEWAB model, it is difficult to understand that this concept, developed and successfully implemented in water-scarce parts of America, has not gained wider application as ***a strategy for improving irrigation water use efficiency***, without reducing yields, in South Africa. ***Under South African conditions its value for improving water use efficiency has been proven*** by Vanassche & Laker (1989) for field crops and Fischer (1995) for tomatoes. It is incredible that ***the work of Fischer seems to be totally ignored***. See also Chapter 3.

As outlined in Chapter 3, it is imperative to look urgently at irrigation systems that have over many decades been proven to be highly efficient for small-farmer situations, but have thus far received little or no attention in South Africa and have actually not been implemented in South Africa:

- From a water saving/increased water use efficiency point ***clay pot irrigation*** should be seriously considered for foodplot vegetable production and home gardens. As indicated in Chapter 3, Daka (2000) has in Zambia proven that ***water savings of as high as 70%*** can be achieved by this technology.
- Secondly, the equally well-proven ***treadle pump technology*** (Chapter 3 and Daka, 2000) should be considered. Because it brings about ***up to 75% labour saving*** compared with rope and bucket systems it means that in small-scale family farming much larger areas of irrigated crops can be grown. The importance of adapting the pumps according to the wishes of local farmers and

of establishing rural backyard industries to construct and maintain them (Chapter 3 and Daka, 2000) should be kept in mind.

- Thirdly serious attention should be given to ***gated pipe*** technology, because of its obvious advantages in regard to reducing water losses in comparison with supply furrows and its simple way of increasing application efficiencies in furrow irrigation. See Chapter 3.

The wise strategy propagated by the highly successful Black irrigation farmer at Nwanedzi (Du Plessis & Van der Stoep, 2001) that any new emerging farmer should ***start small and gradually expand***, should be used as general strategy for such farmers. Uphoff and his co-workers also stressed the importance of starting where the farmers are and moving to new technologies on a small scale, so that the farmers *"are not exposed to the risk of major failures"* (Smith, 2003). The very simple fact is that a new farmer with little or no skills and/or experience of commercial farming, but an aptitude for farming could successfully manage a small enterprise, especially if it starts with *"simple, limited technologies"* (Smith, 2003), but will never be able to manage a large, complex enterprise successfully right from the start. Extremely simple technologies can be highly efficient, as will be outlined below. Starting on a small scale, with simple technologies, and expanding from there, has at least two advantages, viz.:

- Firstly, the farmer is in a position where he can expand and change to newer technologies in accordance with development of his managerial skills and as he gains experience that will enable him to cope with the increasing management demands. Thus his farming progresses in a sustainable way.
- Secondly, the farmer does not have to borrow huge amounts of capital at the start and stand a very high risk of losing it all due to his inadequate management skills at that point. As he/she succeeds in farming, profitable capital is generated that can be used for expansion and modernisation.

I wish to illustrate the success that can be achieved with extremely simple technologies and modernisation as capital is generated, by means of the following real-life experience on my uncle's fruit farm near Tulbagh: Recently one of my cousin's and I recalled how we "suffered" one very hot December "spraying" the peach trees with insecticide by means of dipping little "brooms" made from "renosterbos" twigs picked in the veld in buckets with an insecticide and sugar mixture and shaking these in the middle of the tree. Every time the bucket was empty, we had to go down to the river to prepare the next bucket full of mixture and trek up the steep hill to the next point in the orchard. Of course, a lot of the mixture ended up on our forearms during the shaking of the brooms, and we could not wipe off the sweat running through our eyes. Irrigation consisted of diverting water by means of sandbag weirs into earth furrows conveying the water to the orchards, where furrow irrigation was practised. ***But*** with these "primitive" techniques my uncle produced such high quality peaches that rich farmers from the district, with much more modern technologies, sometimes would come and get peaches from his farm as gifts for important people in Cape Town. He was also never satisfied with a grading of less than about 85% super grade peaches when delivered to factories. Different factories would also compete for his peaches, guaranteeing good prices on contract at the beginning of the season while the peaches would be hardly thumbnail big. As he generated capital, he purchased proper spraying equipment and built dams for storing

irrigation water, so that night-time furrow irrigation was no longer needed and eventually gravity pressure overhead irrigation could be introduced.

A final note, of importance to later discussions on labour: My cousin in the story was not the son of my uncle on the farm, but like me, member of the "extended family" helping on the farm during the labour-demanding December school holiday periods. Like me, he grew up in a town and his farming experience was these December holidays on the farm. Also, like me, he went on to study agriculture at university and became a fairly senior scientist/manager in a specific agricultural enterprise.

4.10 PROMOTE/EMPLOY APPROPRIATE LAND TENURE SYSTEMS

Land tenure system has a very big influence on resource use efficiency and on the possibility to alleviate rural poverty. Therefore any strategy to improve these must have a strong component focusing on land tenure. This has been discussed in Chapter 3 and over many decades in numerous publications and will thus not be addressed in any detail here.

4.11 STRIVE FOR THE INSTITUTION OF LABOUR LAWS THAT ARE FAIR TO LABOURERS, BUT FLEXIBLE AND REALISTIC ENOUGH TO CATER FOR THE SPECIAL CIRCUMSTANCES OF AGRICULTURE

The farm labour issue in general has been discussed in Chapter 3. It is presently a very emotional (and political) issue in South Africa, as it was in America some 30 to 40 years ago. In America, untimely labour actions (strikes) during seasons when farmers could not afford it (e.g. during harvest time) and introduction of a high minimum wage system led to the development of machinery that can perform types of farming operations that previously were unthinkable. In some cases the need for labourers was almost totally eliminated. Near Davis in California, I visited a farm that used to employ 200 labourers for tomato harvesting. At the time of my visit they no longer employed any labourers. The whole tomato harvesting (for tomato sauce production) operation was mechanised. Only four or so drivers were employed. The same with grape harvesting (for wine production), etc. For field crops the solution was bigger tractors and bigger implements, requiring fewer drivers – and often coming down to the farm family (men and women) being able to do all the work themselves.

All these technologies are also available in South Africa now and the large commercial farmers are able to increasingly mechanise. In those enterprises where labour cannot be eliminated, e.g. harvesting and packing of fruit for the export markets, the trend will undoubtedly be forced towards employing more seasonal casual labourers than in the past and fewer permanent full-time labourers. The simple fact is that various aspects of the present labour laws are forcing commercial farmers to reduce their number of labourers, leaving them no other choice. The tragedy is that this is aggravating unemployment and poverty in rural areas. Refer also again to SARPN (2003).

Small-scale resource-poor emerging commercial farmers do not have the capital for intensive mechanisation, nor are their farming operations big enough to make it a viable option. They thus are much more dependent on labour than the larger scale

commercial farmers. They are thus very vulnerable to the effects of restrictive "agriculture unfriendly" labour laws, like those presently in place. The low benefit/cost ratios of small-scale irrigators in the former Venda that employed permanent full-time labourers, due to high labour costs dictated by law, provide an example (Chapter 3). This type of situation would inhibit expansion of the farming enterprises by a small-scale farmer and may even force him/her to change totally to the use of only casual labour or cut it down to a family business run solely by family labour. The worst scenario would be having to relapse back into becoming a subsistence farmer.

Furthermore there should be enough flexibility to allow mutual arrangements between farmers and labourers for their mutual survival during difficult periods, e.g. droughts or temporary poor market conditions, like those between the Middle Letaba small-scale irrigators and their labourers in the late 1980s (Chapter 3 and Khuvutlu & Laker, 1993). Furthermore the fraction of a labourer's wages paid in kind instead of in cash should be a mutual agreement between the labourer and his/her employer and not be dictated by law. In the Middle Letaba case the casual labourers ***preferred to be paid fully in kind*** (farm produce), instead of in cash, ***because this was financially more beneficial to them*** (Khuvutlu & Laker, 1993).

Within small-scale farming, especially family-operated farms, the labour contributions of children, especially during critical peak labour demand periods, have always been crucial for ensuring the viability of the farm. Reports have even shown that the best way to ensure sustainability of small family farms in certain developing countries would be by changing school terms such that holidays coincide with critical labour demand periods so that the children are free to work on the farms during those periods. For sorghum production in the Sahel area of Burkina Faso, it was found that children contribute 36.5% of the labour time for land preparation, but only 2% of the labour time for the rest of the cropping season, for example (Dillon & Hardaker, 1993). Dillon & Hardaker (1993) point out that *"for some tasks a woman or child might be at least as effective as a man"*. From my own childhood experience I know that there are some light tasks for which children, in some cases specifically quite small children that are closer to the ground, are much more effective than adults. As clearly stated in Chapter 3 one is not talking here about burdening children with work that is too heavy for them and would break them physically or psychologically or would keep them out of school. That would be totally unacceptable and should be punished heavily.

As I understand it, South Africa presently has very strict laws forbidding any child to do any work, e.g. on a farm, even if he/she would dearly love to work. The media creates the impression that labour inspectors make very sure that especially during the summer harvest period every child on every deciduous fruit or grape farm, for example, remains idle on the farms throughout the whole six week summer school holiday period. Like the case with restrictive labour laws in general, large scale commercial farmers can easily manage without involving children, at times when they are available and free, in the labour pool. In these cases it is more a loss of income for the families of the children and the farmer's own children becoming bored and naughty on the farm. ***For a small-scale farmer a law prohibiting all children from doing any work at any stage has serious consequences***. For economic reasons he/she absolutely needs his/her children and children from the extended family to assist with

certain tasks, especially during critical peak labour demand periods, as we did when we were children.

In the whole process of development of emerging commercial farmers and from there into full-scale commercial farmers a key part of the strategy should be to strive for the institution of labour laws that will be fair to labourers and children, protecting them against unacceptable exploitation, but at the same time flexible and realistic enough to avoid labour situations that inhibit the development and economic survival of emerging farmers and in worst case scenarios even cause them to relapse back into unproductive subsistence agriculture. If unrealistic labour laws cause development stagnation and even retrogression, it will aggravate rural poverty, instead of alleviating it, and cause poor resource use efficiency of the scarce natural resources water and land.

4.12 PROMOTE AND MAINTAIN A DYNAMIC ***AGRICULTURAL*** RESEARCH AND EXTENSION INFRASTRUCTURE AND ENSURE THAT BOTH RESEARCH AND EXTENSION ARE APPROPRIATE AND OF A HIGH STANDARD

Promoting and maintaining a dynamic ***agricultural*** research and extension infra-structure, should be a key element in any strategy to optimise resource use efficiency. This is discussed in some detail in Chapter 3. The emphasis is on real problem-oriented agricultural research, ***done by people with degrees in agricultural sciences***. Trends to try to push agricultural research towards pure natural science models or for environmental sciences to dominate it, are unacceptable, because it will render agricultural research inefficient in regard to what it is supposed to achieve. Agricultural research requires a certain mind set, being the ability to combine an understanding of basic scientific principles and processes with an understanding of the realitities of field conditions that determine productivity under different systems. Furthermore, the reality that ***science cannot be viewed in isolation***, but that various social, cultural, economic, etc. factors, which have serious impacts on production, must also be taken into consideration, must be respected.

Research must be a collaborative effort between farmers and researchers, with extensionists and subject matter specialists as intermediaries. The farmer and farm should be the starting point for the determination of research needs and the farmers should be incorporated as advisors and evaluators during the research process. (See Chapter 3.) South Africa has quite a good record in this regard in the commercial farming sector, but in the case of small-scale emerging and subsistence farming it leaves a lot to be desired. Even good researchers in the latter fields seem to fall into a trap of in the end wanting to do work from the perspective of what they believe would be most beneficial. Even regarding the South African LandCare research statements have been made to me like *"What we would like them to **do** is . . . . ."* instead of *"What we would like them to **achieve** is . . . . ."*.

In Chapter 3 it was mentioned that in one community in the *Bizana* LandCare project by far the highest yield in the whole project was obtained by a specific farmer using his own "farmer practice", much higher than the yield obtained by him or any other participating farmer with the LandCare "best practice". When I later received a copy of the progress report of the LandCare project in *Bergville* from H.J. Smith, it

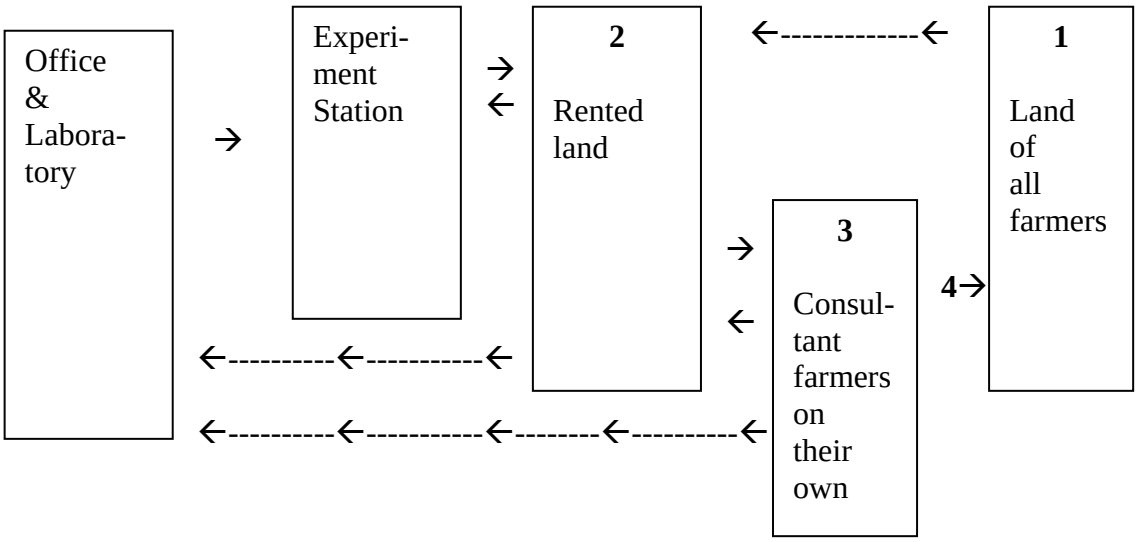
transpired that five of the 15 farmers implementing different practices had much higher yields with their own practices than with the "best practices". In the end the average yields with the LandCare "best practice" (3.1 $t.ha^{-1}$) was just the same as with the farmers' "traditional practice" (3.2 $t.ha^{-1}$) for the 15 farmers. I hope I just misread it, but I could not find benefit/cost comparisons for the two sets of practices. Neither could I find clarification on which one the farmers would choose (especially if inputs are eventually no longer given free to them for the "best practice") in terms of (a) which one fitted in best with their farming practices and (b) which one gave the produce that they needed or preferred most.

Somehow one gets the feeling that researchers went in with practices that LandCare advocates and a belief that these would always be better than the traditional practices of the traditional small-scale farmers. This assumption was obviously wrong, as is so often the case. The strategy should be to identify top successful small-scale farmers and identify their farming systems in terms of (a) what they do, (b) how they do it and (c) why they do it, and do it in that way. The strategy would then be to research ***together with them*** if and how these can be improved (using LandCare ideas) in a way that would be acceptable for them. These proven top farmers would then be mentors for other farmers in their communities to facilitate adoption of improved practices (which may actually be the "traditional practices" of the top farmers). ***This is, after all, the gist of the whole research strategy of starting with the farmers and their existing farming systems (whether big commercial or traditional).*** It is surprising to see what good yield levels some of the top small-scale farmers are actually achieving with their own practices.

From a ***research strategy*** point there are also two other aspects for which the Bergville LandCare project opens opportunities for discussion and explanation:

a. In Bergville and surrounding districts there are a number of top conservation farmers amongst the commercial farmers. The logical approach would have been to identify the conservation farming practices that they use successfully ***under the local conditions*** and to build on these in the research with the small-scale farmers. They could also become involved as mentors. ***An interesting question is to what extent the successful small-scale farmers amongst the 15 have learned from working on some of these farms.***
b. The ox-drawn ripper is well-known in Southern Africa, e.g. in Zimbabwe, where it is (or used to be) manufactured by a local company (Moeller, 1997) and in Lesotho (IFAD, 1992a). It is used for breaking up compacted soil layers (IFAD, 1992a; Moeller, 1997) or to open furrows for planting (Moeller, 1997). In the Bergville project it was used for the latter task. In Chapter 3 it was pointed out that Van Averbeke found that ***ox-drawn rippers were used widely in the former Transkei until a few decades ago***, before the introduction of tractors. The important point is that in Transkei ripping was done in winter, one of the two reasons for it being to capture any winter and spring rains effectively. Now: In the Bergville project the first planting failed because of too dry soil in November. The question is whether winter ripping, like the old Transkei model would not have solved this problem. ***The research strategy should have been to use such successful traditional practice as starting point from which to develop improved technologies.***

Much of what has been advocated as strategy above has been captured in Bill Whyte's paper *"ICTA in Guatamala: A new model for agricultural research?"*, presented at Cornell University in 1977 (Laker, 1978a). The *"two-way traffic"* model is as follows:



The bold numerals 1 to 4 refer to the steps outlined below.

Step 1, the starting point: Areas with the same farming systems (same enterprises and operations) are defined and the farming systems described.

Step 2: ICTA rents land and buys seed, etc. A number of small farmers from the community are hired as labourers ***and consultants*** to work on this land. The objective is to develop innovations that will be acceptable to the farmers of the area. The idea is to test only innovations that will be acceptable. The hired small farmers are used as indicators of acceptability. Only innovations that they believe may be acceptable are tested. Only innovations identified as being acceptable during the tests and which give good results are taken to Step 3.

Step 3: Some of the hired farmers are selected to try the innovations that passed the evaluations in Step 2 as being acceptable and potentially successful, on their own on land provided to them. (Note: Not on their own fields in the community.) If it fails here, it is back to Step 2 for further testing and adaptation, or even back to the researcher's office for reconsideration and rethinking.

Step 4: Innovations that pass the test in Step 3 are then disseminated to the farmers of the area. Problems may occur here. Then it is back to Step 2, as the arrows at the top indicate, and the process starts over again.

Note the following:

- The process starts on the farms and ends on the farms, unlike the old *"one-way"* model that started in the office and laboratory and from there via the experiment station and demonstration plots developed technologies that were then disseminated to farmers – who often rejected it.

- The office, laboratory and experiment station are "external" to the process (where the bold numerals are), but fulfill important "back-up" functions.

A *dynamic and motivated* ***state-run extension service*** is an important requirement if optimum resource use is to be achieved. Unfortunately, the requirements of a dynamic and motivated extension service have often not been achieved in South Africa, especially in the extension services for small-scale farmers. Agricultural extension cannot be left solely to private advisors because they have vested interests and usually give advice simply from a technical perspective.

Chapter 3 discusses extension approaches and strategies. As outlined in Chapter 3 extension officers have to be much more facilitators of exchange of knowledge and technologies than advisors telling farmers what to do. Although this role of facilitator sometimes seems as if this is seen as something new, it is, in fact, not the case. Although it was not called this by name, this was exactly what good government extension officers in White commercial agriculture have been doing. Extension officers must, however, also be able to give farmers correct and appropriate information and advice if they ask for it – or be able to contact a ***subject matter specialist*** who can provide the required information/advice. The concept of "subject matter specialist" does not really exist widely in South Africa yet, but it is very important that a number of such posts be created (and filled) as soon as possible to secure an efficient flow of information from researchers to extension officers in a digested form that extension officers can understand and use it (Chapter 3). Maximum efficiency would probably be attained if the subject matter specialists are appointed within the ARC, and not dispersed in the provincial governments. As pointed out in Chapter 3, extension officers serving a specific niche in a specific area, should have adequate knowledge of the crops and practices in that specific field – e.g. vegetable production in peri-urban or urban areas.

Generalised recommendations often give very negative results. Because individual fields and farmers differ a lot from each other, making standard "packages" of inputs available is not a good strategy. The worst is where a package is based on conditions elsewhere and contains inputs that are not needed in a specific area. ***Unrealistic and generalised approaches can also lead to inefficient use of government support funding***. For example: The National Department of Agriculture recently agreed to make R5 000 ***per hectare*** available for the liming of the fields of small-scale farmers in an area of KwaZulu-Natal (Van Zyl, 2003). According to lime price and transport cost information that I obtained, this means an application of 16 tons of lime per hectare – blanket throughout all fields. Meanwhile the Bergville LandCare project in KwaZulu-Natal, where the pH(KCl) of the soil is only about 3.7 (i.e. very acid), found that 6 $t.ha^{-1}$ lime was adequate and that applying 9 $t.ha^{-1}$ was a waste of money.

In irrigation specifically lack of specialised extension personnel has been a chronic serious limitation in South Africa. This needs very urgent attention. (See Chapter 3.)

The tremendous ***present fragmentation of agricultural research and extension*** in South Africa is ***very detrimental*** to efficient agricultural research in the country and consequently to resource use efficiency, as I pointed out in an invited presentation at a workshop on farming systems research-extension at the ARC in 1998. This is discussed in Chapter 3. ***It is important to find some strategy to urgently integrate***

agricultural research and extension in South Africa again. This should include integration of the faculties of agriculture into a more unified system, so as to promote cooperation and collaboration between the faculties, the ARC, the National Department of Agriculture and the provincial departments of agriculture. ***I refer again to the integrated California model outlined at the end of Chapter 3 as example of how it could be done***. Inclusion of the faculties of agriculture may sound strange to some, but it was really only silly red tape irritations that caused the faculties to fight for excision from the Department of Agriculture in 1974.

4.13 PROMOTE LOCAL AGRICULTURAL PUBLICATIONS AND CREATE MECHANISMS FOR THEIR PUBLICATION

Agricultural research (quantitative and qualitative), studies and surveys are a waste of funding, manpower and time and inefficient for promoting resource use efficiency and alleviating rural poverty if their results and findings are not disseminated effectively. Effective dissemination of results and findings means that it must be available and accessible and in a comprehensible and useful format for users of it, such as extension officers and farmers. The following paraphrasing of conclusions drawn at a workshop on soil resource inventories at Cornell University (Soil Resource Inventory Working Group, 1977) may give the gist of this:

> *Extension officers (and farmers) and researchers are poles apart in less developed areas and there is generally little communication between them. Extension officers need information that they can use and do not want the high-powered academic stuff. If a researcher cannot communicate his/her information, he has failed and the research might just as well not have been done. The quality of research is also a function of the language used in reports and publications – a language that extension officers can understand.*

Effective strategies must be found to promote agricultural publications of different types (scientific, semi-popular, popular; journals, pamphlets; etc.) in South Africa. Where necessary and appropriate special incentives must be provided to researchers, subject matter specialists, extension specialists, etc. to contribute to such publications. See the discussions in Chapter 3.

Firstly, strategies ***must*** urgently be developed to promote and support ***South African scientific*** agricultural and related journals. Researchers must be strongly encouraged to publish their findings in such South African journals. By publishing their findings in South African journals it is immediately available and accessible to people involved in the agricultural field in the country. (Forget about saying that people nowadays have internet access. It does not quite work like that. Internet databases are very incomplete.) It is so important that researchers (at unversities, the ARC, etc.) should receive incentives to publish in South African journals, e.g. giving universities, etc. extra "bonus" subsidies for papers published in South African scientific agricultural journals, over and above the normal subsidies for publications in "recognised" journals. ***Publication of research findings in South African scientific journals will promote the maximum impact on agricultural development in South Africa and rural development in the country – and that is what it is all about, not impressing American or European scientists***. Unfortunately, present trends are stacked against publication in South African journals. The NRF is actively discouraging researchers from publishing in South African journals like the South

African Journal for Plant and Soil. (See Chapter 3). This is not in the best interest of agriculture in the country and unacceptable. The South African Journal for Plant and Soil is constantly threatened that government may remove it from the list of journals for which researchers will receive subsidies, because it has not yet succeeded in qualifying for inclusion in the Science Citation Index (SCI). The plain fact is that citing of findings in the SCI will contribute nothing to improving agriculture and the well-being of people in rural South Africa. Availability and accessibility of the data in South Africa will.

In order to render findings useful for its potential users, like extension officers and well-educated farmers, ***it is essential that research findings must be made available in a well-digested semi-popular format***. It may often be better to give an integrated discussion of the findings of different studies by different researchers. ***A strategy should be found to promote the publication of semi-popular agricultural journals in South Africa and to encourage scientists to publish in them***. If it is worthwhile for scientists to publish in semi-popular journals and they will benefit from such publications, they will do it. Examples are the researchers in the deciduous fruit and wine industries for whom it is advantageous to publish in the Deciduous Fruit Grower and Wynboer/Wineland (see Chapter 3). In general there is, however, no incentive to publish in semi-popular journals and a lot of disincentives (Chapter 3). ***One of the advantages if a system of subject matter specialists is introduced, would be that they should be the ideal people to task with the "translation" of research findings into a semi-popular, easy to understand, format***.

Finally, ***there must be a strategy for the publication of very simple small practical brochures and pamphlets, covering specific crops or practices***. Although these have to be in layman's language, the basic facts must still be correct. As indicated in Chapter 3, it is essential to publish each of these in the relevant languages for the target groups, and importantly using the appropriate dialect or "slang". Although many small-scale farmers are illiterate or not highly educated, they have children at school that should be able to read pamphlets for them.

My suggestion is that ***there should be a special unit within the ARC to take responsibility for publishing popular brochures and pamphlets***. It should have people who can do some of the writing, but they do not necessarily have to do all the writing themselves. Where necessary they could "contract" in others, like extension officers or subject matter specialists. They should facilitate the writing and handle all editorial, printing and distribution responsibilities.

4.14 PROVIDE STRUCTURES AND SYSTEMS FOR FARMER TRAINING AND DEVELOPMENT

Farmers need to be in a continuous learning process to be able to handle the continuous changing demands on them due to changing technologies, changes in markets, changes in labour laws, agricultural politics, etc. Training of farmers should cover all these, and even more, topics. Training of emerging commercial farmers is particularly critical to enable them to develop towards becoming fully fledged commercial farmers. ***It does not help if farmers have land, capital, etc. if they do not have the necessary practical farming and/or managerial skills.***

The two main arms of the training should be hands-on training in technologies and practices and training in farm management. The latter relates not only to the managing of farming practices and labourers, but also to production strategies, marketing of produce, etc.

Various types and formats of farmer training are required, to cater for different needs and situations (Chapter 3). One type is farmer-orientated agricultural college diploma training for prospective farmers with an adequate school background. As indicated in Chapter 3, this should not only include theoretical training, but hands-on practical training in farming technologies and practices to get a "feeling" for the work that labourers have to do. This will create a better understanding of their work and enable the farmer to demonstrate better to them how to execute specific tasks and to manage them with better understanding.

Short training programmes, either hands-on training in some specific practice or training in some management skill, are essential. These can be given at agricultural colleges or special farmer training centres or *ad hoc* within farming communities.

Learning from good, successful farmers as mentors is one of the best ways of learning, as is interaction with other peer farmers. Where possible a system of "apprentice farmers" should be considered (Chapter 3). Successful small-scale irrigation farmers like those at Middle Letaba before the collapsing of the infrastructure of the scheme after 1994 (Khuvutlu & Laker, 1993) could be ideal mentors for other small-scale farmers.

Farmer training should essentially be the responsibility of government, who should provide the necessary structures and systems. As pointed out in Chapter 3, training by some well-meaning non-government bodies can be hair-raising because the trainers may not have the correct scientific/technical background or adequate knowledge regarding the training requirements. ***Training of trainers is thus very important, both for government-employed trainers and others***.

The situation regarding the training and development of small-scale farmers under the revitalisation of irrigation schemes needs to be monitored very carefully. I foresee a real possibility of a repetition of top-down managed irrigation schemes, like in the homeland days, where training was neglected and the farmers were no more than glorified labourers. Under the homeland schemes farmers were supposed to be trained so as to enable them to eventually become the decision-makers, i.e. the actual farmers, but it never happened. Signs that worry me on schemes that are being revitalised include, for example, those where it seems to be a cut and dried decision that a whole scheme will be producing a specific industrial crop. It means that immediately a farmer's individual decision-making is wiped out and he does not learn management skills. After all, ***the whole objective should be to "empower the farmer to take his own decisions"***, as indicated earlier. Also a recent statement that someone was instructed "to produce at Qamata" reminds one of schemes like Keiskammahoek in homeland times, which were geared for production and not towards small-farmer development.

4.15 UNIVERSITY AND COLLEGE EDUCATION AND TRAINING OF RESEARCHERS, SUBJECT MATTER SPECIALISTS AND EXTENSION OFFICERS

Successful commercial agriculture, as well as agricultural and farmer development in less developed areas, need well-qualified agricultural researchers, subject matter specialists and extension officers. A key part of any strategy to promote optimum resource use efficiency and alleviation of rural poverty should, therefore, be to ensure high quality ***appropriate*** university and college education and training of persons who can fulfil these roles. I discussed this issue in a fair amount of detail in Chapter 3 and will not repeat those discussions here. I do wish to stress a few key points here again:

a. Because our natural resources, especially climate and soils, as well as social, cultural, religious, etc. conditions differ to vastly from those in the rich northern continents (and from the humid tropics) ***we need locally trained agricultural scientists***, who understand the resources and the local social, etc. conditions.
b. The amalgamation of faculties of agriculture with other faculties, especially faculties of science, at so many South African universities is to the detriment of agricultural education and training at university level. Agriculture needs a different mind set and approach.
c. The amalgamation of departments representing different important major disciplines within the agricultural parts of the conglomerate faculties has led to serious retrogression in the offering of some of the key disciplines, to the detriment of training in those disciplines.
d. ***There are too many faculties of agriculture in South Africa***. The consequence is a struggle for survival instead of dynamic education and research in a number of cases. This is also the cause of the damaging amalgamations mentioned under b and c above. ***Reduction of the number of faculties of agriculture and the creation of "pure" faculties of agriculture again, with strong separate departments (or at the very least clearly identified sub-departments) in them should be pursued as a matter of the highest priority, in the interest of South Africa.*** The approach should not be to simply close some faculties, but the amalgamation of faculties between universities, with pooling of their staff, facilities and equipment.
e. ***The government, via the ARC, should as a matter of urgency start giving undergraduate bursaries for studies in required fields of agriculture again***. Although preference may be given to students from certain groups, if the ARC so wishes, the bursaries should not be confined exclusively to students from that group. This will not be in the best interest of agriculture or rural development.
f. ***The ARC should create favourable opportunities for post-graduate studies for its young researchers again***. Without proper opportunities they cannot qualify within a reasonable time or at all. Without people with the necessary post-graduate qualifications, agricultural research within the ARC will become inefficient.
g. ***The NRF's special bursaries for post-graduate studies should be given for studies towards degrees in agriculture***, and, except for a very small percentage of special cases, not for persons doing quasi-agricultural research in other faculties. The NRF may also prefer to give bursaries for students from

a specific group if they so wish, but if they confine it exclusively to students from that group, it will not be in the best interest of agriculture in the country.

h. Bursaries should allow students to enroll at the university in the country with the best staff and/or facilities in a specific field***. At post-graduate level, I am absolutely adamant that a student must have the freedom to choose under which supervisor he/she wants to pursue his/her studies***. To prescribe to students that they must enroll for post-graduate studies at "previously disadvantaged" faculties of agriculture is not acceptable. The irony is that the faculties of agriculture at the "Historically Black Universities", especially Fort Hare, were not the "disadvantaged" faculties. They were, in fact, the "privileged" faculties, compared with the "White" faculties at the time. I know, because I was at Fort Hare for more than 12 years during that time. We knew it and our colleagues at the "White" universities knew it. I more than once received more research funding than I applied for and over the time could appoint about five substitute lecturers or full-time researchers, earning full salaries, on sponsored research projects. It is not necessary to "pamper" the faculties at these universities under the guise that they were "disadvantaged". They must simply earn their dues by "delivering the goods".

Finally, it is very important to take a much ***more flexible stance regarding admission requirements*** to faculties of agriculture. As outlined in Chapter 3 it should not be throwing admission open as a "free for all", nor should the standards of university training be compromised or lowered. It is just that experience has shown that a more realistic approach is required. There should also be room for orderly "upgrading" between degrees and movement between universities. This is discussed in depth in Chapter 3, where real life examples are given and the California model is explained.

CHAPTER 5

APPROACHES REQUIRED DURING LAND RESTITUTION/REDISTRIBUTION

5.1 INTRODUCTION

Quite extensive discussions on land reform (land restitution and land redistribution) are given in Chapter 3 (Section 3.12). It deals mainly with outlines of the current situation. The overall picture that emerged made me so despondent that for a few months I was just absolutely mentally and psychologically paralysed. As time went on and more information became available, the picture became increasingly worse. Even from the Ceres area, where I matriculated, came information on a homestead being destroyed and carried away bit-by-bit, irrigation systems being demolished ("every bit of copper was removed and sold"), and all the trees in previously productive apple or pear orchards dead after being handed over.

The general picture is one of horrendous destruction of former highly productive perennial, fruit, nut, irrigation, etc. ***farms after being handed over****, inter alia* due to lack of the high level of management skills required to successfully run such farms amongst those who have taken over the farms. Even more alarming is the plight of thousands of former farm workers and their families who had to leave the farms, and the impression that no one in high places is in the least concerned about the hardships caused to them.

This chapter will concentrate on suggested approaches required during land restitution and land redistribution so as to turn the present destructive situations around into positive situations promoting optimum natural resource use efficiency and effective alleviation of rural poverty. Before reading further here, an in-depth study of Section 3.12 should first be made.

5.2 DEFINE AND DESCRIBE THE OBJECTIVES AND THE PROCESSES OF THE LAND REFORM PROGRAMMES VERY CLEARLY AND COMMUNICATE IT TRANSPARENTLY

The first important approach should be for the Departments of Land Affairs and Agriculture to define and describe the objectives and the processes of the land reform programmes ***very clearly***. Some may say this has been done and that it is all in acts of parliament. I have come to the conclusion, however, that there are a number of things that are very vague for important role players in the programmes and that this leads to a lot of uncertainty and mistrust. Some suspect that government may deliberately be vague, so as to leave themselves the freedom to shift the goal posts at any time. If the objectives have already been well-defined and described, then they must be communicated clearly and transparently to the nation and especially to those closely concerned and who may potentially be directly affected.

In Chapter 3, I mentioned that it was only when I asked what is meant by 30% of the agricultural land that must be in the hands of Black people that the people of Agri-SA realised that it was never spelled out clearly to them and that they only then asked the minister what was meant. It was then a shock to them to hear it referred to land owned

by White farmers only and did not include the former homelands. This should have been made clear from the start. Another question would be whether the 30% refers only to land acquired via the land reform programme, or whether it also includes land purchased by individual Black commercial farmers via normal business transactions. James Moroka's father-in-law, for example, bought the farm on which James is farming now (see Chapter 3) for a large amount of money from his own pocket. Furthermore, a Black empowerment group is one of the partners that bought Boschendal wine estate for over R300 million (the other partner being an overseas company). Would Boschendal now count towards the 30%?

I found that there is also a total lack of clarity, leading to a lot of uncertainty, especially amongst the White commercial farmers, about the envisaged way forward after the 30% land target has been achieved. ***A key question is whether the intention is that land purchased by government and handed to Black communities/groups under the land reform programmes must in perpetuity remain reserved for exclusive ownership and occupation by Black people only***. If it is the intention, then it would mean that a number of new Black "reserves" are being created, especially in view of the fact that groups of several farms (even 14 or 20) are sometimes handed over together to a community consisting of hundreds or even a thousand households (and about six times that number of individuals). The fact that each family has such a small area of land that they cannot make a decent living from it and the low (or sometimes no) production on the land since it has been handed over further strengthens the similarity with a "reserve".

The alleged statement by Mr. T. Gwanya, Acting Chief Land Claims Commissioner, that it is not the purpose of land reform to bring about sustainable development, but just to "right the wrongs of the past", needs urgent clarification. Hopefully he was misquoted. Surely sustainable development, aimed at improving the livelihoods of the people who received the land, must be the primary purpose of land reform. If the people do benefit in terms of improving their livelihoods from receiving the land then it, surely, would indicate that there is something wrong with the way that the programmes are implemented.

I have extracted only a few examples of aspects of the land reform process that need clarification and good communication from the Departments of Land Affairs and Agriculture. Lack of good communication can only lead to uncertainty, suspicion, unfounded rumours, etc.

5.3 ECONOMIC UNITS, LAND TENURE AND MANAGEMENT MODELS AND SUPPORT SYSTEMS

5.3.1 Economic units

If the objective of land reform is to enable each household that receives land (individually or as part of a group) to make a decent living from farming the land, then it means that the size of the land allocated per household ***must*** be adequate to constitute an economically viable unit. In my invited submission to the workshop of parliament's Protocol Committee on Land, Water and the Environment on the act on the subdivision of agricultural land, I stressed this very strongly.

My short written submission (which I also presented orally at the workshop) concluded with the following (Laker, 1995):

"In order to avoid human misery and land degradation, I recommend that:

a. *A minimum income for a decent living for a farming family be defined and that this is used to decide what the minimum size of a farm[1] must be.*
b. *An "average" farm in a homogeneous farming area not be used for decision-making[2], but that the actual potential of the specific area of land is used.*
c. *The potential of each piece of land be based on detailed resource surveys and realistic land capability[3] evaluations.*
d. *Subsistence farmers not be settled on scarce cropland."*

Notes:

[1]Where whole communities or groups are settled as a unit, of course the total area of land for the community must still ensure such minimum area of land per household making up the community.

[2]Meaning decision-making on what minimum area of land would constitute an economically viable unit.

[3]"Land suitability" would have been a better term than "land capability".

In an invited paper at AgriTech '97, I repeated much of the above and also stressed the importance of ensuring sustainability during land reform (Laker, 1997). The simple fact is that there is not enough agricultural land of high enough quality to enable a large number of people to earn a decent living from farming the land. Van der Merwe *et al*. (2000) refer to the findings of Goodland (1995):

"Land reform, according to Goodland (1995), however widely implemented, will not be sufficient to alleviate rural poverty or food insecurity as ***the available supply of land is simply not sufficient to grant a useful quantity of land to even the minority****. To ensure food security and wealth creation, effort will need to be devoted to generating non-farm employment opportunities in rural, urban and peri-urban areas to meet the needs of future population growth. Most effort needs to be focused on reducing population pressures if all investments are not to be rapidly overwhelmed (Goodland, 1995)."*

Van der Merwe *et al*. (2000) further add that it is hoped that South Africa will avoid the mistakes of unsustainable agricultural made in the past, giving the following example:

"In the 1970's, sub-economic land allocations were made to virtually every tribal family in a section of the former Bophuthatswana. As a result of the sub-economic size of plots, most of the land was unused and neglected while poverty and urbanization thrived. Afterwards, traditional rights to cultivate were withdrawn and tribal members, willing to become full-time farmers, were allocated economic land units of 100 ha (Beuster, 1981). This was the beginning of moving from survival economics to emerging economics."

Two notes regarding the above are relevant:

a. South Africa's recent "Black grain farmer of the year", cultivating a thousand hectares successfully, mentioned in Chapter 3, is from the former Bophuthatswana area.

b. Allocating economic units to a reletively small number of families, means a larger number of "landless" families, again stressing the importance of employment creation outside agriculture – and the challenge to government to get the right balance between equity and efficiency during land reform (FAO, 1996).

The approach in the land reform programmes should thus be to allocate the maximum number of potentially economically viable farm units during land redistribution. *This is the only route via which to develop a viable broad Black commercial farming sector in South Africa, instead of just a few isolated Black commercial farmers.*

Achieving the creation of economically viable farm units during land restitution is a much more tricky problem and may not be achievable at all. The problem is that the number of households resettled on land that a formerly displaced community has claimed back cannot be limited to acceptable proportions. Every household or every person who is a member of the community that was displaced and every descendant of a person that was a member of that community is (or should be) entitled to return to the specific area of land once a claim has been settled. The number of households and persons thus being entitled, are many, many more than the number that were displaced several decades ago. A totally different, innovative approach will be required to include all these households in an economically feasible way. A suggestion will be made in Section 5.3.3.

The discussion in this sub-section deals only with communities that are settled on previously White farms that are bought out in order to increase the area of farmland in the hands of Black people (land redistribution) and "White" farms claimed back by Black communities that were removed from them (land restitution). There is also now a lot of interest in land claims ***within*** some of the former homelands, particularly in the former Transkei and Ciskei. These are discussed in the next sub-section.

5.3.2 Land claims within former homelands

Land claims within former homelands can broadly be grouped into three main groups, viz.

a. People that were actually removed from their area in a homeland to another area in order to make way for some form of development. In the former homelands of the Eastern Cape these included removal of people for the establishment or enlargement of nature reserves (Maswana, 2004) or irrigation schemes, for example. Others include ones like the case of James Moroka, who was a quite large commercial farmer in the Thabanchu area of the former Bophuthatswana until the farm was expropriated by the Bophuthatswana government for the building of the Thabanchu Sun casino. Another interesting type of case is that of Zebediela, as outlined in Chapter 3. Here the community was disposessed in 1916, but during the apartheid era the land was bought out by the government and made part of the Lebowa homeland, being managed as a Lebowa government corporation farm. Now the community has received this government land back under a land claim.
b. The second group are those that were involved in "inter-homeland transfers", i.e. where groups of people went from one homeland to another. In at least one

case a group of people ***requested*** to be moved when a certain homeland became independent, because they did not want to fall under that independent homeland. They were then moved to another nearby homeland to concur with their request. In about 1996 the group were able to purchase two farms with the "land acquisition grants" of R15 000 per family which they received from the Department of Land Affairs.

c. A third group of claims recently gained prominence in the media, viz. the very large number of people who claim "compensation" for their "forced removals" under the so-called "betterment schemes". According to a Media24 report on 12/2/2004 *"it is estimated that almost 500 000 people in the former Ciskei and 1.44 million in Transkei were denied compensation for forced removals under betterment schemes"*. This is a totally different situation from all the other claims in the sense that in the "betterment schemes" no person or community was removed from the area falling under their tribal authority (Maswana, 2004). That is, unlike the other cases the communities did not lose any of their original land area. The betterment schemes consisted of planning of land use ***within*** each tribal authority area. Instead of the individual households living scattered over the whole tribal authority areas, residences were now grouped together within villages. Specific contiguous areas were set aside for cultivation, instead of having fields scattered all over the countryside. The communal rangelands were planned into different camps, so as to facilitate rotational grazing. The whole concept of the betterment schemes was to bring about optimum land use through proper land use planning, one of its aims being to reduce soil erosion and land degradation. Although the intentions were good, the outcome of the betterment schemes was very bad, because just about everything was done wrong. Because of lack of knowledge and attention to the characteristics of the soils, areas for cultivation were often put on highly erodable soils, leading to more severe erosion than before the planning (Laker, 2003b; Maswana, 2001). Very importantly, the wishes of the people were not taken into account during the planning. In many areas people do not want to live together in villages, for example.

5.3.3 Land tenure and management models

One gets the impression that in the land reform programmes no attention has ever been given to land tenure and management models. Together with the problems of lack of production capital and management skills, this is a major contributing factor to the problems and failures experienced.

Although government buys out the farms with state funds, the farms do not become settlement schemes over which government takes control. Government just simply buys out farms and hands over the land to large groups of people. After receiving the land the people can do on it what they want to and how they want to. In the land reform programmes it is usually a large number of households that together receive a farm or group of farms. Individual households do not receive ownership or assured long-term leasehold of individual little parcels of land allocated to them. It is all one big pool. In a sense it is wise not to try to measure out, demarcate and register title deeds for minute little parcels of farmland that are so small that a family can in any case not make a living on it. The problem is that it seems that it is not ensured that a formal (legal) arrangement regarding the use of the land, the rights of households and

individuals within the community, management structures, etc. is put in place ***before*** (or even after) the people receive the land. In Chapter 3 the extremely serious problems emanating from this is discussed in detail, such as (to repeat just a few):

- The high levels of conflict within communities.
- Decision-making being paralysed, which is deadly for agriculture, where spot-on decision-making to ensure that the right steps are taken at the right time is crucial.
- Some youngsters enriching themselves at the expense and to the detriment of the community.
- "Free riding".

These situations are actually worse than those in traditional tribal areas. In the traditional tribal set-up there is at least an authority structure that guides the workings within the community according to certain rules. The rules might not have been written down anywhere, but everybody knows them. Although the land is held communally, a specific area of arable land is awarded to each household. They may plant there what they want and others within the community who did not plant may not take produce away from those who have planted (as has happened in a land restitution farm; see Chapter 3).

The problem is that according to the reports that I could get hold of and personal interviews, the "communities" who receive land under the land reform programmes are not tightly knit or "uniform" communities, but groups of very diverse backgrounds. Consequently they have no social structure. This is true even for "land restitution" groups, as was for example made very clear by Moloi *et al*. (1997).

A "community", consisting of a large number of households, who together receive a farm or farms is equivalent to a company with a large number of shareholders. No such company can operate without a statute (or whatever the correct legal term may be) spelling out what the rights, responsibilities, etc. of the shareholders, elected "directors" and appointed managers and/or other employees are. ***The approach must, therefore, be*** that the Department of Land Affairs must require for every succesful land claim such statute (or what the term may be) to be drafted, ***and*** accepted by every household head, ***and*** the "directors" or management committee elected, ***before*** the land is handed to the community. ***If such document is not accepted by all households in the group*** that made the land claim application (or in the case of land distribution who decided to pool their funds), ***then the claim or land distribution application must simply be cancelled*** by the Department of Land Affairs and the land not be handed to the people. If the claimants/applicants cannot beforehand agree on the "rules" for the running of the farming enterprise, then there is ***no hope*** that they will be able to run it successfully once they have the land. I believe the experience thus far has proven this.

Somewhat related to the latter is the following statement by Van der Merwe *et al*. (2000): *"Land reform programmes require long-term perspective, strong political consensus and* ***functional legal intitutions****, with well-defined property rights as farmers' investments and their ability to receive normal credit depends on clearly defined ownership of land (SDC, 1994)."*

Even the best legal arrangements regarding the use of the land can, however, not overcome the severe limitations imposed by the very small area of land made available per household during land reform, which effectively precludes them from making a decent living from the land. In the case of land redistribution it would seem that in future only those LRAD applications that have the potential to ensure an economically viable farm income should be approved.

In the case of ***land restitution*** claims are not necessarily made primarily with a view to obtaining the land for the purpose of profitable farming. Cultural, historical, sentimental, and even religious or psychological, motives may be the reasons for wanting the land back. Aspects like "the land of our fathers", "where the graves of our ancestors are", etc. become the driving force. As indicated earlier, no person that can prove that he/she was removed from the land or is a descendant of someone who was removed can be denied being part of the claim and having access to the land. The number of claimants, therefore, cannot be limited on legal grounds. I am sure one can work out a system that would allow all these people access to the land, but only a limited number becoming farmers who make their living from farming the land. ***One possible approach*** could be as follows: Encourage all eligible households to apply for the standard amount made available per household by the Department of Land Affairs in order to raise enough money to buy back the farm. Encourage as many as possible of the households, especially of persons having good employment somewhere, to desist from actually going to become farmers on the farm, which could only lead to poverty and degradation of the farm. Encourage them to "donate" the money that the government gives on their behalf towards purchasing the farm, without actually moving to the farm, because it will ensure getting the farm out of "foreign" hands and *ensure access to places of cultural, historical and religious importance to* ***all members of the community***. A limited number of community households with the aptitude and capability to farm will then have enough land to make a decent living from farming without degrading the land. They should also have the responsibility to take care of places of cultural, historical or religious importance on the farm. The profits from farming should go to these farmers only and the rest of the community should not have any claim to it. Again, it will be important to draft these rules and have them accepted by everyone before the claim is finalised.

In regard to the above Moloi *et al*. (1997) report on a case found by Chris de Wet of a group of people in the Eastern Cape that were very unhappy because the Department of Land Affairs (DLA) allegedly:

a. Persuaded them to increase the number of claimant households from the envisaged 65 to 110 and then
b. Imposed a limit of 32 households that could reside on the farms.

If the DLA actually did this it would have been an excellent approach if it was not for two basic errors, viz.

a. It was simply two farms that the claimant households bought and ***not*** farms from which they were removed and to which they were moving back. In other words there were no cultural, historical or religious grounds from which the 78 households not permitted to reside on the farm would benefit by "donating" their allocations for the purchasing of the farms to the other 32 households.
b. Even if there were cultural, etc. benefits to be derived, "imposing" a limit would be rejected. They could have been encouraged to limit the number of

families actually going to live on the farm, if it was a genuine case of people moving back to the "land of their fathers", which in this case it was not.

Regarding land tenure Chris de Wet's studies in communities that received land under land reform programmes found that "*two general questions stand out"* (Moloi *et al*., 1997):

- *"To what extent do land beneficiary communities understand the implications of collective undertakings, the possible practical obstacles that go with land ownership and the cost of maintaining consensus and unity?"*
- *"Are beneficiary communities opting for collective solutions simply because it is 'expected of them', rather than out of choice?"*

The following accusation then follows (Moloi *et al*., 1997): *"In an interview, two NGO field workers referred to a case in which tenure arrangements involving freehold were not even considered because a DLA appointed consultant assisting the beneficiaries pushed through a collective agreement. Yet a freehold arrangement would have been more appropriate for the circumstances* ***and an option favoured by the beneficiaries****."*

5.3.4 Support services

Land reform cannot succeed if the new emerging farmers are not backed up by the necessary support services. It must be kept in mind that one is dealing here with people with very little or no experience or knowledge of commercial farming, especially no farm management skills, and little or no production capital.

More-or-less all the aspects discussed in Chapter 4 are also relevant to the new land reform established farmers. Very importantly they need strong, neutral (state provided) knowledgeable advisory/extension services, with the necessary subject matter specialist backup, farmer training (both technical and in management) and mentorship.

Critically important, as indicated in the previous sub-section, is to provide ***guidance and training*** to the prospective farmers during the period ***before*** a farm or group of farms is handed over to them, so as to prepare them for the takeover. They should be advised and assisted in regard to setting up mutually acceptable land tenure and management arrangements and spell these out in legal documents. Potential problems that could arise from collectivism should be explained to them, as well as problems related to having minute little individual patches of land on the other hand.

In many cases, e.g. the 600 families taking over a 2 000 ha farm near Hendrina deciding on extensive cattle farming, ***it must beforehand be explained to the people that they will not be able to make a living from farming and that in reality for so many households the farm could be only a place to stay and that they would still have to earn a living elsewhere by other means***.

Where a community is to take over ***intensive high income perennial crop farms***, such as fruit, grapes, nuts, etc. it must be explained to them ***beforehand*** that the nice orchards, vineyards, etc. do not exist like that by themselves or with little inputs and attention, but that it requires ***very high*** production capital inputs ***combined with*** very

high levels of management to maintain them like that. I make this statement with the greatest respect on the basis of realities experienced while I was at Fort Hare regarding the views of certain communities about why excellent crops grew in some places, e.g. at Fort Farm.

Provision of the much needed production capital is a very difficult situation in land reform because of the extremely high risk of failure to repay loans because of the inexperience of the farmers and the little land available to each.

5.4 HIGH-INCOME PERENNIAL ORCHARD AND PLANTATION CROPS

Special approaches are required for the situations where farms on which high income perennial orchard or plantation crops are grown, are handed over to communities under land reform programmes. Where rainfed grain farms that have been handed over are not used and lie dormant for a number of years no physical damage is done. It is just a matter that the water use efficiency for that period is basically zero and the farming households have no income from farming. Where high income perennial orchard or plantation crops are at stake, they cannot just be left dormant for some time with the hope of using them again later. Without uninterrupted proper high level management and adequate inputs the orchards and plantations will just simply die and the whole farm be destroyed, as has happened in so many cases. This means a destruction of assets worth many millions of rands and further many millions of rands needed to bring the farms back into production again by establishing new orchards and putting in new irrigation and other infrastructure. In addition it takes some years after the establishment of a new orchard before it is productive and bears profits again.

In the case of an orchard or plantation farm that has already been handed over and ***where the orchards/plantations and infrastructure have already been destroyed***, one of at least four possible approaches could be used:

a. If the community so wish, the farm can be left just as it is and the community can revert to purely subsistence farming, with each household planting some rainfed maize and a patch of vegetables on the small area of land available to them.
b. A start can be made with the production of high-income annual crops (special industrial crops or vegetables) to generate quick income that can be used to start with the stepwise establishment of orchards again. During this period the community will need a knowledgeable partner(s) with enough capital to get the production off the ground and provide management expertise. This initial period should also be used for the training of community members to become successful farmers or potential future farm managers. In the case of the “White farms” near Fort Beaufort (Chapter 3) the manager of the local citrus cooperative, for example, see production of essential oils as a possibility for such an initial crop to generate income that could be used for future re-establishment of citrus orchards. He was hoping that the Industrial Development Corporation and the Eastern Cape government would “buy” into this idea and give their support. By the time of his interaction with me he was quite frustrated by the lack of response from both these organizations.
c. It could be decided to start directly with the re-establishment of orchards/plantations. In such a case, it can only be done as a joint venture

including a partner with enough capital to pump in and who would provide management. Since it will take some time for profits to start to accrue there will be a number of years with no income from the farm for the community, except for wages that they could earn by working as labourers on the farm.

d. It can be decided to rather sell the farm to some rich company and for the community to start all over again somewhere else. Since we are talking about farms that have essentially been destroyed and will require enormous inputs to revitalise them, it must be understood that they cannot be sold for nearly the same price for which they were bought out when they were in a productive developed state.

In the case ***of fruit, grape, nut, tea, etc. farms which are still subject to land claims and have not yet been handed over***, it is clear that it is unthinkable that they can be handed over to communities with little or no background or experience of intensive commercial farming unless one of the following two conditions is met:

a. They ***must right from the start*** employ a capable manager. They should on a regular basis communicate with the manager and learn from him, but they must never unduly interfere with his management functions and operations, ***or***
b. They ***must right from the start*** make it a joint venture undertaking, getting in a partner who can make the required capital and management inputs required to run the farm(s) successfully and profitably.

Fortunately it seems as if the Department of Land Affairs is moving towards making these conditions for the handing over of perennial orchard and plantation farms in future.

5.5 COMMUNICATE OPENLY ABOUT SUCCESSES AND FAILURES

An important approach that the Department of Land Affairs should follow to improve resource use efficiency and alleviation of rural poverty in commercial farms that have been bought out under land reform programmes would be to communicate very openly and clearly about successes and failures under the land reform programme. Two of the most important criteria used as indicators of success or failure should be:

a. Whether the land is a few years after being handed over still used at least more-or-less as productively as it was before it was handed over. In the case of orchard or plantation crops the question should at least be whether the trees are in as good a condition and as productive as before the land was handed over.
b. Whether the families who received the land are maintaining a decent standard of living ***from farming the land***.

If both the above were positive then the settling of the land claim was a success. If any one of the above (especially b) gives a negative answer, then the settling of the land claim was a failure.

Measured against the above two criteria, the Department of Land Affairs should identify specific ***cases where land reform was successful***. Studies must then be conducted to establish the ***reasons why*** these cases were successful. The Department of Land Affairs (DLA) should then arrange visits to such successful cases. The visits should be accompanied by persons with a variety of backgrounds: Academics, researchers, politicians (government and opposition), organised agriculture (e.g. Agri-

SA, TLU), important opinion-formers, ***the media***, etc. It is very important to include some sceptical people. ***Such visits will be the only way to convince them***. Officials of the DLA should give introductory background information, but at the farms the ***farmers*** must be the spokespersons (also to answer questions), without interruption from DLA officials. Refusal of managers of former homeland irrigation schemes that farmers may talk to visitors, students or academics, especially without the manager being present, aggravated scepticism about the successes or not of the schemes and mistrust. For the DLA identification of successful cases, and the reasons for their success, is very important, because these can provide guidelines which can be used to predict the chances for success of a claim that still has to be settled or guidelines according to which future claims should be steered.

Measured against the above two criteria, the Department of Land Affairs should also identify specific ***cases where land reform failed.*** Studies must then be conducted to establish the ***reasons why*** these cases failed. The DLA should communicate openly and clearly to the general public, media, etc. about failures and the reasons for their failure. This would mitigate (even counteract) scratching open and hammering of failures in a negative way by the media and others. Taking representatives of pressure groups on land reform, e.g. the Landless People Movement, on field visits to a few such cases could help to show them the negative effects that ***injudicious*** land grabbing could have, especially for the people that they want to help. The same would be the case for opposition political parties that preach acceleration of land reform. For the DLA, honest evaluation of failures and acknowledgement that there are failures, and identifying the reasons for the failures, are extremely important, because it would provide guidelines on what types of mistakes to avoid during the settlement of future claims.

5.6 ATTEND TO AREAS VACATED BY COMMUNITIES MOVING TO COMMERCIAL FARMS UNDER LAND REFORM PROGRAMMES, AS WELL AS OTHER UNUSED AREAS IN FORMER HOMELANDS

Communities that were removed from scattered “black spots” as part of the “homeland consolidation” process during the apartheid era (which started in 1948) from about 1960 onwards, were not just “dumped on the road”, but were “resettled” somewhere in a relevant homeland according to their “ethnic group”. Although some members of such communities have become scattered further afield in the country, the community as such still had this resettled land. Where a community under a land restitution claim now move back to the original land from which they were removed, their resettled land in the homeland obviously ***must*** now become vacant and unused.

Such vacated land may have good agricultural potential. ***In view of South Africa’s scarce water and land resources and the big demand for land, it is inconceivable that such vacated land can be allowed to lie unused***. An integral part of the land restitution approach and strategy should be to make such land ***immediately*** when the community vacates it, available for other farmers who need land. Land which has been vacated some time ago, due to settlement of land restitution claims, and is not yet being used productively, should also be made available immediately to potential emerging farmers who are looking for land.

There are also significant other areas of good farmland that are lying vacant and unused in homelands at the moment. It is very important to make this land available to potential Black emerging farmers who want to farm and have the aptitude for it, but need land. These include former commercial farms that were bought out for consolidation of homelands and areas vacated by people who moved to urban areas and strangely enough are still lying vacant. Again, the country cannot afford to have this land lying vacant and unused while there is such a need for land.

The Departments of Land Affairs and Agriculture should ***urgently*** make inventories of all the vacant, unused land in the former homelands and its agricultural potential. An approach and strategy for bringing ***all*** this land into productive use as soon as possible must then be drafted and ***brought into action without delay***. In some parts of the central Eastern Cape this type of delay is also leading to horrific degradation of formerly excellent commercial farms, bought out in the late 1970s/early 1980s, and still lying unallocated. It has become a "free for all", with neighbouring communities cutting fences and herding in their stock at will, causing extreme overgrazing. One of the most grim examples is that of Tukulu, once a model conservation farm about which a book was even written (Matthews, 1956). Tukulu's fate was clearly described in a recent land use planning exercise done for the farm by agriculture students from the University of Fort Hare. The premier of the Eastern Cape at the time of the compilation of this report (M. Stofile), expressed his deep concern about what happened at and to Tukulu. Tukulu is, however, but one example of an unfortunate trend.

5.7 UNDERSTAND THE FEARS AND TRAUMA OF THE WHITE COMMERCIAL FARMERS

A general impression seems to have been created that land reform in South Africa is seriously delayed because too many White commercial farmers are unwilling to cooperate freely in the process and some simply bluntly refusing to sell their farms. It would help to drive matters more smoothly if it is attempted to truly understand the fears and trauma of these farmers and to handle them with empathy rather than with threats.

Firstly, one should understand the psychological effects of the fate of the majority of the highly productive, well-developed commercial farms that have been bought out over the last thirty to forty years for the settlement of mainly small-scale Black farmers on any commercial farmer whose farm is earmarked for being bought out under the land reform programme. As discussed earlier, although there are exceptions, the dominant picture is one of extreme destruction – nice homesteads being demolished, infra-structure (e.g. irrigation systems) being demolished and sold as scrap, productive orchards being allowed to die and to become sources of firewood and goat browsing areas, well-conserved rangeland being degraded, etc. As outlined earlier, ***it started already with farms that were bought out for homeland consolidation during the apartheid era*** and continued at farms bought out under the land reform programme. ***Against the background of these realities one should then understand the fear and trauma that a farmer*** whose farm has been earmarked for being bought out ***must go through at the thought that the same devastation could most probably also take place at the farm that he, his family and farm workers have***

built up through hard work over many decades – in some cases for a number of generations.

Considering the above a statement by a farmer that *"I will not sell my farm for land reform, over my dead body"* would assume a different connotation. It would simply mean that he is not prepared to sell the farm that he (and his ancestors) have built up, just to see everything they have built up being destroyed within a few years' time. Psychologically, he could possibly find it very hard to cope with the latter if it should happen. It means that at least some (probably many) farmers who resist selling of their farms may not be in principle against land reform, but against the realities of its present outcomes.

The whole process will become so much easier and the resistance of farmers so much less if the whole land reform programme is driven in such a way that well-developed farms remain productive and their infrastructure, homesteads, etc. are kept intact after being bought out. This will greatly help to ease the fears of farmers regarding the future of the farms that they have built up and could substantially increase the willingness of at least some farmers to sell their farms in the interest of land reform.

Secondly, it should be realised that for some White commercial farmers it may be the second time that a farm that they have built up, is bought out within the last 20-30 years. These are farmers that were bought out during the homeland consolidation process and then moved to areas from which Black communities were removed as part of the same process. The latter were invariably underdeveloped or even totally undeveloped agriculturally by the time that the commercial farmers obtained the land. A case in point is the farmers that were bought out in the Balfour-Seymour area of the central Eastern Cape, who then obtained undeveloped land in Tsitsikamma, which they then developed into a productive dairy farming area.

Thirdly, in land redistribution cases (as different from land restitution cases) it is sometimes land that has been in a family for several generations, as far back as before the 1850s in the Eastern or Western Cape or the late 1800s in the case of the Free State and former Transvaal, that is being bought out. To these families this is also the land of their fathers that they have built up from nothing to productive farms, where they lived and played and where graves of their ancestors are in family graveyards on the farms. During the homeland consolidation process White commercial farming families went through this same trauma of losing farms that have been in their families for generations, especially descendents of British settlers in the Eastern Cape, many of whom were not even supporters of apartheid. During the 1960s a man named Blythe Thompson actually toured South Africa and Britain to inform the public about the plight of these farmers. ***In the present situation, handling new cases of this nature sympathetically could greatly enhance goodwill and cooperation from farmers.***

Fourthly, the "willing buyer, willing seller" principle should be applied ***appropriately*** in land ***redistribution*** cases. Clearly, the approach should be to first identify ***all*** White-owned commercial agricultural land that is ***available*** for redistribution. This would include ***all*** White-owned commercial agricultural land that is for some reason for sale, e.g. farmers that need to sell because of financial problems or because of old

age and no children that wish to continue with farming. In addition it would also include ***all*** land that farmers wish to sell ***out of their own free will*** for whatever reason. Where there is a "willing seller" there is no obstacle to the buying out of the land and its redistribution to Black farmers. Unfortunately, it has thus far not looked as if the approach is really to start with the land that is available for sale and with the willing sellers. One rather gets the impression that specific farms are "targeted" by "willing buyer" groups and/or government and that pressure is put on the owners of these farms to sell them for land reform purposes, despite the fact that a farmer may not want to sell his farm. In the process the available land, which could be purchased quickly and without hassles, more often than not seems to be ignored. Somehow it appears as if mainly, or almost exclusively, the best developed and most productive farms are "targeted". It is possible that less attractive farms that are up for sale because of financial or other problems may have as high or higher inherent potential than the highly developed ones and that the difference may simply be due to differences in the vision and management skills of the respective farmers. ***A clear indication by government that they are willing to first buy up all the farms that are available for sale and the farms of willing sellers, before pressurising reluctant or unwilling sellers, would***:

a. Speed up the land redistribution process.
b. Make land purchases cheaper, so that more land can be bought with the available funds.
c. Greatly enhance the goodwill and cooperation of commercial farmers.
d. ***In general maintain higher productivity of the country's scarce farmland and thus more efficient use of the scarce natural resources like water and land, reduce rural poverty and improve food security***.

Fifthly, it could enhance goodwill and cooperation from farmers if government would indicate that not only privately owned "family farms" would be expropriated if the target of 30% could not be reached by purchasing from willing sellers, but that the vast areas of farmland owned by mining houses and other big financial institutions and farmland owned by foreigners would also be included in the pool of White-owned commercial farmland and ***all treated alike***. For too long it looked as if the latter groups would not be required to contribute to the land redistribution programme and that the individual private commercial farmers would have to bear the brunt of land reform. Again, this could unfortunately create the impression of a vendetta against the individual private White commercial farmers. In early March 2004, the Minister of Agriculture did *"request"* big companies to make some of their farmland available for land reform, in order to help reach the 30% goal in time, and indicated that there should be looked at the amount of land owned by foreigners. These were still mild statements compared with the strong words often levelled at individual farmers, however. Government's dilemma is of course that big companies and foreigners could very quickly squash any possible suggestion of expropriating some of their large areas of farmland for land reform by advocating, through their strong lobbying power, that such action could damage investor confidence in the country. One would hope that the big companies, with their large contiguous tracts of farmland, would in the interest of land reform and alleviation of rural poverty ***at least*** be willing to enter into some form of "nucleus estate smallholder" (NES) programme with Government. (See 5.8.)

Finally, it could enhance goodwill and cooperation from White commercial farmers in the land reform programme ***if Government would seriously start with urgent actions***

for the settlement and/or development of Black farmers on the presently grossly under-utilised and even unused good quality agricultural land in the former homelands. These include:

- Farms that were bought out during the apartheid era and not used productively at present.
- Degraded irrigation schemes not yet earmarked for revitalisation.
- Land vacated by communities that moved to former commercial farms under the land reform programme (See Section 5.6.)
- Land vacated by families that have moved to urban areas. Van Averbeke (2002) describes the ironical situation in regard to this land as follows (quoting several publications from which the information was drawn): *During the past ten years, freedom of movement has brought about urban migration by entire rural families. Land vacated by its owners or right-holders could be used productively by others. After all, levels of unemployment and food insecurity in the African rural areas are high.Moreover, prices of food are high because remoteness of the African rural areas causes transaction costs to be high. One expects this situation to be conducive to growth in agriculture in the African rural areas, but evidence suggests that this is not the case."*

Promoting and putting structures and mechanisms in place for optimum utilization of this land, would prove that Government's objectives truly are (a) development of an efficient and productive Black agricultural sector, (b) optimum utilisation of the natural resources water and land and (c) effective alleviation of rural poverty, and that land redistribution is just one facet of an overall plan to achieve these objectives.

Overall my impression is that in general the White commercial farming sector is not against the principle of having a land reform programme, but that they have serious concerns regarding the way in which the process is implemented. There are, or have been until recently, too many uncertainties regarding key aspects – as was pointed out in earlier chapters and sections. The degradation, even destruction, of highly developed farms after having been handed over, is a cause of great concern and trauma for farmers whose farms are "wanted" for purchase. Furthermore, if the process had thus far led to the development of a viable, productive commercial Black agricultural sector, the White commercial farmers would have been much less sceptical about the process than now when it seems as if this is not being achieved, or even actively pursued.

5.8 WILL THE FARMS THAT HAVE COLLAPSED AFTER HANDING OVER PERFORCE LEAD TO THE RUSSIAN ROUTE?

It has been pointed out that in Russia the land reform aimed at the development of a private small-scale farming sector on the formerly state-owned collective farms failed due to the lack of production capital and farm management skills of the farmers. As pointed out earlier, the radical outcome of this was that the Russian government has decided to sell all farmland to rich big companies (petroleum, mining, etc.). According to Makeev (2003) this was due to strong lobbying by these companies convincing the Russian government that this was the only solution. The reality may also be that these companies are the only bodies that have the massive capital resources required to develop the agricultural sector from nothing. As pointed out

earlier, Makeev (2003) expects that due to this, Russian farmers will more-or-less disappear from the scene and will be forced to work for very low wages as farm labourers or be replaced by foreign farm workers.

Also in Indonesia corporate farming became popular with the government, but very unpopular with the farmers, according to Francke (1977). He alleged that there was an alliance between the government and the corporations. The consequence was that the government became richer and the farmers became poorer. In 2002, I was requested to do a soil investigation at a sugarcane estate on the Indonesian island of Sumatra. The area under sugarcane is 60 000 hectares, twice the size of Vaalharts, South Africa's biggest irrigation scheme. The estate belongs to a big finance institution and is managed by expatriate consultants from a rich first world country – to the obvious frustration of Indonesian counterparts who had to serve under them. In addition, it was alleged (but I could not verify or confirm whether this information was true) that the Indonesian labourers working at the estate earned the equivalent of only ***one*** US dollar ***per week***.

As pointed out earlier, several (to put it mildly) highly productive farms based on very intensive farming systems (vineyards, fruit and nut orchards, etc.) have collapsed after being handed over under the South African land reform programme and that it would cost astronomical amounts to get them back to their original productivity. It may well turn out that big companies or corporations are the only bodies with enough capital to bring about the redevelopment of these farms. This could become, even more, the case if more farms collapse after being handed over in future. ***The South African government will have to timeously look at the possibility that this scenario may be enforced by pure economical factors and prepare for handling it – or somehow avoiding it.*** South African minimum wage legislation would prevent "farmers" having to become labourers working for meagre wages. On the other hand the capital strong companies and corporations would be able to hire top-grade managers and mechanise operations to the extreme, thus leaving most rural people without any employment or income. The big corporate farming enterprises have the ability to ***maximize*** resource use efficiency, but they often do ***not***:

a. ***Optimize resource use efficiency***, with optimum resource use efficiency meaning the use of the resources in the best interest and to the best advantage of the community and/or nation.
b. ***Alleviate rural poverty***, but rather aggravate it – as explained above.
c. ***Promote food security***, since they most of the time concentrate on production of industrial crops and/or "runaway crops" (high value crops for the export market) and not on production of staple foods. Swaziland is an excellent example, with its large sugarcane, citrus, etc. estates, mainly owned by foreign companies and managed by expatriates, while the country is at the same time suffering serious maize shortages. It is, though, accepted that many areas are only suitable for production of industrial and/or special high value crops and not for economic production of staple grains. This is the case for several areas in South Africa.

The situation could perhaps be mitigated if one could find an acceptable and viable variation of the ***"Nucleus Estate Smallholder" (NES) model*** that was developed in Indonesia for the settlement of "transmigrated" people from Java in Sumatra, Kalimantan and Sulawesi (Darmawijaya, 1982). In Indonesia, this was used for

boosting the production and export of perennial plantation crops. In the South African situation one could thus look at its possibility for large units of vineyard, orchard (fruit, nuts) or plantation (e.g. tea) crops. These are probably the scenarios requiring the highest capital and management inputs. A NES "agent" is appointed, which has the right to "manage" for its own pocket 25% of the estate (the "nucleus" of the estate). The remaining 75% of the estate is allocated to small-scale farmers. In the Indonesian example each small farmer on a NES project *"has the right to **own** 3.5 ha of land, consisting of 2 ha for perennial plantation crops, 1.25 ha for annual food crops, and another 0.25 ha for housing and its surrounding gardens"* (Darmawijaya, 1982). It should be noted that in neighbouring Malaysia it was considered that each farmer needed at least 10 ha rubber plantation to make an acceptable income (Paramanathan, as quoted by Laker, 1981). The NES agent is responsible for the construction of processing facilities, offices, social services (including schools, shops, a market, roads, mosque or church, sports fields, staff accommodation, etc.) with a capacity that is capable of supporting and processing of the plantation products of both the nucleus and "plasma" (small farmer) areas of the total NES. The NES agent is also responsible for providing "superior" clonal plant material, doing land clearing and planting, providing "field maintenance" guidance, post harvest processing and marketing of all the products from both the nucleus and plasma areas. In Indonesia government-owned enterprises were appointed as NES agents. ***Since the main aim in South Africa would be to mobilise private capital from big corporations or companies one would have to look at a system by which either a corporation or company is appointed as NES agent or a partnership between a company/corporation and government acts as NES agent.*** The system by means of which the Boyes Group pumped R28 million into Zebediela and the way it is managed now that land restitution has been finalised for the estate is almost some kind of NES variation.

CHAPTER 6

RECOMMENDATIONS REGARDING FUTURE RESEARCH NEEDS TO ENSURE EFFICIENT USE OF OF PRIMARY NATURAL RESOURCES FOR EFFECTIVE ALLEVIATION OF RURAL POVERTY AND PROMOTION OF FOOD SECURITY

6.1 GENERAL INTRODUCTION

Nearly all reports and theses on research done in South Africa over several decades on topics related to the fields of this report have ended with recommendations for follow-up research that was required and/or new research needs identified during the specific project. Unfortunately, some important recommendations have not been followed up and important information is still lacking as a result. ***It is strongly recommended that someone be urgently tasked to go through the relevant reports, theses and other publications and compile a list of the important recommendations for further research made over the last 25 to 30 years that have not been followed up and should require urgent attention.***

In many cases important pieces of information that belong together to give a coherent integrated useful picture are "hidden" in different thick reports and/or theses and/or papers published in overseas journals, with the consequence that they are unknown and/or quite inaccessible and/or incomprehensible for the potential users of the information. Some very useful data are simply lying in old research files. ***Although this is not research in the classical sense, it is strongly recommended that individuals be tasked with collating, digesting and synthesizing the South African (and where applicable other) data on specific topics into comprehensible useful mimeographs, bulletins or pamphlets.*** *It is* ***very important*** *to keep in mind that some very important research with findings that are still extremely useful was done 40, 50 or 60 or more years ago and that these should be included in the searches. This is especially with a view to information that could be very useful for emerging or subsistence farmers at this point in time.* I know of at least one PhD thesis which consisted simply of collating and digesting all the research on a specific topic piled up in progress report files by a series of consecutive researchers over decades at a specific research centre. The thesis unlocked all the valuable data, that were lying inaccessibly and useless all the time, into a useful format.

With very few exceptions, South Africa's agricultural researchers are still lagging far behind as far as real understanding of the principles and approaches of Farming System Research-Extension and similar or related research procedures are concerned. It is important to give serious attention to bringing a lot more of them "on board" as far as these types of research are concerned, otherwise research aimed at efficient small farmer development will remain hamstrung.

A number of the factors that impact most strongly on the efficiency of resource use, alleviation of rural poverty and promotion of food security have nothing to do with agriculture as such. Consequently, research on agricultural sciences and technologies alone, although it is important, will not ensure efficient resource use, alleviation of rural poverty and food security. Research on finding solutions for several external problems hampering these is urgently required. The "scientific" data collection

required urgently are often not classical quantitative statistically verifiable experimental research, but more survey type or qualitative studies.

Below, I list a small selection of the most important topics that I believe should be studied very urgently if efficient resource use, effective alleviation of rural poverty and food security are to be ensured (or at least promoted).

6.2 RECOMMENDATIONS FOR SPECIFIC RESEARCH/STUDIES TO BE UNDERTAKEN URGENTLY

6.2.1 Non-technical research

6.2.1.1 Research towards finding an effective strategy for convincing politicians, activists, officials of relevant government departments, opinion formers, the general public, the media, etc. of the realities regarding the nature, qualities and geographic distribution of South Africa's primary natural agricultural resources

Motivation: As indicated earlier effective past political propaganda has indoctrinated people to such an extent that they seem to find it impossible to grasp and accept the realities of the nature and geographic distribution of the primary natural agricultural resources of the country. Until they grasp and accept these realities, they will not be able to base future planning on them. This will mean that the significant areas of moderate to high potential land in former homelands will remain under-utilized. The consequence will be inefficient use of the natural resources, perpetuation of rural poverty and food insecurity in these areas, especially the former Eastern Cape homelands. In addition, there are also unfortunately publications like Kruger *et al*. (1993) and Schulze (1997) which give gross over-optimistic estimations of, for example, South Africa's maize production potential. The danger of these over-optimistic estimations and their use in food security projections was outlined by Laker (2003b).

This research and strategy development should be done by a public relations expert or someone in some such field.

6.2.1.2 Research towards finding an effective strategy for convincing politicians, activists, officials of relevant government departments, opinion formers, the general public, the media, and prospective farmers of the realities regarding the capital and management requirements for successful commercial farming – especially for intensive, high value perennial crop systems

Motivation: It is clear that there is a total lack of appreciation and understanding of the high capital and management requirements for successful commercial farming, especially for intensive high value perennial cropping systems like vineyards, orchard crops and plantation crops amongst decision-makers involved in the land reform programmes and the prospective farmers. This is a major cause of the collapsing and destruction of such farms after they are handed over. Unless the decision-makers and prospective farmers gain a clear understanding of these requirements, and the necessary structures to

provide them are put in place before a farm is handed over, the destruction of highly developed farms will continue unabated. The result will be inefficient resource use and perpetuation of rural poverty.

6.2.1.3 Studies on the impact of agricultural unfriendly labour legislation – with special reference to the effects of minimum wages, inflexible working hours and other inflexibilities and to the importance of the roles of children in small-scale family farming

Motivation: Agricultural unfriendly labour legislation can have devastating effects in perpetuating rural poverty, especially in small-scale family farming, but also in larger scale commercial farming. Someone who understands the basic differences between the agricultural scenario, especially its seasonality, and other enterprises, like mining or industries, should undertake such study.

6.2.2 Research in regard to irrigation technologies

6.2.2.1 Studies on simple, easy to manage water and/or labour saving irrigation technologies for small-scale farming

Motivation: There are a number of simple, easy to manage water and/or labour saving irrigation technologies that are being used effectively in other Southern African countries and elsewhere in Africa, that have not been exploited in South Africa yet and need urgent attention. Likewise, the use of other small-scale simple and efficient technologies developed and used elsewhere, like small gated pipes, should be included in such studies. Some of these have been so well researched and have been used so effectively in practice that little or no local experimentation will be required. For such technologies studies should concentrate on getting to know how the technologies are used elsewhere and to develop instruction handbooks or pamphlets for their use (and in some cases maintenance and construction). Three important technologies that must be included in such studies are (but keep in mind that others could be added);

a. ***Clay pot subsurface irrigation***: Various publications on this can be consulted, but personal interaction with Dr. A.E. Daka of Zambia would be imperative. A key factor would be to sort out the production of the pots, since local women probably do not have experience of producing ***porous*** clay pots.
b. ***Treadle pumps***: The present South African approach is too one-dimensional and top-down. Again, Dr. Daka's work should be a starting point on the importance of adapting the pumps according to the preferences of local farmers and on turning its manufacturing and maintenance into a local village-level industry.
c. ***Small metal gated pipes***: These are well-known and used in the United States, with the small plot system that has been used effectively at the University of California in Davis' research farm looking like an attractive option. Local research with it will possibly be required.

Short furrow irrigation is not included in the list because it is by now well-enough known and researched in South Africa. I am not sure whether it has

been adopted widely and effectively enough in South Africa, however. If not, then studies should be conducted on ways to improve its adoption rate where applicable and the efficiency of its implementation in the field.

6.2.2.2 Studies on the selection of appropriate irrigation technologies for different soil and climatic conditions

Motivation: A major problem in the South African irrigation scenario, leading to low irrigation water use efficiencies and poor crop performances, is a gross lack of selection of appropriate irrigation technologies or adaptation of these to specific soil and climatic conditions. Unbelievable errors, like using centre pivots on strongly crusting soils with very low infiltration capacities, or drip systems on coarse sandy soils, are common. These two mistakes are inexcusable. Using of micro-sprinklers or drippers on strongly sealing soils, e.g along the eastern seaboard, instead of furrow irrigation, could be attributed to lack of knowledge amongst irrigation planners about these incompatibilities. Enough knowledge is available about this now from South African data and American experience that it should no longer be an excuse to make these mistakes and to realise that there are many scenarios where furrow irrigation is a much more appropriate and effective option. Similarly guidelines for appropriate choices between overhead and surface systems in areas characterised by extremely high evaporative demands or high winds should be developed. Firstly, thorough open-minded, objective desktop studies of all the available South African data should be conducted, as well as of overseas data, especially from areas in the USA with similar soil and climatic problems. Thereafter, directed field research should be conducted where necessary. There seems to be a panacea to believe that overhead sprinkler or micro-irrigation systems are *per se* more efficient than surface systems. On many soils and under certain climatic conditions this is just simply not the case. In addition systems like irrigation in alternate furrows, using large scale gated pipes, etc., etc. should also be studied.

6.2.2.3 Development of instruction manuals for the planning, implementation and management of all types of irrigation systems, from micro-sprinklers through furrows to clay pots

Motivation: Instruction manuals for the efficient planning, implementation and management of different irrigation systems are required. For many systems there are probably manuals covering the engineering aspects well, but more attention is required to the applicability of a system to specific soil, climate and crop conditions***. Importantly each manual should clearly indicate the "no-go" scenarios for that type of system, and provide an indication of what type of system(s) will probably be the best alternative for a specific no-go scenario.***

6.2.3 Studies on irrigation scheduling

6.2.3.1 Collation, analysis and synthesis of research data on irrigation scheduling

Motivation: Much good research has been done in South Africa on irrigation scheduling, but I believe that there is a big need for comprehensive collation of these data, followed by in-depth open-minded, objective analysis of the data and synthesis of appropriate useful recommendations for different scenarios. The emphasis is on "open-minded", "objective" and "appropriate", because, like with irrigation systems, too many people seem to see only what they want to see and stick with what they believe, even if the facts show that their beliefs are wrong.

6.2.3.2 Studies on"high frequency deficit irrigation"

Motivation: Research at the Universities of Fort Hare and Pretoria and in the USA with a variety of crops has shown that ***appropriate*** high frequency deficit irrigation strategies give ***much higher irrigation water use efficiencies*** without reducing yields. With "deficit irrigation" here is not meant that plants are stressed, but that when the lower limit of plant-available water is reached, irrigation is applied, but the profile is not fully filled to field capacity. Despite the obvious advantages of this approach in terms of increased irrigation water use efficiency in water-scarce situations, it has not been implemented in irrigation scheduling in South Africa. Prof. Alan Bennie's excellent BEWAB irrigation scheduling model includes a type of variation related to it, though. For the rest it is totally ignored, however. The Fort Hare and UP research has shown that the efficiency depends on the actual strategy followed, e.g. to what level the profile is filled up during irrigations. A desktop study of the available South African data is urgently required, as well as of the latest American data, to identify the most appropriate strategy for implementation of this scheduling approach. Further field research under additional sets of soil and climatic conditions will probably be required. A study will also be required to identify why this strategy has thus far received so little attention amongst South African irrigation planners and why those that knew of it were reluctant to implement it.

6.2.4 Studies on optimising rain water use efficiencies under dryland (rainfed) cropping conditions

6.2.4.1 Studies on water harvesting

Motivation: Water harvesting is widely used throughout the world to improve yields and water use efficiency under rainfed cropping in semi-arid areas, but has thus far received little attention in South Africa and the Southern African region. Objective evaluations of the water harvesting research results from the Free State and Botswana does not paint a promising picture, as was indicated earlier. In view of the successes achieved with water harvesting techniques elsewhere, further research on ***different*** water harvesting ***techniques*** (only a micro-basin in-field system having been tested in the Free State) ***for as wide as possible a range of different rainfall and soil combinations*** should be

conducted urgently. (I believe the WRC has already set this in motion.) Indigenous systems already presently being used by small-scale farmers in South Africa (e.g. the former Ciskei case mentioned earlier) and possible expansion and/or improvement to them, should be accorded high priority. ***The whole former Transkei and Ciskei*** areas, with their peculiar rainfall pattern of spring and autumn peaks and a relatively long summer dip, combined with the nature of their soils, ***should be a very high priority for such studies***. Areas with good quality soils and relatively high rainfall should also be included.

6.2.4.2 Studies on conservation tillage techniques

Motivation: Conservation tillage techniques (zero tillage, minimum tillage, stubble mulching, etc.) are usually also viewed as efficient technologies for improving water conservation and rain water use efficiency under rainfed cropping. As indicated earlier, South African research results for these differ widely between different climate and soil scenarios, from being highly beneficial to being negative. Firstly, a thorough desktop study should be conducted urgently in order to try to identify a pattern which can be used to predict where success can be expected and where not. Secondly, further field research on this topic should be conducted urgently on as wide as possible a range of different climate-soil combinations to improve the accuracy of predictions. Again, the former Ciskei and Transkei should be high priority areas because of their peculiar climate and soil combinations. ***Special attention should be given to the applicability of these practices within small farmer situations***. Studies at Beltsville, Maryland, for example showed that zero tillage was better than conventional tillage only if very high nitrogen applications were made. Furthermore, American information shows that zero tillage systems have much higher management requirements than conventional tillage. Both the latter may be important negative factors in resource-poor small farmer scenarios. Furthermore, these types of systems may not be well suited to non-mechanised cultivation situations. This will also have to be investigated.

6.2.5 Studies on farming systems and indigenous farming techniques/practices

Motivation: Thoughout the world there has for a number of decades now been an appreciation that there are valuable ***indigenous farming technologies*** in less developed areas and that these ***should be used more effectively in improving resource use efficiency and alleviating poverty***. In the former Transkei and Ciskei there are several examples. It has already been mentioned that in the LandCare studies in East Pondoland farmers were found who produce nearly four tons of maize per hare with their own technologies and even do better than the LandCare “best farming” technology. Also in the area there is a community of irrigation farmers who has perfected a technique of getting green mealies early on the market by growing seedlings in greenhouses and transplanting them successfully in the field (Van der Merwe, 2004). The researchers could not achieve success with transplanting maize seedlings! They also use effective indigenous pest control methods. The winter ripping with ox-drawn rippers to improve the efficiency of storage of early spring rains in the soil has already been mentioned. ***Effective indigenous***

technologies should be identified as a matter of priority and possible ways to improve them researched according to to ICTA model of Guatamala mentioned earlier.

Van Averbeke (2002) describes it brilliantly: "*Technical innovations in smallholder agriculture require thorough understanding of local farming systems and technology. The likelihood of introducing succrssful technical interventions is increased, when research starts by developing an understanding of indigenous knowledge and technology. Such understanding is bound to provide direction to technical innovation, because it is based on awareness of how local resources are used with the help of indigenous technology.*"

6.2.6 Studies on the wheat production potential of the former Ciskei and southern and central parts of the former Transkei

Motivation: This may sound like an unnecessarily detailed or specific research recommendation within the context of this report, but I do not believe it is. Several aspects serve as motivation for this recommendation:

- Wheat is an important staple food in South Africa. The production potentials of the country's traditional wheat production areas are low. The consequence is that the country must import substantial amounts of wheat every year.
- As indicated earlier, the Black farmers of the Peddie area of the former Ciskei were important wheat producers during the middle to late 1800s and actually produced wheat for the mining areas in the interior of South Africa. Wheat was also one of the crops grown at the irrigation scheme of Chief Kama near Middledrift.
- Significant areas of the Ciskei and southern and central parts of the former Transkei have soils that resemble some of the good wheat producing soils of the Eastern Free State (Van der Merwe, 2002).
- The rainfall patterns of these areas, with autumn and spring peaks and more winter rain than the Highveld, appear to be much more favourable for wheat production than the Eastern Free State.

Negative factors include:

- The poor results of Van Averbeke and Marais with their wheat experiments in the former Ciskei. They identified lack of "planting rains" as the most important factor. This is a strange finding in view of the fact that the area receives much more autumn and winter rain than the Eastern Free State.
- The particular Eastern Cape soils are strongly crusting, more so than their Eastern Free State counterparts and wheat has a very poor tolerance for crusting soils, because of emergence problems. But then the Western Cape wheat areas also have some very strongly crusting soils.

Urgent research into the possibility to turn the Eastern Cape into a major wheat producing area is strongly recommended. Aspects such as adaptation of planting dates to fit the specific rainfall patterns of the area best, tillage

practices to negate crusting problems, breeding of cultivars suited to the specific area, willingness of the local population to produce wheat (if it is found that it can be done successfully), etc. need to be researched.If success is achieved, it can greatly contribute to:

- Better water use efficiency, because one is talking about those soils that are somewhat similar to soils that in the Eastern Free state for example proved to be good wheat soils, but poor maize soils.
- Alleviation of rural poverty in the area.
- Improving food security, both at local and national level.

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