

Exploring landscape green innovations to improve
aquatic ecosystem services for the benefit of
urban and peri-urban communities:
A case study of the Khayelitsha Wetlands

Report to the

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Executive summary

Background and Rationale

Human-beings are entirely dependent on ecosystem services for their basic needs. The CBD (1992: 3) defines ecosystems as dynamic complex systems of fauna, flora and micro-organism communities and their non-living environment interacting as a functional unit. By extension, ecosystem services can be defined as the benefits that people obtain from the defined ecosystems (MA (2005: V). There are four types of ecosystem services, namely, provisioning, cultural, regulating and supporting services.

Wetlands are extremely valuable type of aquatic ecosystems that provide many benefits to society. These benefits include improvement of water quality, protection from flooding and supply of water during dry periods. In addition, wetlands are frequently sites of high biodiversity, providing habitat for often specialised plants, birds, frogs and other living creatures. Yet despite this, wetlands are increasingly under threat due to the spread of urban infrastructure and expanding agricultural activities.

This research focuses on the Khayelitsha wetlands system and the ecosystem services it provides to the surrounding communities in a context of socio-economic and spatial disparities in relation to upstream users of the Kuils River. The research explores the characteristics of Kuils River catchment as one cannot speak about the Khayelitsha wetlands without understanding where the water that gives it life comes from.

The gap this research is attempts to fill is that of understanding aquatic ecosystem services associated with urban and peri-urban areas. Most research on ecosystem services have mostly focused on intact ecosystems located in pristine landscapes away from areas that are perceived to be of little biodiversity significance (Gomez-Baggethun & Barton, 2013). Yet urban areas often possess critical biodiversity and provide vital services. These also occur in a context of socio-political and economic influences which shape the way that the wetlands are used and managed. As a result of little focus being placed on understanding aquatic ecosystem services in relation to various needs in urban and peri-urban areas, little research has gone into investigating the nature of innovative landscape scale interventions that could be implemented to secure the critical services such ecosystems provide. This research therefore sought to address the following key questions:

- What types of ecosystem services does the Khayelitsha wetland provide to the local community and upstream users of the Kuils River?

- What are the integrated landscape management approaches that can be used to protect urban and peri-urban aquatic ecosystem services using the Khayelitsha wetlands as a case study?
- What are the enterprise development opportunities in the Khayelitsha wetlands area?
- Which of these enterprises can become bankable projects?

Methodology

This study relied on qualitative research to explore the nature of landscape interventions to improve aquatic ecosystem services and the socio-economic well-being of communities surrounding this ecosystem. The research tools used were ethnographic in nature and included participant observation, one-on-one interviews with community members and representatives of the City of Cape Town (CCT) as well as focus group interviews.

Ethnographic research is particularly useful form of qualitative research which enables researchers to observe and/or interact with participants in their everyday lives. This allows for the researchers to gain a deeper understanding of the challenges and opportunities that the participants encounter within their environment and therefore the development of sustainable solutions become relevant and accepted within the communities. Traditional approaches to conservation and economic development often occurred using a top down strategies, where those considered as “the experts” determined solutions and outcomes for community level challenges. These strategies also set out to create boundaries of protected areas, with locals’ movements into and out of these spaces being restricted to varying degrees. However growing research has shown that there is a direct correlation between the success of conservation projects with community goodwill and support of local partnerships (Hung, 2004; Glover et al, 2005; Ohmer et al, 2009; Bennett & Dearden, 2014; Snyman, 2014).

The use of ethnographic approaches, unlike traditional methods of enquiry which ask highly practical questions, allows researchers to see peoples’ behaviour on their terms and not ours. The outcome of these in-depth interactions was the development of a bankable business plan conceptualised by the Makhaza community who live along the Khayelitsha wetlands. The business plan not only included potential social and environmental enterprises, but also a included the proposal for the development of a Green Hub that aims to create a platform for education, community building, conservation and empowerment for marginalised communities.

However, research projects such as these are not immune to challenges. While achieving local buy-in is of significant importance, gaining support from local government and community forums is important. The challenge encountered during this project included navigating and trying to understand which government departments were responsible for the management of the wetland system and the river. In addition, because the project focused on conservation,

economic development and community, the process required engagement with different departments with different protocols and agendas. In addition, Khayelitsha is highly political space (with representation from political parties such as the Democratic Alliance (DA) and the African National Congress (ANC)) where attempts to start projects or businesses needed to be approved by dedicated forums. This therefore meant that navigating the socio-political and economic landscapes took significant amounts of time. These challenges are explained in more detail in the report.

However, the business case was tested with the City of Cape Town at municipal level, and at the time of writing this report, the researchers and community members were in continuous dialogue and planning on the possible implementation of this business plan and engagement for a public-private partnership.

Results and discussion

As one of the key outputs, the literature review, unpacks the types of ecosystem services and their role in aquatic environments. The purpose of the review was to understand the types of ecosystem services available in the Khayelitsha wetlands. The key insights from this review indicated that these wetlands provided essential services to surrounding communities. The general aquatic ecosystem services included water resource and quality protection, air purification as well as biodiversity and species protection. Of particular relevance to this research was the usefulness of the wetland system for storm and flood water control, provision of raw materials (such as use of *Typha Capensis* plant for compost and water lilies for sale) as well as the cultural and recreational services.

It is important to understand the provision of these services in relation to the socio-economic and political landscape of the Khayelitsha Township. The area is characterised by high unemployment rates, poverty and high levels of crime, and yet is also sprawling township full of entrepreneurial activity. The review aimed to situate people and the wetland in a system of relating, a paradigm that concentrates on the interactions and connections between systems - social, the environment, politics, economic and religion. This conceptual framework demonstrates how linkages within systems can be applied to this research on aquatic ecosystem goods and services (AEGS). It assists in understanding how these material and social connections are manifested in the human and nature relationship, which then determines how the resource can be managed whilst addressing socio-economic needs.

The nature of landscape innovations to address human and wetland well-being

This research sought to build an understanding of the context specific needs of the communities living around the wetland, which can be linked to landscape interventions that would lead to the protection of the wetland. Drawing from ethnographic research, some of the needs of the community identified in relation to the wetland included, access to information on public participation in decision making, access to technological innovations for assessing water quality, process education of engaging with the City of Cape Town, and access to market.

The needs assessment was essential to building the business case, another key output. The business case was designed to address the particular needs of the community, which in turn secured their buy-in. We believe strongly that to effectively conserve natural capital such as wetlands, it's important to get buy-in of local custodians (community) in a meaningful way. Activating the local economy through opportunities for job creation, will not only empower local community members but will also inspire them to value their local resources even more.

The business case for the Khayelitsha Green Hub and Market

Based on individual engagements and a comprehensive needs assessment of communities linked to the wetland system, it was found that to protect to wetland system sustainably requires the establishment of a platform for capacity building and entrepreneurship to encourage active participation of local community members.

The business case proposes, as mentioned above, the development of a Green Hub in the Makhaza area, which is located next to the wetland park. This concept was developed after consultations with the African Centre for a Green Economy, Gender CC and the Environmental Monitoring Group (EMG), investigating the needs and entrepreneurial opportunities that were available in relation to the protection of the Khayelitsha wetland. The concept was developed as a response to the much-needed employment and income generating opportunities in an area characterised by high levels of unemployment, crime and poverty. In addition, the idea was developed in response to creating more environmental awareness and promotion of sustainable practices related to the Khayelitsha Wetlands System and other wetlands in the area.

The objectives of the Green Hub include:

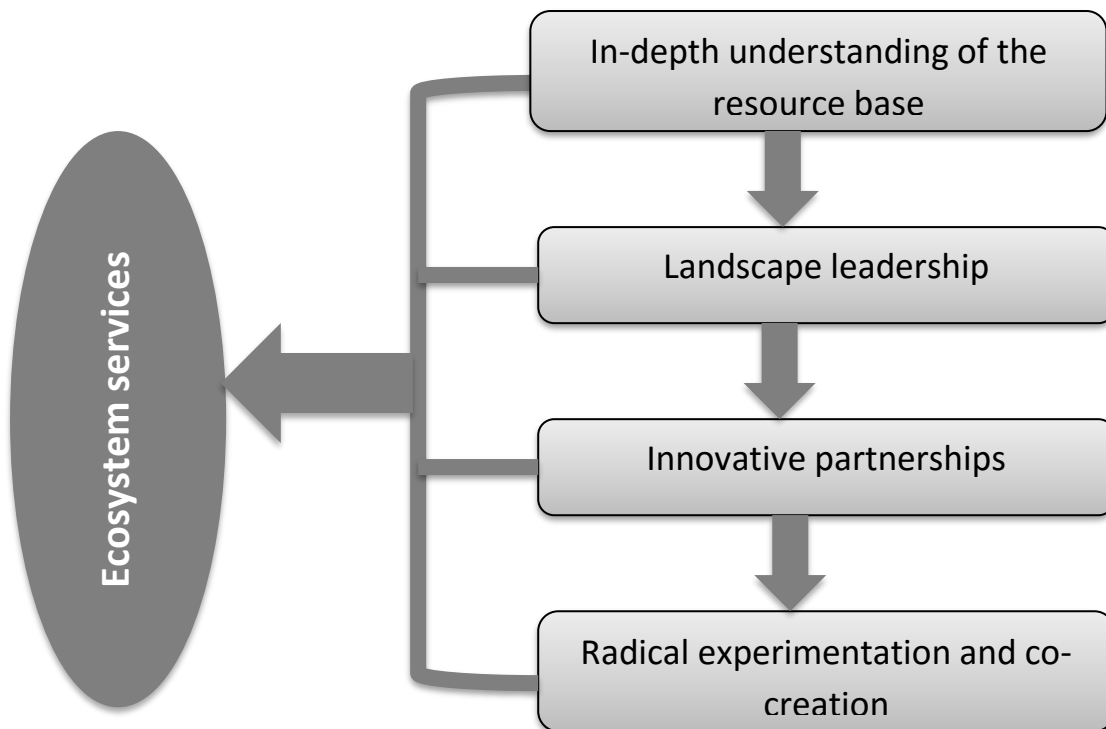
1. Establishment of a platform for community driven awareness raising on green economy
2. Creating a local market place for green entrepreneurs to trade
3. Incubate local green enterprises to explore the use of local resources and to upcycle waste materials.

Local members of the community have already shown considerable leadership in organising themselves through the catchment forum, and have undertaken various volunteer activities

linked to pollution control. There are also significant economy activities being conducted such as gardening and making of local craft. Our capacity building intervention will supplement these efforts, by introducing a formal green business incubation programme, as it addressed the particular needs of the community.

Framework for landscape innovation

Based on the comprehensive review of the ecosystem services prevalent in the Khayelitsha wetland system and the ethnographic mapping of key relationships within the broader catchment, a proposed framework is presented that draws out the lessons learnt from this exercise, and their potential applicability to other complex socio-ecological systems that may exhibit similar characteristics. This framework outlines the key components of landscape innovations that need to be fostered to promote effective management of urban and peri-urban aquatic ecosystems.



Conceptual framework for enhancing landscape innovations

Landscape innovations in this context refers to the kinds of approaches required to effectively manage aquatic ecosystems that are intricately linked to society and people (economy, culture, institutions) and the environment (wetlands). These kinds of systems require interventions that go beyond the traditional conservation approaches of merely focusing on the ecosystem, and not taking cognisance of the interactions with people and growing pressure on the system as a result of demographic change and unsustainable resource use. Most of the innovations required to develop a good understanding of these socio-ecological

systems are therefore ‘soft’ non-technical solutions that focus on strengthening inter-relationship between people and the environment for their mutual benefit.

There are 4 key elements in the framework for landscape innovations that are key to securing ecosystem services for aquatic systems in peri-urban landscapes.

Understanding the natural resource base

In-depth understanding of the **resource base** at a landscape level. It’s important to understand the resource flows at a landscape level, including the biotic resources from which the ecosystem services are derived.

Landscape leadership

Fostering landscape **leadership** to champion a holistic approach to aquatic ecosystem management. Good leadership is required at all levels, ranging from communities that are the direct custodian of the resources, to upstream users, business and political leadership.

Innovative partnerships

Innovative **partnerships** are geared towards addressing shared risk among key stakeholders in the landscape.

Radical experimentation and co-creation

Fostering radical **experimentation** and **co-creation** amongst landscape actors and stakeholders. The complex nature of these socio-ecological systems implies that not a “one-size-fits-all” solution can address the systemic nature of challenges.

These key principles of landscape innovation are not exhaustive, but present a useful framework to engage key stakeholders in a strategic fashion to foster collective action at a landscape level. This study has addressed various aspects of the framework, although there is still an opportunity for a rigorous review and testing for wider application in similar socio-ecological systems.

Recommendations for future research and implementation

1. Investigate the potential economic opportunities provided by the Khayelitsha wetland system

Considering that one of the most explicit needs established from this research is the urgency to provide economic opportunities, its recommended that further exploratory studies be undertaken to investigate the potential of identifying economically valuable raw materials linked to the wetland that could be used to build economically beneficial products. Alien invasive species like *Typha capensis* which is known to occur widely in the Khayelitsha wetland system, but their potential to be exploited at a commercial scale is not known. If commercially viable quantities were available this could unlock significant opportunities for products, such

as crafts and for medicine. This would provide an excellent opportunity for effective community engagement, while ensuring that the wetland system is effectively managed.

2. Implementing the green hub

Throughout the interactions with local community members, it was clear that a high level of distrust exists between the community members, local authorities and other stakeholders such as researchers. This is primarily due to the perception that communities don't benefit directly from interventions linked to the wetland system, and in some cases, are not sufficiently engaged in decision-making. The Green Hub, would help to build trust within the community, as it will be a concrete undertaking with direct benefit to members of the community, but at the same time promote practices that would build resilience of the wetland system. To ensure that the concept of the Green Hub can be fully realised, all key stakeholders more specifically the City authorities need to come on board as this will be key in ensuring that the Hub can be implemented. A second factor for success of the Green Hub is a concerted effort to build the capacity of participating community members on enterprise development, conflict resolution and effective stakeholder relationship management, and the importance of wetland ecosystems. Many of these aspects will be undertaken by organisations that are already operating in the area, such as the Environmental Management Group (EMG). The African Centre for a Green Economy, could also provide enterprise development support, through its New Economy Accelerator (NEA) that has been incubating enterprises in the last 3 years.

3. Explore the potential to establish a Kuils River Catchment Forum (KRCF)

Evidence from engaging various stakeholders in this project has clearly demonstrated the complexity of the Kuils River catchment, with its complex network of relationships, power dynamics and environmental risks. A forum would present a great platform for all stakeholders in the catchment to engage each other in a bid to find common solutions to the shared risks prevalent in the catchment. Upstream water users such as farmers, industry and water treatment plants all play a significant role in determining the ecological integrity of the wetland systems downstream that this initiative is concerned about. The upstream users also hold the best potential in protecting the wetlands downstream, partly because they derive the most economic benefit from the catchment as a whole, but are also exposed to severe business risk if the integrity of the catchment is not secure.

Previously there has been an attempt to set up a Kuils River Catchment Forum (KCF), but unfortunately the effort does not appear to be successful. It is therefore recommended that a feasibility assessment be undertaken to further explore this potential. The South African Water Act 1998 stipulates the establishment of non-statutory catchment forums to encourage wider stakeholder engagement in water management, so this undertaking would help this goal as outlined in the Water Act.

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

This is a study explores the ways in which urban and peri-urban dwellers impact and in turn, depend on the services provided by aquatic ecosystems. Specifically, this project aims to review the ecosystem services provided generally in the Kuils River WMA and particularly in the Khayelitsha wetlands system under contextually relevant social, economic and political systems. This is done with a view to developing a better understanding on how these systems impact the provisioning of ecosystem services, the benefits derived from the Khayelitsha wetland by local communities which will lead to the development of bankable business projects for the local community and broader landscape outcomes related to water management.

The challenge in water management, and in this particular case, the management of an urban wetland, is not simply in the understanding of ecological systems, but rather in the understanding of how governance and cultural systems interact with these ecological systems and how these inform policy and management practices (McDonnell, 2008). Understanding these dynamics is critical to the development of effective strategies for the management of water in the WMA as well as the ecosystem services which ultimately benefit the Khayelitsha community.

Due to the complex nature of water management as outlined above, there is a need to focus at broad landscape scale level to address the challenges that may occur at a specific site. There is therefore need to foster solutions at the landscape level, through i) landscape leadership, ii) innovative partnerships, iii) radical experimentation through co-creation, and iv) In-depth understanding of the resource base.

The study is intended to inform key stakeholders such as local communities, private sector upstream users, NGOs, government and other role players on the importance of the ecosystem services provided by the Khayelitsha wetland. The intention is also to consider relationality between and within the ecosystem service provision and other external systems, to provide a framework for which key stakeholders can engage with each other. It also intends on providing a case for participatory management of water in the catchment, motivating practical solutions such as job creation and improving service delivery to community members in relation to protecting public goods such as the wetlands.

The specific objectives of the study comprise the following:

- To investigate the nature of ecosystem services that the Kuils River provides broadly and specifically the Khayelitsha wetland provides to local community members

- To evaluate the impact of multiple landscape user group, both upstream and downstream, on ecosystem services provided by the Khayelitsha Wetlands
- Investigate the nature of landscape innovations suitable for protecting urban and peri-urban aquatic ecosystem services, using Khayelitsha wetlands system as a case study
- Identify enterprise development opportunities that can be used to boost community involvement in the protection of the wetland
- Develop a business case for a bankable project locally owned and managed by local community members that address issues related to water, food and/or energy security

This report situates the communities and the wetland in a network of historical, economic, scientific and ecological events to better understand the trade-offs between the ecological functioning of the wetland and the socio-political circumstances. It highlights the complex entanglements of natural resource management with national priorities of economic development in the context of inherited apartheid city spatial planning. The city of Cape Town over the years has been notoriously known for its spatial disparities, where the wealthy (historically and dominantly the white population) live in less dense areas, closer to the mountains and nature. The poorer communities are located on the Cape Flats in dense communities which in turn has significant ecological impacts and the provision of ecosystem services. The Khayelitsha wetlands present an opportunity to address some of the inherited inequities of spatial planning. Through looking at the multiple facets that come into play in assessing the ecosystem services provided by the wetland, our goal is to provide a holistic understanding of natural resource management, which in turn can inform policy.

1.2 MOTIVATION FOR STUDY

This research was also conducted at a time when South Africa's Western Cape experienced one of its worst droughts in 100 years (DWS, 2017). The Western Cape has a significant agriculture sector which contributes approximately 4% of the province's gross domestic product (GDP) and is important for the country's export economy (Maree, 2017). The deciduous fruit industry, wine and citrus industries provide key export commodities. The agriculture and agro-processing sector provide 18% of the employment opportunities in the Western Cape (Maree, 2017). The decrease in employment in the sector due to lower production, coupled with rising food prices increases socio-economic tensions and precarity. It also increases the rate of rural to urban migration, with former farm workers seeking better opportunities and service delivery in urban centres.

South Africa is characterised by rapid urbanisation with an estimated 71.3% percent of the population expected to live in towns and cities by 2030 and nearly 80% by 2050 (UN World Urbanisations Prospects, 2014). Urban centres provide important pull factors such as perceived job opportunities, better access to education, infrastructure and services. Push

factors for rural to urban migration include increasing poverty in rural areas, difficulty in accessing services and a decline in arable land to name a few (Meyer-Ohlendorf, 2009).

The challenge with rapid urbanisation is the lack of adequate resources to meet the demands of a growing population in an area. The outcome of this is that the local government lacks the capacity to provide enough jobs, decent housing and adequate social service delivery (Joshua et al, 2014). Due to these afore mentioned challenges, poor urban dwellers are forced to occupy informal settlements in marginal areas, leading to overcrowding and being spatially removed from where the job opportunities and services lie. The negative impact of an expanding population in these peri-urban areas on the environment becomes multiple-fold. These range from a decrease in flora and fauna in an area due to clearing of land for housing and agriculture to changes in water quality, a result of increased pollution from, for example, poor waste management.

In Cape Town, some of the areas where these informal settlements develop, although considered peripheral zones, occupy important ecological spaces such as wetlands. These wetlands provide critical ecosystem services to urban areas; unfortunately, they are also the most impacted by rapidly growing populations.

Considering the underlying forces of how urban and peri-urban dwellers affect and in turn rely on the services supplied by these aquatic ecosystems is important for creating effective approaches for their management. The management of water and the development of water infrastructure are deeply rooted in the societal development agenda embedded in discourses of colonisation, state formation, poverty eradication, economic growth, sustainability and other development aspects (Mollinga, 2008). It significantly shapes the lives and livelihoods of people, cultural and political systems in the way that it is controlled, deployed and regulated as a “shared” natural resource.

Top down approaches are often used in the attempt at developing sustainable water management practices. People seek many services from ecosystems and thus perceive the condition of an ecosystem in relation to its ability to provide desired services. The ability of ecosystems to deliver services can be assessed by a variety of qualitative and quantitative methods. An assessment of the condition of ecosystems, the provision of services, and their relation to human well-being therefore requires an integrated approach. The approach needs to be one which “promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the viability of vital ecosystems” (UNEP-DHI Centre for Water and Environment, 2009). In addition, the approach should be seen as a process, one that is long-term, reiterative rather than linear and adaptive to economic, social and environmental conditions and to changing human values (Conradin, 2010). This enables a

decision process to determine which service or set of services is valued most highly and how to develop approaches to maintain services by managing the system sustainably.

This study focuses on aquatic ecosystems in multi-use landscapes ranging from residential, private business to farming. The complexity of the interactions as well as varying use of water in the water catchment area calls for a transdisciplinary approach in conducting this study. Therefore, in addition to integrated landscape approach, ethnographic research, was used to gather general information on the greater Kuils River catchment area and to a greater depth, the Khayelitsha wetlands.

1.3 ETHNOGRAPHY AS A RESEARCH METHOD

Ethnographic research is particularly useful for exploring emergent forms of life, both because of its deep interaction with research participants and the lengthy period of time over which data is collected. Ethnographic research is a qualitative method that enables researchers to observe and/or interact with participants in their everyday lives and environment. Ethnography is a key method within the discipline of anthropology but is used across a wide range of social sciences and in recent years is being used collaboratively with natural scientists. Within the fields of conservation, natural resource management and stewardship, ethnography can be used to support a researcher's deeper understanding of problems beyond natural systems. It allows researchers to see the interrelation between natural, economic, social and political systems, how a change in one can have adverse effects on the other systems. The aim of ethnographic research is to "walk the walk" of research participants to better understand the problems encountered in their specific contexts. Through this, it is hoped that a researcher will be able to truly understand the problem and therefore be better equipped to develop context specific sustainable and inclusive solutions to the challenges faced by communities.

Ethnographers often live with a community/society for a year or more, in order to learn about them. This fully immersive, long-term 'live and work' approach to ethnography has not proven popular within the field of natural resource management. Part of the reason may involve the inherent methods of the discipline to produce quantitative data such as the number of people who stand to benefit from an approach to resource management. In the case of this research, as important as understanding the quantitative aspects are, ethnographic research is important for people-centred projects. For instance, only after I (the researcher) had participated in community activities on a regular basis did some of the participants alert me to some of the frustrations of "being the researched". The details of this are outlined in chapter 5, however the summary of the argument is that the authoritarianism that comes with government departments, academic and research institutions has put them in a precarious position. People have conducted research in those spaces several times, and yet the community does not have access to that information.

Other frustrations include “broken promises” which in turn affects their hopes for improved futures as well as the way they interact with “outsiders”.

Ethnographic methods include participant and non-participant observation, interviews and surveys. All of these methods can be very valuable in gaining a deeper understanding of a challenges faced in a society. The multiplicity of methods inherent in the ethnographic approach opens up possibilities for non-traditional research subjects, and alternative ways of knowing. De Certeau’s (1984) analysis of the everyday (embedded in ethnographic approaches) allows us to acknowledge the importance of alternative ways of knowing outside of the hegemonic norms in the process of knowledge production. This allows everyday practices to be taken seriously. It raises for us the question of how we might learn to be responsible for others, to respond to their needs better, if we take seriously the particular ways in which they live their lives in relation to water in the catchment area.

Our research focuses briefly on the Kuils River catchment as one cannot speak about the Khayelitsha wetlands without understanding where the water that gives it life comes from. The research then focuses on the Khayelitsha Wetlands in more detail, particularly on the park which is located in the sprawling Khayelitsha Township.

The gap this research is attempts to fill is that of understanding aquatic ecosystem services associated with urban and peri-urban areas. Most research on ecosystem services have mostly focused on intact ecosystems located in pristine landscapes away from areas that are perceived to be of little biodiversity significance (Gomez-Baggethun & Barton 2013), yet urban areas often possess critical biodiversity and provide vital services. As a result of little focus being placed on understanding aquatic ecosystem services in relation to various needs in urban and peri-urban areas, little research has gone into investigating the nature of innovative landscape scale interventions that could be implemented to secure the critical services such ecosystems provide.

1.4 RATIONALE FOR STUDY AREA SELECTION

The Khayelitsha wetlands were selected as the most suitable study area for the following reasons

- i) A significant amount of scientific research and data in relation to human impact on the Kuils River catchment area and ecosystem goods and services was conducted in the area (Feng, 2005; Fourie, 2005; Lannas & Turpjie, 2010; Kotze, 2010). The Kuils River lies upstream to the Khayelitsha wetlands and is responsible for constant supply of water to the wetland, the water quality as well as to a certain extent, shaping of social, political and ecological landscape of the wetlands and surrounding communities.
- ii) The Kuils River catchment has several different landscape user groups which

makes for an interesting case for an integrated approach to water management. Irrigated agriculture (vineyards mostly) and waste water treatment plants (Bellville and Zandvliet) feature in the upper, middle and lower reaches of the river. Conservation and recreational activities also feature along the river. The residential areas are Gordon's Bay, Strand, Somerset West, Macassar, Stellenbosch, Kuils River, Eerste River, Bellville, Eversdal and Durbanville are located within the catchment area, presenting an opportunity to understand the perceptions of urban dwellers in relation to urban rivers and water systems. This would also apply to the informal settlement residents in Khayelitsha, Kyamandi, Nomzamo, Lwandle and Sir Lowry's village.

- iii) Landscape innovation: The Khayelitsha Wetlands Park's water quality, ecosystem goods and services are highly impacted by the activities of upstream users. What actions can be taken or opportunities are available to improve the well-being of both people and the wetland without one compromising the other?

1.5 ATTRIBUTES OF THE KUILS RIVER CATCHMENT AND KHAYELITHSA WETLAND SYSTEM

Figure 1 above shows the Kuils River and Eerste River located in the Cape Flats, with the red arrow showing the location of the Khayelitsha wetlands system. The Kuils River begins in the Kanakop area of the Cape Flats, flows for approximately 30 km at which point it joins with the Eerste River draining an area of approximately 300km². It flows down south to enter the sea through False Bay. Along its course, the flow and quality of the river is shaped by multiple factors such as wetlands, agricultural lands, canals, flows from small tributaries, affluent from waste water treatment works (WWTW) as well as waste from formal and informal residential areas.

Significant amounts of indigenous vegetation have been removed from the Kuils River (State of Rivers Report, 2005). The outcome has led to the proliferation of alien plants and modification of the river banks due to erosion and confinement of channels to name a few (State of River Reports, 2005).

The Kuils River was once a seasonal river, drying up in the summer months to form small pools, also known as "kuils" and then flowing into torrents during the winter rains (Luger, 1994). This change in seasonality of the river is largely due to the contribution of significant amounts of effluent from the waste water treatment work (WWTW) in Bellville and Macassar. The discharge of treated waste water has more than doubled the volume of the Kuils River and significantly shifted its flow regime. As a result, the Eerste River estuary (along the course of the Kuils/Eerste River) is actively migrating westwards and has become progressively less saline (State of Rivers Report, 2005).

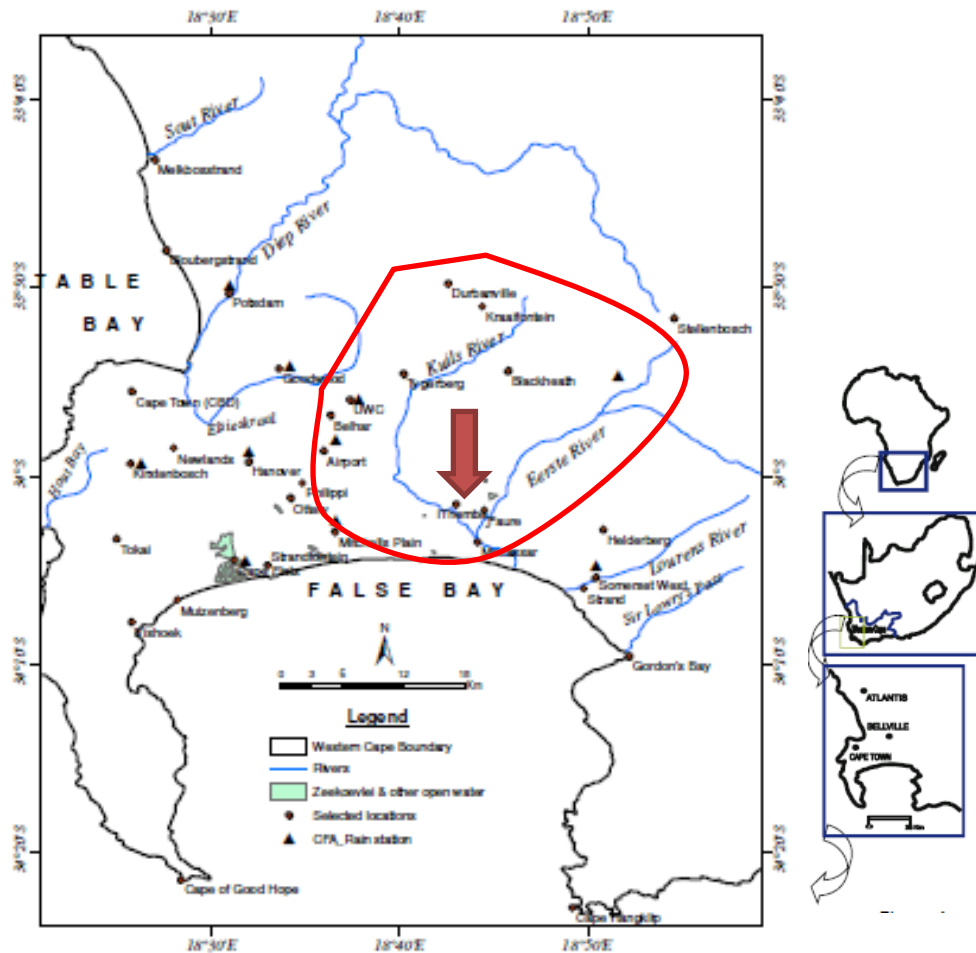


Figure 1: Rivers and open water bodies in the Cape Flats Area

In addition to the impact of effluent, storm water discharge, litter from urban and peri-urban areas in the catchment, the pollution levels of the Kuils River are very high (State of Rivers Report, 2005). “Public health” water samples from this catchment fell below the minimum quality guidelines developed by the City of Cape Town, with a progressive decline from 2011-2013 (Catchment, Storm water and River Management, 2013). The disappearance of pollution-sensitive invertebrates and ecosystem functioning is also evidence of the impact the pollution has of the ecosystems in this area (State of Rivers Report, 2013). The river once also featured multiple wetlands however due to the challenges and rapid urban development mentioned above, these have disappeared from the river.

The exponential growth of urban and peri-urban areas, requiring extensive clearing of land for development has resulted in the canalisation in the upper sections of the river, which in turn has impacts on downstream users. The canalisation not only increases the velocity at which water flows downstream, but also reduces the amount of plant and animal life that

were necessary to maintain the health of the river. This in turn reduces water quality and increases incidences of flooding downstream.

The River Health Programme assessed the biological and habitat integrity of the Kuils River based on the River health indices (State of Rivers Report, 2005). The indices measured were:

1. Index of habitat integrity (IHI) which measures the impact of human activity on vegetation surrounding the river as well as instream habitats. The upper and lower parts of the Kuils River measure fair on this index whilst the middle section of the river was indexed fair-poor.
2. Water quality index (WQI) assesses the appropriateness of water for aquatic ecosystems based on the total presence of ammonia, phosphates, nitrogen and dissolved oxygen. The upper Kuils scored poorly for this index whilst the middle and lower reaches had water quality deemed as unacceptable.
3. South African Scoring System (SASS), an indicator used to measure the number of invertebrate families found at a site. Again, the middle Kuils had unacceptable levels whilst the upper and lower reaches scored fairly.
4. Riparian vegetation index (RVI) measures the modification of indigenous vegetation from its original state. Indigenous vegetation is an important source for fauna in the area. Regrettably the upper and middle Kuils have poor indices whilst the lower reaches of the Kuils scored fairly on the RVI.
5. Fish Index (FI) is a good indicator of long-term influences on a general habitat showing the extent to which fish assemblages deviate from its undisturbed condition. All 3 sections of the river have poor FIs.

The general desired health of the Kuils River was considered as fair, however, areas that scored poorly on the indices featured a significant number of alien invasive species, tolerant or diseased indigenous species, high human disruptive populations and over-use of resources provided by the river. This inadvertently affects the aquatic ecosystem goods and services that can be provided within the Kuils River catchment area.

The abstraction of water from the river in its upper reaches for agriculture has drastically impacted the flow and quality in the lower reaches. The negative outcomes of this is visible by the impacts on the goods and services that the river supplies the users downstream such as the communities surrounding the Khayelitsha Wetlands Park.

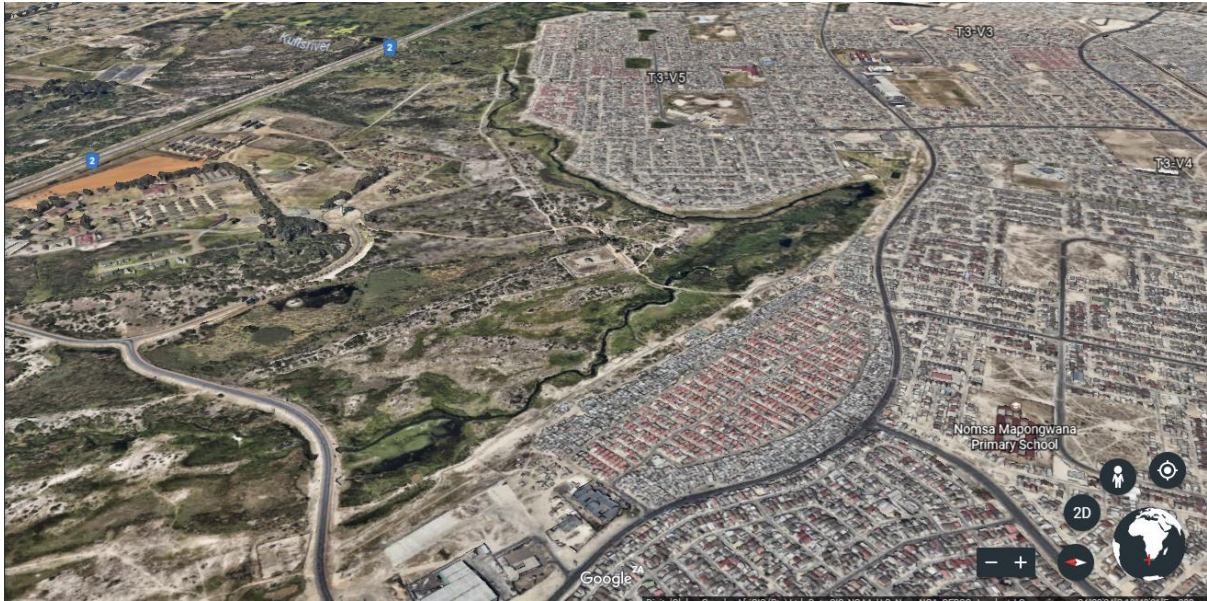


Figure 2: Khayelitsha Wetland Park (Google Earth, accessed October 2016)

Located on 44,5ha, the Khayelitsha wetlands are listed as a critical biodiversity area (CBA). The Khayelitsha Wetlands Park is situated on these wetlands, to the east of Spine Road Extension and is possibly the most utilised ‘gateway’ into Khayelitsha. The Khayelitsha Wetlands Park was established in 1998 after a study identified various appropriate and viable land-use zones within the greater Khayelitsha wetlands area (City of Cape Town, 2013). The area designated for the park extends about 1,8km in length and incorporates at its eastern end an existing local park known as Makhaza. The wetland occurs within an urban setting and is surrounded by roads, low cost housing and informal settlements. Cattle grazing, harvesting of plant material and invasion by exotic plants and animals all represent threats to the integrity and sustainability of the wetland. The wetland is of conservation value and hosts a mixed species heronry of regional importance, while it also serves as a nesting site for a diversity of migrant birds.



Figure 3: Topographical maps left -to-right 1983, 1995 and 2000 showing the increase in development around the KWP, shown in red (Malan et al 2014).

The Khayelitsha Wetlands Park serves as a demonstration of how urban green spaces can be incorporated even in overcrowded, peripheral and lower income areas of a city. The importance of Khayelitsha wetlands to the local community cannot be underestimated. The wetland nature of the Khayelitsha wetland park creates opportunities for water purification and it is reported that the wetland system is fulfilling an ecological role to some extent (Malan et al, 2014). Unfortunately, the wetland is extremely degraded as a result of upstream pollution from the Kuils River mentioned above. Poor infrastructure and inadequate service delivery, waste from the formal and informal settlement also contribute to the pollution of the system. As a result, even though the wetland is still ecologically functional, its full potential has been compromised due to the massive threats it faces.

Research aimed at developing recommendations to improve aquatic ecosystem functioning will thus best suit the Kuils River WMA. Top down approaches are often used in the attempt at developing sustainable water management practices. As mentioned earlier, due to the location of this aquatic ecosystem in multi-use landscapes and complexity of role players in the catchment area, an integrated landscape management approach and ethnographic research are required in order to engage the diverse group of stakeholders to meaningfully participate in the strategic and effective management of this water system. Before one can do so, it is fundamental that a greater understanding of what ecosystem services are and how people interact with these water systems is vital.

1.6 SCOPE OF THIS REPORT

Understanding the ecosystem services provided by wetlands for socio-economic development and the integrity of the ecosystem itself requires an understanding of the way in which stakeholders, both upstream and downstream, impact as well as stand to benefit from the wetland. The key questions that this research explores are therefore:

- What types of ecosystem services does the wetland provide to the local community and upstream users of the Kuils River?
- What are the integrated landscape management approaches that can be used to protect urban and peri-urban aquatic ecosystem services using the Khayelitsha wetlands park as a case study?
- What are the enterprise development opportunities in the area?
- Which of these enterprises can become bankable projects?

This report of aquatic ecosystem goods and services (AEGS) will address the importance of healthy ecosystems not only in terms of the well-being of the wetland but also considering the benefits accrued to the local community and other stakeholders. The review will consider how effective integrated landscape approaches help to leverage broader water catchment area management and associated environmental outcomes. This will be grounded by first

understanding the socio-political and economic landscape through anthropological research methods.

The overview is therefore structured as follows:

- ❖ Chapter 2 unpacks the framework of ecosystems services in relation to wetlands. The chapter also discusses the actor network theory (ANT) in relation to the networks within a system, the role of political systems, social and economic systems in shaping the way that people relate to water and environment. This will further be explained by systems relations diagram which will inform the transdisciplinary approach used to interrogate the research questions to be addressed in subsequent deliverables.
- ❖ Chapter 3 considers the aquatic ecosystem services provided by Khayelitsha wetlands system in particular to the various stakeholders in the WMA. The chapter also explores the challenges as well as the benefits of the wetlands experienced by multiple stakeholders in a multi-landscape use of the Kuils River WMA
- ❖ Chapter 4 is an ethnography of the Khayelitsha wetlands park that considers the local community's cultural and material dependence on the wetland system. The chapter explores the particular ecosystem services provided by the park with a lens on the socio-political and economic context. Because these people's lives are shaped by rapid growth and falls of industry and post coloniality, their everyday, although considered as marginalised, has been a part of larger economic, political and social structures. This chapter is concerned with how the communities have interpreted and acted upon the water resource management of the wetland.
- ❖ Chapter 5 outlines a needs analysis that was conducted that produced key insights on the challenges encountered for the conservation of the Khayelitsha wetlands in relation socio-economic development for participants in the research. The chapter is particularly important as it bridges the theoretical and conceptual frameworks of the thesis with the practical aspects of the business case.
- ❖ Chapter 6 provides a detailed business case formulated in collaboration with the community members. Drawing from ethnographic research highlighted in previous chapters, and collaborative efforts between NGOs and community members, the business case details and motivates for a Khayelitsha Wetlands Park Market and a Green Hub to enhance the conservation efforts already taking place. Key to this proposal is the aspect of township tourism that stands to benefit the greater Khayelitsha area.
- ❖ The report concludes by providing key learnings from this project as well as recommendations for integrated and inclusive approaches to the management of aquatic ecosystems in urban and peri-urban areas. Given the location of the aquatic ecosystems in low income and vulnerable spatially marginalised areas, the solutions developed must suit the socio-economic and environmental context.

2 CONCEPTUAL FRAMEWORK FOR ECOSYSTEM SERVICES

2.1 WHAT ARE ECOSYSTEM SERVICES?

Human-beings are entirely dependent on ecosystem services for their basic needs. The CBD (1992: 3) defines ecosystems as dynamic complex systems of fauna, flora and micro-organism communities and their non-living environment interacting as a functional unit. By extension, ecosystem services (drawn from the definition by MA (2005: V)) can be defined as the benefits that people obtain from the defined ecosystems.

The diagram below demonstrates that human capital intersecting with built capital is embedded in social capital. What this means is that people as well as infrastructure are a product or are significantly shaped by social processes. All these forms of capital are in turn, embedded in natural capital which provides services that are important to achieving human well-being. Therefore, natural capital is a significant input for the creation of other forms of capital. Although ecosystem services may not flow directly as capital for human well-being, the figure demonstrates that interaction with the other forms of capital are vital to achieving this well-being. In the case of the broader Kuils River WMA, the different user groups are in one way or the other reliant on the ecosystem services provided by the river and wetland to achieve human well-being. For instance, as mentioned in the previous chapter and detailed in the next, the Khayelitsha wetlands park provides opportunities for recreational activities helping to achieve social well-being for nearby communities.

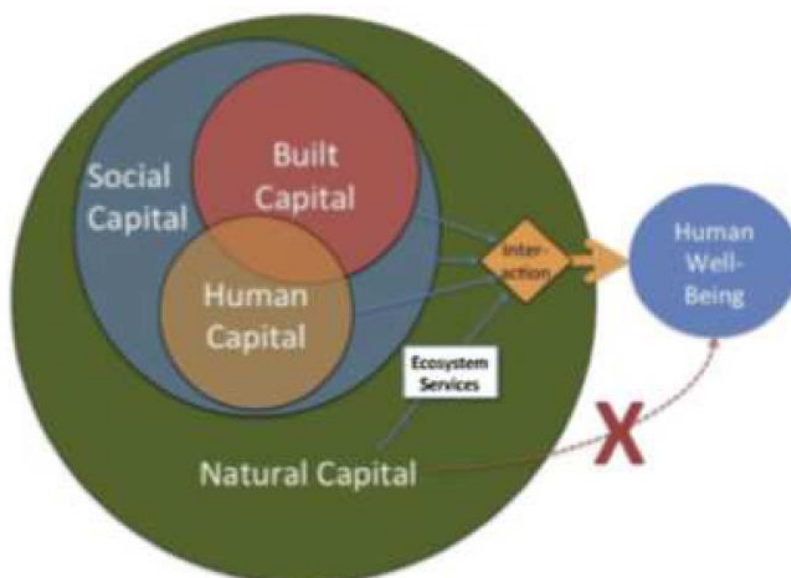


Figure 4: Interface between built (infrastructure), human and natural capital required to produce human wellbeing (Constanza 2014, in Rawling 2014)

2.2 THE ROLE OF ECOSYSTEM SERVICES

Biodiversity is one of the main important characteristics of ecosystem services in terms of the ecosystem itself and the outputs produced as an ecosystem service. For instance, the Kuils River and the Khayelitsha wetland as ecosystems are home to various species of plants and animals, at the same time they have products outputs (e.g. medicinal plants, natural resources for income generating activities along the river) that are beneficial to humans. Veenklaas (2012) highlights the complex relationship between biodiversity and ecosystem service. A high level of biodiversity does not necessarily mean the provision of goods that are useful to people, at the same time, the ability to create ecosystem services does not mean the conservation of biodiversity.

2.2.1 Types of Ecosystem Services

Ecosystem services have been categorized into different groupings based on the type of services they provide. These are: „

- i) functional groupings – e.g. regulation, carrier, habitat, production, and information services (Lobo 2001; de Groot et al. 2002); „
- ii) organizational groupings – e.g. services that are associated with certain species, that regulate some exogenous input, or that are related to the organization of biotic entities (Norberg 1999); and „
- iii) descriptive groupings – e.g. renewable resource goods, non-renewable resource goods, physical structure services, biotic services, biogeochemical services, information services, and social and cultural services (Moberg and Folke 1999).

For operational purposes of this study, and being informed by MA (2005) we will classify ecosystem services along functional lines, using categories of provisioning, regulating, cultural, and supporting services. It is important to note that these services often overlap.

2.2.1.1 Provisioning services

These refer to the material or energy outputs provided by the ecosystems (MA, 2005; TEEB, 2010; Haines-Young and Potschin, 2013; COWI, 2014 in Rawling et al, 2015). This service includes the provisioning of food, water, raw material and medicinal plants, genes and genetic information used for animal and plant breeding and biotechnology. It also provides ornamental resources and animal products, such as skins and shells, and flowers, although the value of these resources is often culturally determined. This is an example of linkages

between the different types of ecosystem services. Fresh water is another example of linkages between categories—in this case, between provisioning and regulating services.

These services can be subject to the markets driven by buyers and consumers as well as regulations by government. Market-based mechanisms are often used to determine the value of provisioning services as these goods are often bought and sold in existing markets (Van Den Berg et al., 2013 in Rawling et al, 2015).

2.2.1.2 Cultural services

These consider the non-material benefits available to people for example recreation, cognitive development, reflection, aesthetics and provision of cultural ritual sites and spiritual enrichment. These include cultural diversity influenced by the diversity of ecosystems and many spiritual practices are linked to the associated values of ecosystems. Ecosystems also shape knowledge production, in traditional and formal settings.

Cultural services are tightly bound to human values and behaviour, as well as to human institutions and patterns of social, economic, and political organization. Thus, perceptions of cultural services are more likely to differ among individuals and communities than, say, perceptions of the importance of food production.

2.2.1.3 Regulating services

These services refer to the benefits obtained from the regulation of ecosystem processes (Bennette el al, 2009; Gomez-Baggethun, 2013), for example:

- Air quality regulation – Urban areas are characterised by high pollution rates from transportation, industry urban solid waste and so on. Ecosystems both add chemicals to and remove chemicals from the atmosphere, influencing many aspects in the regulation of air quality.
- Climate moderation - Ecosystems influence climate both locally and globally. For example, at a local scale, changes in land cover can affect both temperature and precipitation. At the global scale, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases. „
- Water run-off regulation and erosion control - The increase impermeable land cover in urban spaces drastically increases the amount of run-off leading to floods and altering the underground water storage potential in the system. Vegetation and soil reduces the run-off and slows down water flow through the capture and absorption of water in these areas. Urban landscapes with 50–90 % impervious cover can lose 40–83 % of rainfall to surface runoff compared to 13 % in forested landscapes (Bonan, 2002).

- Water purification and waste treatment - Ecosystems can be a source of impurities in fresh water but also can help to filter out and decompose organic wastes introduced into inland waters and coastal and marine ecosystems. „
- Regulation of human diseases and pest control - Changes in ecosystems can directly change the abundance of human pathogens, crop and livestock pests and diseases.
- Pollination and seed dispersal - Ecosystem changes affect the distribution, abundance, and effectiveness of pollinators and seed dispersers. „
- Extreme weather protection. The presence of vegetation for example in coastal ecosystems can dramatically reduce the damage caused by hurricanes or large waves. These can also reduce the impact of drought events.

2.2.1.4 Supporting services

Supporting services are those that are necessary for the production of all other ecosystem services. They differ from provisioning, regulating, and cultural services in that their impacts on people are either indirect or occur over a very long time, whereas changes in the other categories have relatively direct and short-term impacts on people. These services are in relation to the habitat provided for migratory species and to maintain the viability of gene-pools, soil formation and primary production

Some services, like erosion control, can be categorized as both a supporting and a regulating service, depending on the time scale and immediacy of their impact on people. For example, humans do not directly use soil formation services, although changes in this would indirectly affect people through the impact on the provisioning service of food production. Similarly, climate regulation is categorized as a regulating service since ecosystem changes can have an impact on local or global climate over time scales relevant to human decision-making (decades or centuries), whereas the production of oxygen gas (through photosynthesis) is categorized as a supporting service since any impacts on the concentration of oxygen in the atmosphere would only occur over an extremely long time. Some other examples of supporting services are primary production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.

2.3 ECOSYSTEM SERVICES AND HUMAN WELL-BEING

Figure 3 below shows the linkages between the ecosystem services provided and human well-being. It also shows the extent to which it is possible for socioeconomic factors to

mediate these linkages. What this means is that, in the case of a degraded ecosystem service, it is possible to procure a substitute demonstrating high potential for intervention.

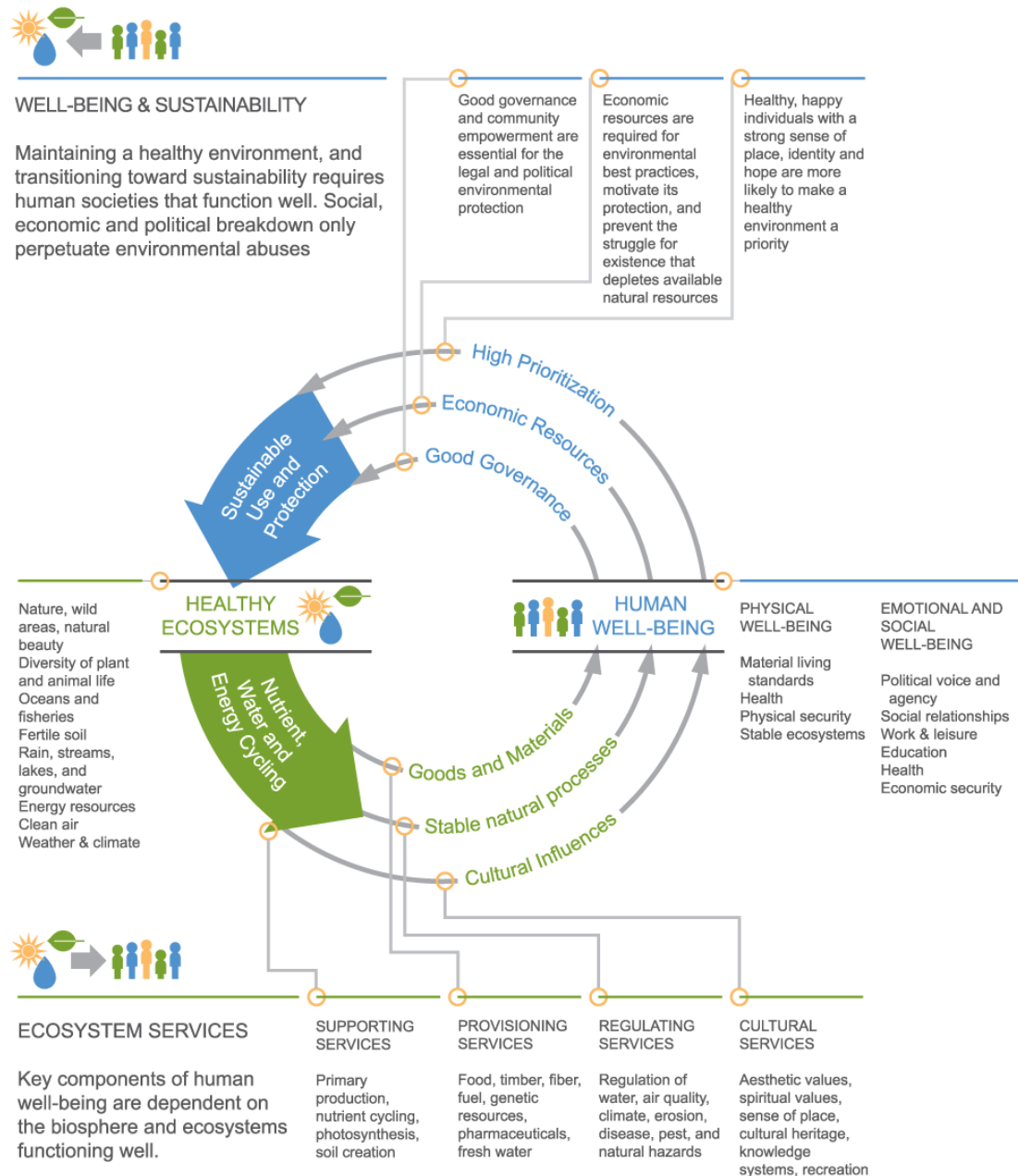


Figure 5: Linkages between ecosystem services and human wellbeing, adapted from MA 2013 (Duraiappah et al 2012).

The mentioned ESs can be further categorised into ‘final’ ESs which are identified as those which contribute to the well-being of humans. These include provisioning, regulating and cultural services which remain linked to the underlying ecosystems from which they are derived from (COWI, 2014 in Rawling et al, 2015). The other category is that of ‘intermediate’ services for which supporting services falls under. This entails the biological/ecological processes, structures and functions that serve the provisioning for the ‘final’ ES.

According to Malan et al. (2014) ecosystem services have different elements that need to be considered in relation to human well-being namely:

- i) biophysical structure or processes – what type of ecosystem is it and what processes occur within it
- ii) its function – e.g. filtering of water or circulation of nutrients
- iii) its service – e.g. production of harvestable products
- iv) the benefits – contributions to well-being such as health, financial empowerment
- v) the value – e.g. investable products are outputs

Over the last 50 years ecosystem services have been impacted significantly due to the increase in demand for natural resources by an exponentially growing human population. Accessing and manufacturing to produce usable goods has contributed substantially to the improvement of human well-being and economic development. However, this has not translated to benefit for all, particularly the poor. The Millennium Ecosystem Assessment report (2005) highlights three major challenges associated with the management of ecosystems:

1. Approximately 60% of the ecosystems examined during the assessment were utilized unsustainably. The impact of the damage and loss were visible, substantial and growing. The MA stated that in many cases, the impact of the damage caused is often passed from one group of users to another and future generations.
2. Some evidence suggests that significant changes being made to ecosystems have an increasing likelihood of having multi-faceted impacts for human well-being. Examples of such changes include disease emergence, abrupt alterations in water quality, the creation of “dead zones” in coastal waters, the collapse of fisheries, and shifts in regional climate (MA, 2005).
3. The poor are disproportionately affected by the degradation of ecosystems. This contributes to the growing inequities and disparities in the distribution of resources leading to overt poverty and conflict between groups.

The challenges identified in the MA (2005) are evident in the Kuils River WMA. This is discussed further in the following section, relating it to the system dynamics of the broader WMA and the wetlands in particular.

2.4 SYSTEM DYNAMICS LINKED TO ECOSYSTEM SERVICES

Human-beings have spent a significant amount of time and effort engineering ecosystems in order to produce food, fibre and other products optimally, i.e. cheaply and reliably (Foley et al. 2005; Kareiva et al. 2007; Monfreda et al. 2008; Ramankutty et al. 2008). A significant amount of research into ecosystem services has detailed the ways in which people have benefitted from these services, often focusing on landscape level or not more than a few services at a time. There is however a challenge with focusing on these efforts and a few

services provided by ecosystems at a time. It may result in the oversight of how landscapes simultaneously produce multiple ecosystem services that interrelate in complex dynamic ways (Bennet et al, 2009). The over focusing and intervention on one or two ecosystems service provisions unfortunately may result in not only the overall increase of those particular services whilst deteriorating in other important ecosystem services. For instance, fertile soil and access to water in a wetland is conducive to the provisioning of food ecosystem service. This however may require the clearing of land for agriculture, resulting in a decline in flood attenuation, water purification and carbon capture and storage on this landscape.

According to Bennett et al (2009) the challenge with focusing on one or two ecosystem services at a time is that these studies typically assume a linear relationship between ecosystem structure and the provision of services. With a limited knowledge about the relationships among ecosystem services, there is an increased possibility of sustaining undesirable exchanges, wasting prospects of capitalising on these synergies, and perhaps experiencing significant and unforeseen changes in provision of ecosystem services (Bennet et al, 2009: 1395). It is highly likely that the relationship is more complex than that. In addition to ecosystem services at landscape level impacting each other, other systems such as political, economic and social systems influence whether there is a decline or increase in the provisioning of these services.

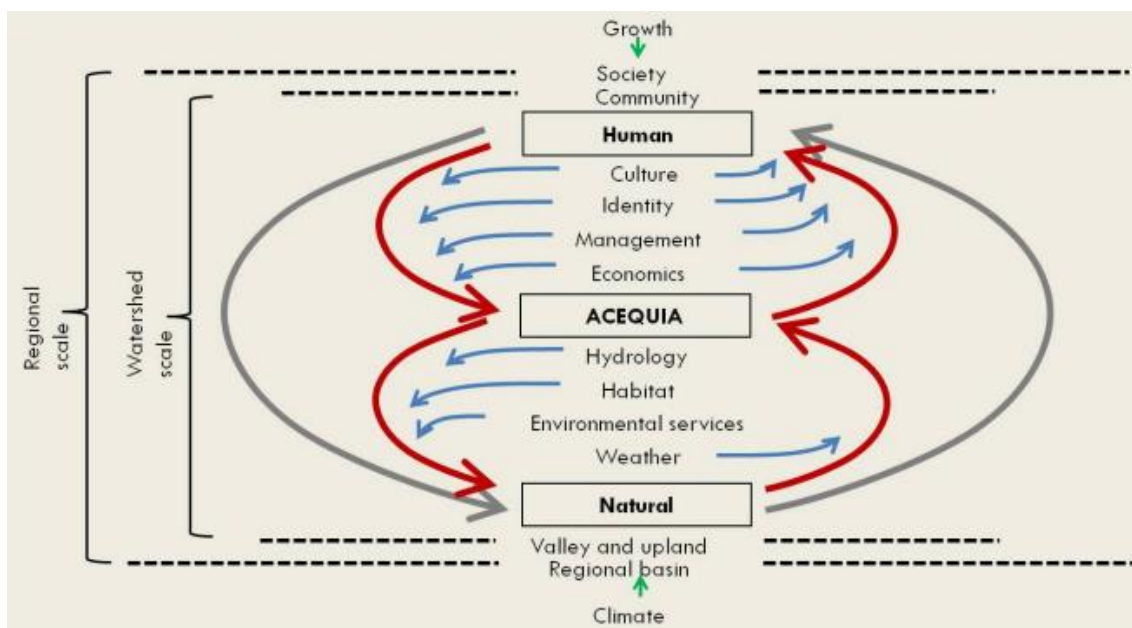


Figure 6: Network of relating flow chart with human and natural linkages (Fernald et al 2012).

Latour's (2005) Actor-Network-Theory (ANT) aims to situate both actors and actants in the reconstruction of the network of interactions leading to the stabilization of a system, bridging the binaries between human and "non-human". It is a paradigm that concentrates on the interactions and connections between systems - social, the environment, politics, economic and religion. This conceptual framework demonstrates how linkages within systems can be

applied to this research on aquatic ecosystem goods and services (AEGS). It assists in understanding how these material and social connections are manifested in the human and nature relationship. It is therefore through understanding the whole river, the ecologies of practice and the system dynamics that we can understand the ecosystem services provided by the Khayelitsha wetlands for the sake of the multiple stakeholders and in turn inform policy in the management of the river and the wetland.

For the purposes of this research, we will also in addition to issues raised above, we payed attention to the effects of common drivers (e.g. land use change, bureaucratic change) on the multiple ecosystem services provided by the Khayelitsha wetlands system. We therefore extended our research focus to the Kuils River catchment in order to get a better understanding of the other drivers that influence the provision of services by the wetland. This research will also investigate the interaction among the ecosystem services, as well as the interaction with other systems that influence the provisioning of service

3 AQUATIC ECOSYSTEM SERVICES PROVIDED BY THE KHAYELITSHA WETLANDS SYSTEM

In urban and peri-urban, these are some of the ecosystem services that come into play in the Khayelitsha wetlands system:

3.1 WATER RESOURCES AND QUALITY PROTECTION

Natural or man-made wetlands often form part of urban and peri-urban spaces. Wetlands are a key component important to green spaces within urban areas. These are often described as the 'kidneys of the natural environment' as they play a significant and valuable role in filtering, protecting and purifying urban water systems (Van Straden, 2013). Run-off water in urban areas collects many different kinds of pollutants, from the air and land ranging from carbon molecules to heavy metals and untreated waste from residential areas. In this Kuils River catchment, a large volume of inadequately treated waste water from the Bellville WWTW is discarded into the Kuils River. In addition, significant volumes of water from storm water drainage systems contribute to the poor quality of water that flows into the Khayelitsha wetlands. The advantage of having the Khayelitsha wetland system is that instead of directing these pollutants further downstream and into the sea, wetlands capture the polluted water for temporary storage. Through complex filtering processes, pollutants and foreign chemicals are broken down into less harmful or harmless chemicals and nutrients that can be absorbed by the natural environment (Van Straden, 2013). The role of the Khayelitsha wetlands system is therefore critical, as mentioned above, to improving the water quality for downstream use as well as before entering the sea. The presence of deep pool plants such as *Typha Capensis*, *Water Parsnip* and *Schoenoplectus scirpoides* (see Malan et al, 2014) play this important role of filtering the water.

3.2 BIODIVERSITY AND SPECIES PROTECTION

Biodiversity, integral to the functioning of ecosystems across the globe, is continuing to decline rapidly. This occurs despite biodiversity being featured as a top priority on climate change and resilience agenda worldwide. The continued loss of biodiversity is of great concern as this forms an essential role in sustaining ecological and ecosystem balance. These are also directly related to the human well-being. Expanding population in cities, the infrastructure of creating cities and the systems used to operate these urban spaces compromise vast numbers of ecosystems. For instance, land is cleared and used for agriculture and housing, water is diverted to this land impacting the plants and animals that were reliant of these resources. The upper reaches of the Kuils River are characterised by significant numbers of alien invasive species plants with the riparian vegetation being removed. This compromises the quantity and flow of water upstream. However, urban green

spaces such as the Khayelitsha wetland can protect and enhance biodiversity and species extremely well. The mere increased vegetation cover due to urban green spaces contributes to increased biodiversity and conservation (Van Straden, 2013).

“*Typha capensis* is an important plant for many species of birds that are closely associated with water. The dense stems provide ideal shelter and nesting opportunities for birds such as the Moorhen (*Gallinula chloropus*), African Black Duck (*Anas sparsa*), the Red Bishop (*Euplectes orix*), Yellowrumped Widow (*Euplectes capensis*), and the Common Waxbill” (Voigt and Porter, 2007). The sunken stalks of bulrushes afford idyllic nurseries for hatchlings of several freshwater fish species including frogs, toads, terrapins and other aquatic organisms (Voigt and Porter, 2007).

3.3 STORM AND FLOOD WATER CONTROL

With the growing vastness of cities, and use of concrete, natural water absorption into the soil is compromised. The risks that may be a result of this are lower water tables, increased flood risk, increased temperatures which all threaten livelihoods, particularly of the poor. Flood water control and intervention is an ecological service associated with urban green spaces such as wetlands. This ecological service can go a long way to disseminate heavy rainfall and floods. The Kuils River historically featured several wetlands, however due to the rapid development of industry and housing in the area, cases of flooding occurred which led to certain parts of the river being canalised. A key characteristic of the Khayelitsha wetland is the natural ground cover; this allows for the natural uptake of water, in addition to the fair share of water absorbed by plants. It is estimated that cities with a reasonable urban green space coverage, can naturally absorb up to two-thirds of stormwater, preventing flood hazards while recharging surface and groundwater. Without urban green spaces, none of these ecological services and processes can continue.

3.4 AIR PURIFICATION

Cities are often the sites of high concentration of air pollution due to traffic and industrial activities. The wetland play an important role in regulating and reducing air pollution within these urban spaces. Harmful chemicals found in the air are absorbed by plants and replaced with oxygen resulting in benefits for the sustenance of different forms of life. The higher the concentration of plants in the Khayelitsha wetlands system spaces, the great the chance of purifying air.

3.5 NATURAL RESOURCE CONSERVATION

The different forms of life cannot exist without the support of natural resources. However, largely due to anthropogenic pressure, the planet’s natural resources are threatened by pollution, exploitation of these resources without creating contingencies or replenishing the

depleting numbers. The Khayelitsha Wetlands can offer functional and cultural benefits to urban dwellers. In this particular wetland, the vegetation protects the soil, water systems as well as the fauna and flora that use them as habitats.

3.6 CULTURAL AND RECREATIONAL SERVICES

The park area in the wetland system is most commonly used for cultural and recreational use. The Khayelitsha wetland park is aesthetically pleasing and sports many recreational facilities that the local residents of the Makhaya and Makhaza Township can enjoy. The park itself has an outdoor gymnasium, children's playing equipment (often used as a play area for a nearby early development centre) as well as a fenced in soccer field (also used by local fire fighters during their down time). Along the water body are also walking trails which some of the residents use for leisurely walks. Outside the park is located a church building whose congregants often use the wetland for different purposes, including using it as ablution facilities. Plants from the wetland are used for consumption as food or medicines. The youth in the area use the wetland as an opportunity for a canoeing business.

According to Voigt and Porter (2007), a decoction of *typha capensis* of the rhizomes is used for venereal diseases or during pregnancy to ensure easy delivery by traditional healers. This was also confirmed by the participants in the study. The prepared solution is taken orally or applied externally to promote expulsion of the placenta. It is also said to strengthen uterine contractions. The decoction is sometimes taken to promote fertility in women, to enhance male potency and libido, to improve circulation and for diarrhoea and dysentery. In countries such as Brazil, the fleshy, spongy rhizomes are dug up and may be pounded to a meal and used as a source of starch and the pollen may be used as a high-protein food. The leaves are used to make hand brooms and are also used to some extent in weaving and thatching.

Despite its invasive nature, typha does have several economic benefits. It can be used as a subsistence crop as all parts of the plant can be eaten and is grown as a speciality food source in South America. In Japan, the pollen is used to produce a plant growth regulator, whilst in other parts of the world and in South Africa, the different parts of the typha are used for crafts such as baskets and furniture or for the thatching of roofs. The brushy part of the plant can be used as torches or they can be dried and used as decorative plants. The plants have also been used to make paper in South America. The plant can also be used for water purification and has also been used by the urban women gardeners in this research as compost.

For a long time, community members using the Khayelitsha wetland played a key role in protecting this critical ecosystem, so this project just aims to provide them with more tools to effectively protect the wetland. This project will play a major role in bringing upstream stakeholders, more specifically the private sector and other role players to support the efforts of local community members. To achieve this requires that the project is designed in a manner that empowers local community members and creates opportunities from which benefits can

accrue to local community members, either through local enterprise development or capacity building. In order to achieve this, we will look at the range of ways that communities use the river and the wetland. The outcome of this research will in turn inform policy makers both at the local and national level, on how to effectively engage local community members in the protection of public goods, such as wetlands. The output of this research will also provide the city with practical options for community empowerment, recommendations on how to create jobs and to improve service delivery to members of this community.

4 AN ETHNOGRAPHY OF THE KHAYELITSHA WETLAND SYSTEM

This chapter takes an ethnographic look at the Khayelitsha Wetlands system, a celebrated and pleasant wetland, marked as a beacon of sustainable development in townships by the City of Cape Town. The wetland as mentioned above is surrounded by the Makhaza community and hence is often referred to by the locals as the Makhaza wetlands. The wetland is bordered by a mix of formal and informal housing, formal and informal businesses and educational centres. For some community members, cultural and material practices are dependent upon the wetland. In addition, fauna and flora (listed in chapter 4) are dependent on the existence of the wetland. In the wetland, again as mentioned above, faces threats from poor water quality from the Kuils River, rapid urbanisation, alien invasive plants and animals threaten the well-being of the wetland, people, flora and fauna.

This chapter is concerned with how these challenges have been acted upon and interpreted by the local community. The threat of the poor water quality and more urban development on already scarce natural resources instigated confrontations between nature, science, techno-efficiency, legal instruments and politics, influencing the sustainability of KWP project. This means inevitably, hierarchies become manifest based on the interests and powers engaged in the use and management of the KWP. With the differences in power and interests, biological and cultural diversity are valued differently. For conservationist leaning management, biological sustainability is prioritised, whilst socially inclined organisations prioritise cultural sustainability. The result is the making of very different human-wetland relations, implying different possibilities for the wetland (its occupant fauna and flora) and the surrounding community.

4.1 NETWORK OF RELATING BETWEEN KHAYELITSHA'S WETLAND ECOSYSTEM SERVICES AND HUMAN WELL-BEING

In response to challenges faced by natural resource management, a diagram showing the network of relating has been developed as a tool to understand and represent the complexities of networks within and around ecosystems. These complexities encountered are in relation to trade-offs between environmental management and socio-economic benefits (Evans, 2004). These challenges are also often a result of the difficulties faced in relaying information around the complexity of the values of ecosystem goods and services to a variety of landscape user groups with potential conflicting perspectives, particularly in the Kuils River WMA (Costanza and Ruth, 1998; Lane, 2008; Sterman, 2000; Morecroft, 1982).

Management interventions such as adding fertiliser, clearing of vegetation, can drive change in one or more ecosystem services. These drivers of ecosystem service provision can affect a single ecosystem service with only trivial effects on other services of interest, or they can have

significant effects on multiple services at once. For example, the building of infrastructure along the upper reaches of the Kuils River allowing people to participate in activities such as golf and baseball enhances the supply of cultural ecosystem services without affecting other activities such as trail walks. On the other hand, increasing fertilizer use to improve the golf course turf can have a significant negative effect on downstream provision of clean water in addition to the intended effect of increasing sporting activity. The Cape Town landscape is also inherently shaped by political systems, inherited or otherwise. The land usage in the Kuils River catchment shaped by land distribution based on class also linked to race. This is a clear demonstration that the ecosystem services provided by the Khayelitsha wetland cannot be separated from political and economic systems.

The impact of drivers on ecosystem services is evidently multi-lateral. The enhancement in one may result in the diminishing of the other or several can be impacted in the same way. Along with effects of drivers on multiple ecosystem services, relationships among services can be caused by direct interactions with other systems (Bennet et al 2009). In the cases mentioned above, this interaction (between cultural services, political histories, land use, and water quality) is strong and quite evident.

The issues discussed above can be communicated and represented in a causal loop diagram, which is an approach for representing the feedback within and across interacting subsystems (Fernald et al, 2012). In this research, we attempted to understand the interaction of these ecosystem services with each other and other systems that will then be represented by the network of relating diagram.

Costanza and Ruth (1998), Evans (2004), Sterman (2000), Ford (1999) and Kirkwood (2013) explain how the representation of fundamental system components graphically and their interactions are needed to better understand complex, nonlinear, dynamic systems (in Rawling et al, 2015). These graphic representations of system networks allow for stocks and flows to be 'created' to represent different elements in order to isolate particular effects, thus decision-makers and managers will be more informed as to what exactly causes specific outcomes in complex systems (Evans, 2004).

4.2 HUMAN-WETLAND STORIES, CO-PRODUCTION OF CULTURAL AND ECOLOGICAL SUSTAINABILITY

To understand the human-wetland relationships, we look at particular stories that emerge from participant observation with the community members.

4.2.1 Infrastructure and Cultural production

Over the months of fieldwork, I witnessed many changes to the wetland with the introduction of more infrastructure such as foot paths, bird watching posts and more recreational areas

closer to Spine Road by the CCT to benefit the local community and attract tourists. Of particular interest was the introduction of the concrete palisade fencing. This was introduced perhaps as a border for the park, zoning off the area as separate to the formal and informal housing surrounding this area. However, within the short time that this fence had been up, it had already been vandalized to create access points for the locals and livestock not allocated in the earlier planning for the park. On the next visit, this had been repaired. Conversations whilst digging on the vegetable gardens and picking litter with waste picker entrepreneurs suggested that this destruction of property was a common occurrence where planners and locals had different views on what the needs were. One of the gardeners, a woman in her late 50s whom we shall call Mam' Dube¹ went on to say

“But what did they (the CCT) expect. They do these things without talking to the people and expect us to just be okay with it. Before they started doing these development things, people could just easily go to the wetlands and feed their goats and cattle. You could even just go and get some special plants. But now they put this fence, and people have to walk all the way around to get in. Even with the water meters that they have put in other houses. They don't even explain what it is, next thing you see you have a R10 000 water bill. I will never have that in our house. They just want to make money from us” (Translated; Interview with Mam' Dube 16 May 2016)

Mam' Dube's statement above is loaded with various ways of knowing the Khayelitsha Wetlands, which are an important part of the Kuils River (the way the local community knows the wetland (see more examples in Appendix 1), the way the CCT knows the wetland, the way the plants and animals know the wetland. The link between the water in the wetland and water they consumed in the home that is metered).

The City of Cape Town commissioned several environmental assessment studies on the wetland park and the potential for economic opportunity as well as environmental benefits that could be derived from the park. In the process of creating a space for the benefit of the community, the fence and gates implies the creation of parameters by the state, a command and control (which possibly could have been unintentional) approach for the use of the commons, how it is accessed and by whom or what.

Members of the community were already engaged in practices on the wetland that they benefitted economically from. A group of women were engaged in organic small-scale farming, however due to land ownership claims; they were evicted from the land. Previous studies provided a list of a number of resources harvested from open areas in the City of Cape Town including: medicinal plants; food plants such as *Aponogeton distachyos*; animals; arum lilies (*Zantedeschia aethiopica*) and *Phragmites reeds* (Turpie et al., 2001) which were also

¹ Pseudonym

being harvested from the wetland. The wetland was also used as grazing land for livestock, small and large due to the availability of quality grazing.

The use of infrastructure to separate the local communities from this natural resource can be referred to as a 'metabolic rift', a concept developed by Clark and Foster as an ecological interpretation of Marx's theories on labour and separation from the land. The concept of 'metabolism' is inherent in social relations to nature, as it highlights the relations, exchanges and flows between people and nature, providing the conditions for labour. Marx explains that there is a "necessary "metabolic interaction" between humans and the earth" (Clark and Foster, 2010). The particular social metabolism is currently run by "the capitalist mode of production, which influences the material exchange between society and nature" (Clark and Foster, 2010)². The very endurance of capitalism and neoliberal approaches to the economy and development depends on its extractive nature in order to perpetuate the modes of exchange that remove the work from the labourer.

The state's management of natural resources using neoliberal rationalisations capitulates 'command and control' solutions under the guise of economic growth, economic efficiency; economic and social development for marginal and low-income communities and sustainable development.

Therefore, the argument is that this approach fails to allow for adequate engagement in understanding the activities, importance and meanings drawn from the interaction with this natural resource. Although the topic of raring of livestock in urban spaces is a much-contested terrain, the research challenges us to consider the importance of some of the other cultural practices conducted in the wetland. The services provided by the KWP cannot be separated from their embodiment in beings and lives. And the restriction of movement in and out of the wetland interferes with previous ways of interacting with wetland. Many arguments for the controlling access have been made; however, often this has not been communicated to the majority of the community. The general view then becomes that the benefits of conservation, preservation and restoration of the KWP are largely accrued by the state, private entities (e.g. tourist agencies) and donors and less so by the locals. Neoliberal environmental policies based on scientific knowledge, in many ways like their economic counterpart, are grossly inadequate in addressing poverty and inequality.

As mentioned by Kosoy and Corbera (2010) "When ES³ are commodified, they become the basis for new socio-economic hierarchies, characterised by the re-positioning of existing social actors, the emergence of others, and very likely, the reproduction of unequal power relations in access to wealth and ... resources."

² *Ibid.*, 145

³ Ecosystem Services

5 BUILDING CAPACITY FOR GREEN ENTREPRENEURSHIP AND THE PROTECTION OF KHAYELITSHA WETLANDS: A NEEDS ASSESSMENT AND ANALYSIS OF LOCAL ENTERPRISES

5.1 INTRODUCTION

The purpose of this chapter is to outline the findings from the key community engagement activities to better understand the context of needs for economic development opportunities that can be used to boost community involvement in the protection of the Khayelitsha wetlands. Although communities are made up of many types of stakeholders, including regulated and informal sector businesses, for purposes of understanding what the needs are of peri-urban dwellers, the focus was on individual citizens and local co-operatives within the community that may be interested in or derive services from the wetland. Capacity was defined as the ability of a community to participate effectively in the protection of the wetlands through green entrepreneurship activities and the decision-making process thereof. The study examines how the capacity of communities and citizens current protection of the wetlands can be enhanced.

The needs assessment and analysis drew on the overview of the ecosystem services provided by the wetlands and in turn informed subsequent key deliverables, which was the development of a business case for bankable projects in the area discussed in Chapter 6.

5.2 BACKGROUND ON KHAYELITSHA RESIDENTS, NGO AND PUBLIC PARTICIPATION ON THE PROTECTION OF KHAYELITSHA WETLANDS

Khayelitsha Wetlands Park forms part of the greater Khayelitsha Wetlands Area located in the lower reaches of the Kuils River, which forms an integral component of the Metropolitan Open Space System (MOSS) for the City of Cape Town. The rehabilitation and landscaping of the Khayelitsha Wetlands Park was undertaken by local consultants and the Tygerberg Administration. The aesthetically pleasing, environmentally friendly landscape design has enhanced the area and created a valued amenity for the impoverished community of Khayelitsha.

Community members work in partnership with organisations such as the Coalition for Environmental Justice (CEJ) Stellenbosch University, Cape Peninsula University (CPUT), the Environmental Monitoring Group (EMG), Gender CC, Adopt-a-river programme (City of Cape Town) and Soil for Life. These organisations together with the community and government work together to strategize around protecting and creating sustainable livelihoods connected to the wetland. The community members, mostly women who came together to speak out against gender-based violence in the area, have engaged in clean-up activities, awareness

raising workshops, action research into pollution and solutions and ongoing engagement between communities and local authorities.

5.3 METHODOLOGY

During the first phase of the project, Africege conducted semi-formal interviews, focus group interviews, participant observation and conducted a needs assessment workshop with enterprise representatives, individuals and NGOs operating in and around the wetland to help identify:

- Current activities undertaken and business opportunities currently being pursued
- The areas in need of an investment in capacity
- Multi-stakeholder partnerships that already existed in the area and what these relationships entailed
- Effective mechanisms for delivering capacity building tools based on previous interaction with community members
- Actions that could be taken to enhance current business and wetland protection activities

A workshop was conducted at the Khayelitsha Wetlands Park with community members, NGO affiliates and representatives from the Department of Agriculture.

The purpose of the workshop was to identify the needs of the people that are receiving economic returns from use of the Khayelitsha wetlands through recreational activities, collection recyclable materials and food gardening.

Due to the absence of some key community members Africege conducted follow up meetings with community members who were unable to attend the workshop. Further interviews were held with the NGOs Gender CC, Environmental Monitoring Group (EMG) and Soil for Life who have worked extensively with the community in the last few years. The interviewees were asked a series of varying and open-ended questions to assist in understanding the context from varying social and economic perspectives.



Image 1: Needs dissemination meeting between NGO partners and community members



Image 2: Community gardener showcases biogas digester used at an early development centre adjacent to KWP



Image 3: Khayelitsha Canoe Club preparing for a tour in the KWP



Image 4: Outside the home of a waste recycler after collecting plastic bottles in the Khayelitsha wetland system

The participant observation approach was particularly useful during this first phase of the project as one could observe daily interactions, exchanges, conversations, and activities around the wetlands and participation in the workshops. The approach entailed participating in the preparation of the gardens, collection of waste in and around wetlands and

participating in the tour of the wetland in canoes. This approach was helpful and will continue to be helpful in observing human practices along the Kuils River and in the wetland, itself. What activities do people partake of in the wetland? What ecosystem services do they derive from the wetland? What markers do they leave behind or take with them? How does it change the wetland, or how does it impact the people? This approach also assisted in getting a better sense of what capacity development the enterprises and the community needed.

Africege also attended a workshop of upstream users of the Kuils River interested in restoring and protecting the river. Although several individuals were invited to attend this workshop, with the intention of creating cross-catchment collaboration, it was poorly attended, with representatives from church groups in Durbanville, Sarepta and a biologist from the Driftsands Nature Reserve. However, it was highlighted that the attendees were members of the larger community activist group called the “Friends of the Kuils”. The purpose of engaging with upstream users was to understand the current relationship that communities have with the river, the ways they interact with it, what futures are envisioned for it, who is tasked with managing it and to assess opportunities for partnerships with private business in relation to enterprise development.

In addition, Africege attended public participation workshops that drew government representatives from the Table Mountain Fund, Department of Water Affairs and the Department of Agriculture. The goal was to understand the role that government already plays in supporting enterprises in the area, the resources available and to get a holistic view of those working with communities at grassroots and local level on a day-to-day basis. Concurrently with attendance of workshops, Africege reviewed literature on public participation that was particularly relevant to capacity build in the area. This has been reflected in the previous section of the report.

This study, however, did not undertake to evaluate the effectiveness or relevance of the models being used for capacity building in the Khayelitsha wetlands. The themes identified below drawn from the interviews could however serve as opportunities for the development of new partnerships for new capacity building initiatives. Any development of programmes would require extensive public and community input for them to be effective, hence going forward; local government representatives will be involved in the development of a bankable project.

5.4 OVERVIEW OF NEEDS ASSESSMENT WORKSHOP AND INTERVIEW THEMES

The following section summarises the overall responses from the workshops, interviews and participant observation with respect to a) which stakeholders need capacity building efforts b) what do communities need to build their capacity to participate in profitable, inclusive and

sustainable entrepreneurship c) what mechanisms would be suitable to build capacity building tools.

5.4.1 Who needs capacity building?

A key consideration that emerged from the needs assessment interviews and participant observation was that the two formal enterprises had already received extensive business skills training from EMG and other organisations, such as the Cape Peninsula University of Technology (CPUT), that had worked in the community but had since left. The business skills training covered aspects such as the development of business plans, understanding the market, the basic requirements of day to day running of a business, bookkeeping and organisational structure to name a few. In addition, other capacity building that had been embarked on by Gender CC and the government included information exchange and sharing, training and education on the management and protection of wetlands. Soil for Life trained the women food growers in sustainable and effective farming practices as well as provided assistance and direction in accessing funds and resources from different entities.

The following points were however highlighted in the interviews:

- There was a general researcher/researched fatigue from community members. They highlighted that they had interacted with many organisations over the years but this often resulted in empty promises, disappointment and general mistrust of outsiders especially from educational institutions. The community members stated that the interactions they have with these institutions do not result in tangible outcomes which are much needed in a place characterised by high levels of poverty and unemployment.
- Efforts to build capacity with more women and the youth in the area should be pursued
- Community members wanted to be involved and consulted more in decisions and activities that impacted their livelihoods. Examples highlighted were the inclusion and training of the locals in the distribution and installation of rain water capture tanks project driven by the Department of Water Affairs.
- Due to the nature of their precarious lives, the majority of community members who engaged in enterprising activities related to the wetland have more than one avenue of drawing an income, often away from the wetland. This means that these members are often over extended and cannot cover all the enterprise issues that merit their attention.
- If the public is educated about these issues, the potential of more local participation will emerge
- Given the limited resources, capacity building and investment efforts should be more focused on the leaders and those already practising green entrepreneurship in the area to boost their efforts and increase their income streams in order for them to focus on fewer ventures

- The waste pickers in the area worked individually, informally and on an ad hoc basis. Capacity building for these individuals could potentially allow the creation of a more profitable enterprise.

Thus, there was a strong voice that supported capacity building of the ventures identified in this study, as well as mobilising youth and more women to participate in entrepreneurship activities that protect the wetland and promoted the general well-being of the community.

5.4.2 What capacity building is needed?

The interviews pointed to fundamental building blocks that interviewees thought should be part of capacity building efforts. These include:

- Information:** Community members and NGOs such as EMG, Coalition for Environmental Justice and SA Water Caucus emphasized the need for timely dissemination and imparting of information early in the public participation process. This was viewed as essential to enhancing the capacity of communities to participate, be well-informed and understand the relevance of interventions by government. An example of the clash between the City of Cape Town and community members where water meters were installed and racked up exponentially high bills. The NGOs argued that the community members did not oppose to paying the bills but required more information and better understanding of the billing process. Therefore, the importance of proactive dissemination of information was raised by many interviewees.
- Technical assistance:** From the interviews and participant observation, it can be concluded that many of the community members would require technical assistance because of the technical nature in which many of the environmental organisations and funds operate. In the conversations with representatives from the TMF and DWA, emphasis was placed on the much-needed support by the community in navigating the bureaucracies and technical issues characteristic of government departments and funding agencies.
- Process education:** According to interviewees many processes on the entrepreneurship and environmental activism journey can be intimidating. This included application for financing, mobilising government involvement for their wetland protection awareness campaigns and so on. The community members have been largely reliant on EMG as an intermediary but highlighted the need to understand the process themselves.
- Access to documents:** Many of interviewees highlighted that did not know their rights when it came to the use of the wetlands. This was further highlighted when the food growers were forced to relocate their garden and the land they utilised was already owned. The Khayelitsha Canoe activities were also halted due to lack of access to documents and information that detailed the lawful, safe and relevant use of the wetland for income generation purposes.

- e. Access to finance: As already stated, many of the interviewees engage in several activities, such as resale of second-hand clothing and running a shebeen, to supplement household incomes. A significant capital injection would be required to focus their activities more and increase their efforts on the protection and utilisation of the wetland.
- f. Access to technological innovations: Most interviewees identified some of the major challenges they experienced were inefficiency due to the lack of access to certain technologies. The Khayelitsha Canoe Club highlighted that they were unable to conduct canoe tours without receiving approval from the City of Cape Town after water samples had been tested for pollution levels. They were frustrated at the process as it took time and often meant that they missed the opportunity to conduct business until they received city approval. They therefore require a technology that is reliant and will allow them to test the water themselves. Tshidi, a waste picker and recycler highlighted due to the lack of a better way of carrying the waste for recycling, the work was laborious and had a low return. She also highlighted that she had to operate with a middle man who took a large percentage of the potential earnings if she went directly to the larger recycling companies. Tshidi therefore required a better method for collecting recyclables as well as a shipping container to store what was collected.
- g. Access to market: With the potential growth of the enterprises and expansion of the network of enterprises in the area, more innovative forms of accessing the market need to be considered. What measures can be taken to get their goods to market or draw in customers, resulting in cross-cultural and geographical connections for the upliftment of the whole community?

5.4.3 How should capacity building tools be delivered?

In addition, the interviews highlighted several mechanisms that were perceived as effective in delivering capacity building tools

- a. Action research/participant observation: Interviewees were interested in the approach that Africege was using in order to understand the community needs. Rather than once-off meetings or top-down approaches often applied, this meant that capacity building tools would take into consideration their everyday social, economic, cultural and environmental contexts in developing capacity building tools.
- b. Meetings: Face-to-face meetings were highlighted by several interviewees as the most suitable mechanism for delivering capacity building. However, several points were raised in order for this tool to be effective:
 - The meeting should be organised at a convenient location (taking into consideration spatial marginality and limited space available in the township) and time in order accommodate as many community members as possible.
 - Often complex language is used in these meetings with largely isiXhosa speaking members. The meetings should therefore always include a translator.

- Broader stakeholders need to be included in the meetings for more collaboration across sectors and geographical locales
- c. Workshops: Collaborative workshops, spear-headed by locals, would be the most suitable mechanism for the development of business case for bankable projects in the area. Africege will play a leading supportive role whilst EMG, Gender CC and Soil for Life will be secondary support for this particular action.
- d. Internet access via Mobile phones and devices: Information and Communication Technology play an important role in access to information for spatially marginalised communities like Khayelitsha. Most community members have access to smart phones which can enable them to access the required documents highlighted above. A platform could also be set up for easier access to this information.
- e. Mass media: Local newspapers and online media were highlighted as a good mechanism for reaching potential customers as well as recruiting more potential entrepreneurs.
- f. Grants: Many interviewees mentioned access to funding from government could assist the efforts of capacity building

5.5 POTENTIAL APPROACHES TO CAPACITY BUILDING

The needs assessment highlighted several approaches that could be used to address capacity building for green entrepreneurship, management and restoration of the wetland. This section summarises several general approaches drawing from some of the interactions during the research process and literature review. As stated above we believe strongly that to effectively conserve natural capital such as wetlands, it is important to get buy-in of local custodians (community) in a meaningful way. Activating the local economy through opportunities for job creation, will not only empower local community members but will also inspire them to value their local resources even more. Local members of the community have already shown considerable leadership in organising themselves through the catchment forum, and have undertaken various volunteer activities linked to pollution control.

5.6 Development of a bankable business project

A number of interviewees suggested focusing on capacity building of community members who have shown interest and willingness to collaborate in building a business case for a collaborative project. The three enterprises and EMG have shown a keen interest in being drivers of the development of this project. They have begun to communicate and reach out to more potential enterprises that work particularly with crafts. What the interviewees envisioned was not necessarily limiting the selection to only enterprises that draw natural resources from the wetland, but rather using this collaboration as an opportunity to reach a broader audience in terms of education and awareness of impacts the community has on the wetland.

During the course of the capacity building, the project facilitators will work with community members to develop a bankable green enterprise that is owned and locally managed by

members of the community. The focus of such a business will be to address a critical issue that is pertinent to the livelihood of the local community, such as water, food and energy security.

The enterprise development aspect of this project will focus on bringing systemic change to the members of the local community. As a result, the main emphasis in identifying business opportunities will be on their potential to create jobs. The goal of the project is to identify enterprises that have the potential to create at least 30+ jobs either directly or indirectly. Emphasis will be placed on vulnerable groups like women and youth in the vicinity of the wetlands, since they stand a better chance of catalysing change on the ground.

As an exit strategy for this project, from the onset strong ownership of the project will be bestowed on the local community members. This includes the project manager for the project emanating from the local community, and a local implementing committee for the project will also be appointed. This is to ensure that once the project comes to completion, local community members will take full ownership of the initiative.

5.7 Business Incubation Programme

In as much as there is a great sense of community involvement in the management and protection of the wetland, the interviewees had not yet considered the benefits of collaborating with other enterprises also using the wetland. The advantages of enterprises working together is that together, they present a stronger business case and therefore increases their chances of accessing funding or investment. This also increases their competitive advantage.

To achieve our goal, Africege will use an approach/programme referred to as BIZZFIZZ (www.bizzfizz.org.uk), which uses entrepreneurial tools to address community social and environmental challenges. Key aspects of the business incubation to be delivered through the Bizzfizz model include: -

- Ecosystem services: This will comprise a broad overview of how to develop marketable environmental goods and services.
- Strategy: How does a business create and sustain a competitive advantage?
- Marketing: How does a business decide what the customers are for its product or service and how to best reach those customers?
- Finance: How does a business raise money to finance its goals and objectives?
- Operations: What are the methods and systems used to provide customers with products and services?
- Problem Solving: How do you break down complex business problems to drive improvement?
- Communication: How do you deliver your ideas for real impact?
- Collaboration: How do you work in collaborative business teams?

More specifically, from a green economy perspective the incubation programme will focus on 3 issues:

- i) The role of small business in a green economy- high level overview of the need for change and the idea of a “purpose” driven business
- ii) Focus on green economy tools and business model innovations, that can be used to grow enterprises e.g. wellbeing at work, the circular economy (e.g. circular management, functional sales, industrial symbiosis etc.)
- iii) Financing and sources of finance, e.g. ethical financing

The business incubation programme will focus on using the passion and enthusiasm of local communities to drive the local economy by mobilising skills and resources in disadvantaged communities. The focus on local economies fosters partnership rather than competition as entrepreneurs collaborate to address context specific community needs.

5.8 Local Community Market

Interviewees highlighted the need for a platform to trade their goods. Currently each of the members sold their goods to local community but acknowledge the potential benefits of working together and reaching a wider audience. They also highlighted that having a larger more formalised market will increase the opportunity of creating awareness for the protection of the wetland.

The key problem highlighted by most of the interviewees is that communities do not always know the right channels and how to engage with government effectively in making such projects a reality. This challenge is particularly more obvious when community groups are at odds with the regulating entities that have a better knowledge of navigating the system. These entities often take for granted, such as how to apply for project assistance from the City of Cape Town, how to apply for funding, are unfamiliar to local groups that have concerns for environmental issues affecting their communities. The lack of familiarity, particularly in setting up a market, creates a serious disadvantage for the community. With that in mind, local groups would require training in specific procedural skills such as how to participate in planning and negotiation meetings with government.

To achieve the establishment of a market, community members could use the “Pocket Market” model (www.foodroots.ca), a vehicle for increasing the availability of fresh, local food, while helping food growers to reach a broader local consumer market. A local food system supports local food growers, sustainable and ecological farming methods, maintains food production and requires less logistics and travel which is important for poorer communities. This model also allows for the trade of a diverse range of products and allows different activities to occur. This leads to broader participation in the management and maintenance of the Khayelitsha Wetland as many community members stand to benefit from its upkeep.

The pocket market model differs to the farmers market in size and resources required such as tents, chairs and travelling distances to the market stalls. For a community such as Khayelitsha, it would not make economic sense to sell their produce at such markets often located in affluent suburbs. However, the flexibility of the pocket market would allow for the trade of produce in other neighbourhoods. Because this model is also produced for small scale food producers, it is well worth noting that the location of such markets can be held anywhere such as school halls, government building and parks.

Some of the limiting factors for certain locations are zoning and permitting regulations held by municipalities and also institutional policies or food service and trade contracts. As mentioned earlier, it would therefore be essential to also get the buy-in of local municipalities as well as include them in the planning of such a project. An effort to increase local communities and municipalities could build the capacity of the community members at a low cost. The collaboration with municipality would mean that there is already expert knowledge on how to navigate the process setting up such a project in a CBA. This also means that potential funds from the government could be channelled into realising this project and therefore a greater chance of it being more sustainable in the long-run.

5.8.1 New Collaborative Participation across Kuils River Catchment area

Several interviewees suggested that new ways of involving the public in the management of the Khayelitsha wetlands was through more collaborative, ongoing relationships with upstream users of the Kuils River. The mobilising of different stakeholders to participate in creating a healthy ecosystem for the river would have the result of building capacity for participation of caring for natural resources in urban spaces. This view is consistent with some of the literature on public participation (see Cox, 1995; Mnguni & Alletson, 2008). This approach would establish formal relationships that do not relegate community stakeholders to commenting on proposed actions, but rather provide a role for community stakeholders in developing proposals or negotiating agreements with government.

Capacity to participate could be increased not only through the exchange provided by the collaborative structure but also by virtue of the increased opportunity to advance other capacity building tools, such as information-sharing. In addition, an ongoing collaborative relationship could promote citizen involvement early in the decision-making process.

Replicating the model undertaken by “Friends of the Liesbeek” would be the most likely approach to building collaborative participation. Extensive work has been done in rehabilitating the Liesbeek River through multiple stakeholder engagement. Awareness campaigns and fundraising drives have been the key drivers in bringing communities together as well as creating job opportunities in the protection of this natural resource. Over the years, the river has seen a remarkable improvement from the clearing of invasive plants, to the re-introduction of animals to the river basin.

The participant observation, business proposal workshops and interviews conducted over 12 months are vital securing the trust of the community and their buy in in long term projects such as this. It is also important for understanding the everyday needs considered as priority by the community themselves. Some of these needs are small and incremental, such as access to information. Others are more expansive and fundamental such as job creation through market access for enterprises in the area. The plethora of ideas presented by the community members themselves is encouraging as Africege's goal was for the community to take full ownership of the process. The critical next step of this project is including more stakeholders, i.e. community enterprises and municipalities responsible for the Kuils River catchment, together to realise the objectives of the business case.

6 BUSINESS CASE FOR KHAYELITSHA WETLANDS MARKET AND GREEN HUB

6.1 OVERVIEW AND RATIONALE

A report by the World Bank (2015) found that about half of South Africa's urban population lives in townships and informal settlements, accounting for 38% of working-age citizens, but home to nearly 60% of its unemployed. According Mahajan, the editor of the study, what is needed for township economies is "a dynamic middle-income economic structure on a large scale that hosts a range of robust businesses, both labour intensive and small enterprises that are suited to absorbing the limited skill levels available among the townships' unemployed masses".

The Khayelitsha Wetlands Park (KWP) green hub is a concept idea that was developed by the Makhaza Community Members who live around the wetlands. This concept was developed after consultations with the African Centre for a Green Economy, Gender CC and the Environmental Monitoring Group (EMG), investigating the needs and entrepreneurial opportunities that were available in relation to the protection of the Khayelitsha wetland. The concept was developed as a response to the much-needed employment and income generating opportunities in an area characterised by high levels of unemployment and poverty. In addition, the idea was developed in response to creating more environmental awareness and promotion of sustainable practices related to the Khayelitsha Wetlands systems and other wetlands in the area.

Objectives of the green hub

4. Establish a platform for community driven awareness raising on green economy
5. Create a local market place for green entrepreneurs to trade
6. Incubate local green enterprises to explore the use of local resources to upcycle.

Community members of the Makhaza area are already engaged in clean-ups, education and tours of the wetland to some extent. The KWP Green Hub will aim to enhance these activities by providing a formalized platform that can attract more people to the wetland. Women and a group of youth (mostly young men) have been designated as the target group both because they have been the most proactive participants in the activities on the wetland as well as in this research project. Research has shown that women tend to manage resources more efficiently than men, investing the majority of their income in the household and for their children thus impacting a larger scale of society. The youth are currently the highest unemployed demographic group in South Africa at an estimated 63,1%, were also selected as a key target group for the project. The youth are also often open to exploring new opportunities. The KWP Green Hub will be empowering these marginalized groups by enhancing their opportunities to generate incomes and own assets.

6.2 PROJECT SCOPE, GOALS AND OUTCOMES

Many community members in the Makhaza area of Khayelitsha are already actively involved in the upkeep of the Khayelitsha wetlands. Some are involved in organized voluntary cleans ups as well as education on the benefits of wetlands in urban areas. The **KWP Green Hub** will create a physical space and platform for more environmental education. In addition, the Green Hub will be essential to the establishment of an enterprise development programme that focuses on the creation of products from locally sourced material (for example from the surrounding wetlands) or through environmentally and socially inclined businesses. The community members requested assistance in accessing training for craft skills such as basket making, jewellery making, furniture manufacturing and more. The program envisions providing training for the development of these craft skills for sale locally at the **KWP market** discussed below and internationally, via the online market **Mudanga.com**. The Green Hub will set up an incubator that will also provide essential business training based on green economy principles.

The goal of the **KWP local market established by the Green Hub and local community** is to create a space/platform for social and environmentally oriented small business to trade their goods to the general public **every weekend**. Such a space is currently unavailable in the Makhaza area of Khayelitsha.

When the problem of Khayelitsha being spatially disconnected from jobs and the under use of the KWP is viewed as an opportunity to create a platform for entrepreneurial activity it shifts perspective positively and radically. Community markets are such a platform. Communities across Cape Town area are already beginning to realize the practical benefits of engaging partners from all sectors to create more diverse localised shopping/retail choices as a part of their regular 'business'. Collaborative investments in community markets produce economic, social and environmental dividends for the entire community.

The KWP market will provide products and services in the following categories:

6.2.1 Organic agri-businesses

The market will provide a platform for the local small-scale farmers and gardens to sell their surplus organic produce. The current food growers involved in the conceptualisation of the KWP market are:

1. Makhaza Wetlands Food Growers (a co-operative of women who grow organic vegetables)
2. Independent growers
3. Igalelo Labafazi (a co-operative of women who grow organic vegetables)

The majority of the food growers received training in growing organic produce from a reputable NGO, Soil for Life based in Cape Town.

6.2.2 Arts, Crafts and Foods

The major drawing card of specialty and lifestyle markets are often the cuisines available and local craft work on sale. In this inception phase, we have four service providers for arts, crafts and food. A call will be made for more providers in this area.

6.2.3 Eco-tourism

Due to the location of the proposed market, it would be important to capitalise on the beautiful wetland and draw in customers from the broader Cape Town area. The KWP presents a combination of experiential opportunities which include environmental education (which can be modelled on the Greenpoint park), eco-tourism coupled with township tours, recreational and social activities.

The Khayelitsha Canoe Club already provides educational tours of the wetlands and empower the local youth through education and training in canoe sporting activities.

6.2.4 Goals

Promoting micro-enterprise: The majority of South Africans are unable to participate in the formal economy, particularly households in rural and peri-urban areas. Focusing on the development

Women and Youth Empowerment: Women and the youth are often the most marginalized groups when it comes to participation in the formal economy. However, these two groups are the key drivers of informal economies and are a key demographic in charting the transition to a green economy. Women are invested in nurturing the future generations of leaders, and the youth are also the future leaders that can drive sustainable and fair business practices. Their buy-in is therefore important for achieving broader socio-economic outcomes and the green growth agenda.

Supporting Livelihood: By providing craft and business skills development and creating access to finance, we expect to help raise their incomes and thus also boost the local township economy. Through Africege's micro-financing organization, GroFund, the project will provide micro loans to vetted potential highly impactful businesses.

6.2.5 Outcomes

Year 1

After support from Africege, Gender CC and Environmental Monitoring Group (EMG), the following outcomes can be measured.

- Number of enterprises trading at the KWP Market
- Increase & diversify incomes
- Training workshops (crafts, business skills, green economy)
- Mitigate risk, Plan for the future, Make choices
- Increase township tourism
- Invest in wetland and human well-being
- Invest in education

Year 2 & 3

- Over 1000 households empowered directly or indirectly through the setup of the KWP Green Hub and Market.
- Improvement in the incomes of peri-urban households.
- A credit discipline culture inculcated amongst beneficiaries.
- Investment and income generating opportunities increased through diversification.
- Strengthened financial intermediation system.
- Diversified ownership structure and good governance in the local government.

6.2.6 Theory of Change

The preliminary Theory of Change (ToC) for the KWP Green Hub, can be summarised in four levels as outlined below (a detailed business will be published as a separate document):-

Impact – The local economy impacts the KWP Green Hub is seeking to contribute to but cannot claim attribution. The key issues to address here include, growing green and social enterprises and investments in the local township economy

Outcomes – The overall outcome, which can be strongly attributed to the KWP Green Hub, will include improved social economic conditions for peri-urban dwellers and protection of the related aquatic system

Outputs – In terms of output, there will be access to skills development, enhanced ecosystem services, increased cross-catchment dialogues and uptake of sustainability practices.

Activities – The activities supported by the KWP Green Hub's resources, will include the provision of training, access to microfinance capital, convene monthly platform to showcase local innovations and partnerships with local government authorities.

6.2.7 Milestones and measures of success

Progress can be measured based on target community's achievement of better economic status & dignified life as well as the protection and enhancement of the KWP ecosystem services. The target population will have a positive growth oriented economic status. While conducting the skills training and implementing the KWP market, we will capture the monthly household income. We will also track the number of people that participate in the events of the KWP Green Hub. Of most importance would be the tracking of flora and fauna in the KWP. This will be done in collaboration with the CCT Parks Department and birding organisations that may be interested in the project.

6.2.8 Expected duration of the project

It is expected that in year 1 and 2, Afrigege, Gender CC and EMG will drive the set up and launch of the project.

From year 3, the NGOs will play a supportive role and encourage the local community to take ownership of the project. The goal is to have this as a long-term project that improves the lives of the local community and the natural landscape significantly for many years to come.

6.3 SUMMARY OF SWOT ANALYSIS

Strengths

- 2 different entertainment atmospheres can be on offer at the KWP market due to the sheer size of the KWP
 1. Vibrant township setting.
 2. Quiet, beautiful and peaceful surroundings can be offered on tours on the wetland itself
- High visibility location with easy access from N2.
- Well maintained park with numerous equipment for entertainment for all ages
- The KWP presents a combination of experiential opportunities which include environmental education (which can be modelled on the Greenpoint park), eco-tourism coupled with township tours, recreational and social activities
- Community interest and support for establishment of a market.

Weaknesses

- Lack of a structure to protect vendors and shoppers from the elements.
- Located a little far from wealthy customer base.

Opportunities

- Small number of community events would likely help us stand out and promote the market.
- Move towards buying local food and increased interest in farmers' markets will work in our favour.
- Move towards revitalising and increasing the number of natural spaces in the urban centres, as well as creating inclusive economies will work in our favour.

Threats

- Surrounding markets and established markets could draw customers from this area.
- Local politics and tensions may affect the progression and speed at which the market can be established
- Inability to secure enough vendors would result in a small market that won't draw enough foot traffic.
- Financing for budget for advertising and promotions
- Location in high risk area in terms of security

7 Framework for landscape innovation

Based on the comprehensive review of the ecosystem services prevalent in the Khayelitsha wetland system and the ethnographic mapping of key relationships within the broader catchment, a proposed framework is presented that draws out the lessons learnt from this exercise, and their potential applicability to other complex socio-ecological system that may exhibit similar characteristics. This framework outlines the key components of landscape innovations that need to be fostered promote effective management of urban and peri-urban aquatic ecosystems.

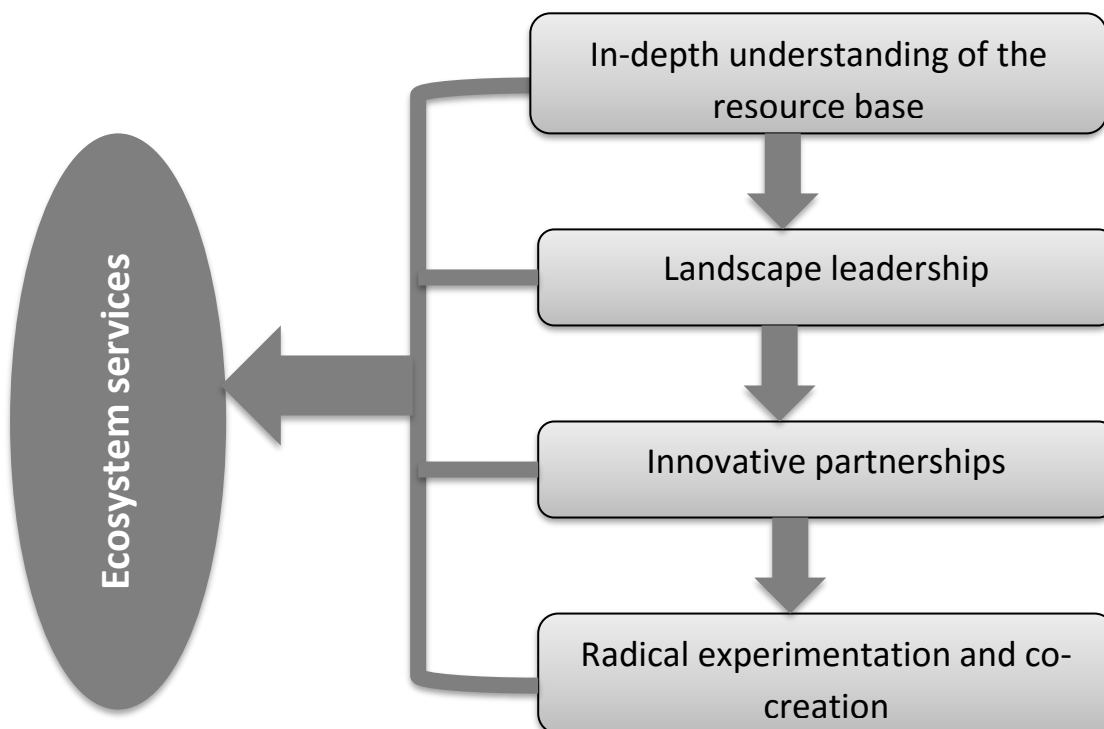


Figure 7: Conceptual framework for enhancing landscape innovations for aquatic ecosystems

Landscape innovations in this context refers to the kinds of approaches required to effectively manage aquatic ecosystems that are intricately linked to society and people (economy, culture, institutions) and the environment (wetlands). These kinds of systems require interventions that go beyond the traditional conservation approaches of merely focusing on the ecosystem, and not taking cognisance of the interactions with people and growing pressure on the system as a result of demographic change and unsustainable resource use. Most of the innovations required to develop a good understanding of these socio-ecological systems are therefore 'soft' non-technical solutions that focus on strengthening inter-relationship between people and the environment for their mutual benefit.

There are 4 key elements in the framework for landscape innovations that are key to securing ecosystem services for aquatic systems in peri-urban landscapes.

7.1 UNDERSTANDING THE NATURAL RESOURCE BASE

In-depth understanding of the **resource base** at a landscape level. It's important to understand the resource flows at a landscape level, including the biotic resources from which the ecosystem services are derived. This is key for understanding the inter-relationships with the various actors in the landscape. The importance of using landscape scale approaches in mapping ecosystem services cannot be understated, as this research has clearly demonstrated that in a landscape of multiple actors and overlapping mandates, clarity of how a specific ecosystem fits in the broader landscape is key for ensuring its effective management.

7.2 LANDSCAPE LEADERSHIP

Fostering landscape **leadership** to champion a holistic approach to aquatic ecosystem management. Good leadership is required at all levels, ranging from communities that are the direct custodian of the resources, to upstream users, business and political leadership. Due to the multiple stakeholders involved, champions are required between each group of stakeholders to advance the agenda of securing the ecosystem, with their different constituents. In the case of Khayelitsha wetland system, the local community stakeholders have demonstrated considerable leadership, but this needs to be strengthened by effectively linking the community to other stakeholders through innovative partnerships and experimentation

7.3 INNOVATIVE PARTNERSHIPS

Innovative **partnerships** are geared towards addressing shared risk among key stakeholders in the landscape. The diverse range of stakeholders in the landscape presents an excellent opportunity for partnerships, such as big business with SMME's downstream and upstream farmers, partnering with smallholder farmers in Khayelitsha. Such partnerships are important for fostering collective action for developing understanding among stakeholders that the shared resource presents both opportunities and risks to their wellbeing and must thus be harnessed.

7.4 RADICAL EXPERIMENTATION AND CO-CREATION

Fostering radical **experimentation** and **co-creation** amongst landscape actors and stakeholders. The complex nature of these socio-ecological systems implies that no one solution can address the systemic nature of challenges. The need for experimentation, by exploring new approaches or designing interdisciplinary mechanisms is therefore important. It's also important that solutions designed to address a specific challenge are developed through a process of co-creation that involves all stakeholders within the system, as opposed to top-down approaches that can be perceived as biased towards an agenda of a specific group of stakeholders.

These key principles of landscape innovation are not exhaustive, but present a useful framework to engage key stakeholders in a strategic fashion to foster collective action at a landscape level. This study has addressed various aspects of the framework, although there is still an opportunity for a rigorous review and testing for wider application in similar socio-ecological systems.

8 Conclusion and further research recommendations

This research provided a literature review in relation to a broad assessment of the ecosystem services, starting with a conceptual framework for ecosystem services, which outlined the role of ecosystem services in urban spaces, why they are important, system linkages to ecosystem services, the role of understanding actor-networks to grasp the complexity of these linkages and the types of services available in the Khayelitsha wetland. In this context, ecosystem services refer to the benefits that people receive from ecosystems.

It is important to note that this research focuses on ecosystem services provided in an urban setting which means that these services are affected by social, political and economic systems. They can usefully be conceived as a mesh network of linkages for which people, plants, animals, social practices and infrastructure (to name a few) are a part off, contributing to the balance of the system. However, it is important to note that in the absence of people there are no services, and people often modify ecosystems to enhance the production of specific services.

In a multiple landscape user area such as the Kuils River catchment, understanding networks of relating also helps us to understand the drivers, outputs and inputs of ecosystem services and the benefits derived from the Khayelitsha wetland for upstream and downstream users. This can then inform the frameworks for the interventions that can be implemented in the sustainable management of natural resources such as the Khayelitsha wetland.

In this report, we identified the ecosystem services provided by the Khayelitsha Wetland system, such as cultural services, air purification, water quality improvement, biodiversity and natural resource protection, flood attenuation, provision of raw material for crafts an agriculture, as well as recreational services. One of the key findings of this review is that there are opportunities in building understanding on how people derive benefits on the ground and what people are doing on the ground to protect and manage the wetland sustainably. Most of the work around ecosystem services has been carried out in pristine environments with little interference from urban influences, while in developing countries the benefits to low-income households been poorly documented.

From an empowerment perspective, this research has identified the enterprise development opportunities in the area and of these enterprises, which ones can become bankable projects. In addition to the empowerment of local communities, drawing from actor-network theory, this research has created an opportunity for engagement between upstream users of the Kuils River with those located downstream, particularly in Khayelitsha wetlands.

During the course of the research, several impediments to building local capacity for participation in the Khayelitsha wetland maintenance activities were highlighted. These impediments often alluded to interviewees' perceptions of basic problems with the local municipality's approach to addressing other challenges being faced by locals, such as unemployment, service delivery and crime. Although these impediments have broad

implications for public participation in general and are not limited to capacity building efforts, the issues raised are fundamental concerns that must be understood and addressed in developing a capacity building strategy.

A key concern voiced by members of the Makhaza community was that, participation in interventions for the wetland and surrounding communities is futile because the well-being of the locals is often not central. This concern was expressed by interviewees in a variety of ways, including that communities feel their input does not matter because government does not consider their efforts in cleaning up the wetland as remunerable.

Participation was viewed by some interviewees as "busy work" that is often very time consuming. Community groups have volunteered in the cleaning up of the wetland, however given the social and economic context, some interviewees felt that incentives would increase participation in the clean-up of other wetlands located in Khayelitsha. Others described the current process as "disempowering" because in other areas, people earned an income for cleaning up urban spaces. Why should this not be the case in the wetland?

Several interviewees explained their perception that from previous encounters with government, NGOs, academics and others, these groups had no intention of listening to a community and is just "doing what is required" for public participation in their own pursuits. They were therefore sceptical about Africege's role in the capacity building, and the development of a bankable project for investment.

Several interviewees emphasized, however, that if communities think they stand to benefit, especially in economic returns, they will participate. Accordingly, new approaches to public participation that assure stakeholders that their views will be taken into account could increase public participation. The community participants' perceptions are consistent with studies on public participation that find that many citizens view the communication flow in participatory processes as uni-directional, from the Agency to the citizen and believe the information is managed, controlled and manipulated, limiting their capacity to participate. For example, according to these studies, citizens feel that public hearings and meetings are inadequate and that their aim is primarily to convince, rather than to communicate.

In that regard, Africege took seriously these inputs from the community in building a business case. The potential for economic return, environmental and people well-being in the area should be considered as a great opportunity for more inclusive and sustainable economies at the base of the pyramid. It is therefore important to be aware of the importance of cultural, economic and political processes in the area in order to rebuild trust with community members who have researcher fatigue. This lack of confidence in "outsiders" can be further addressed by through transparency and clearly defining the role and purpose of Africege and their important participation in decision making processes. Furthermore, providing timely and extensive feedback could help ensure ownership of the project by community members.

In conclusion, through this project, we explored the possibility of ecosystem services and landscape innovations in enhancing both cultural and biological sustainability rather than these occurring at the detriment of each other. We then sought to understand the ways in which community members used the Khayelitsha wetland. And through this, we explored how the enactment of the protection of the wetlands through cultural and biological sustainability presents different opportunities for green and social entrepreneurship (see Appendix 2 for examples of green entrepreneurship practices). The enactments we are interested in are the everyday cultural practices that are a part of the human-wetland interactions. For instance, the use of the wetland for canoeing and educational tours, waste recycling and upcycling demonstrate mutually beneficial relationship between the people and the wetland. Our focus on the ways of relating to the KWP essentially informs us that the protection of the wetland is informed by human values influenced by the social, political, economic and the technological.

8.1 RECOMMENDATIONS FOR FUTURE RESEARCH AND IMPLEMENTATION

8.1.1 Need for more in-depth investigation of the potential economic opportunities provided by the Khayelitsha wetland system

Considering that one of the most explicit needs established from this research is the urgency to provide economic opportunities, its recommended that further exploratory studies be undertaken to investigate the potential of identifying economically valuable raw materials linked to the wetland that could be used to build economically beneficial products. Alien invasive species like *Typha capensis* which is known to occur widely in the Khayelitsha wetland system, but their potential to be exploited at a commercial scale is not known. If commercially viable quantities were available this could unlock significant opportunities for products, such as crafts and for medicine. This would provide an excellent opportunity for effective community engagement, while ensuring that the wetland system is effectively managed.

8.1.2 Implementing the green hub

Throughout the interactions with local community members, it was clear that a high level of distrust exists between the community members, local authorities and other stakeholders such as researchers. This is primarily due to the perception that communities don't benefit directly from interventions linked to the wetland system, and in some cases, are not sufficiently engaged in decision-making. The Green Hub, would help to build trust within the community, as it will be a concrete undertaking with direct benefit to members of the community, but at the same time promote practices that would build resilience of the wetland system. To ensure that the concept of the Green Hub can be fully realised, all key stakeholders more specifically the City authorities need to come on board as this will be key in ensuring that the Hub can be implemented. A second factor for success of the Green Hub is a concerted effort to build the capacity of participating community members on enterprise development, conflict resolution and effective stakeholder relationship management, and the importance of wetland ecosystems. Many of these aspects will be undertaken by

organisations that are already operating in the area, such as the Environmental Management Group (EMG). The African Centre for a Green Economy could also provide enterprise development support, through its New Economy Accelerator (NEA) that has been incubating enterprises in the last 3 years.

8.1.3 Explore the potential to establish a Kuils River Catchment Forum (KRCF)

Evidence from engaging various stakeholders in this project has clearly demonstrated the complexity of the Kuils River catchment, with its complex network of relationships, power dynamics and environmental risks. A forum would present a great platform for all stakeholders in the catchment to engage other in a bid to find common solutions to the shared risks prevalent in the catchment. Upstream water users such as farmers, industry and water treatment plants all play a significant role in determining the ecological integrity of the wetland systems downstream that this initiative is concerned about. The upstream users also hold the best potential in protecting the wetlands downstream, partly because they derive the most economic benefit from the catchment as a whole, but are also exposed to severe business risk if the integrity of the catchment is not secure.

Previously there has been an attempt to set up a Kuils River Catchment Forum (KCF), but unfortunately that effort does not appear to be successful. It is therefore recommended that a feasibility assessment be undertaken to further explore this potential. The South African Water Act 1998 stipulates the establishment of non-statutory catchment forums to encourage wider stakeholder engagement in water management, so this undertaking would help this goal as outlined in the Water Act.

9 REFERENCES

Adelana, S., Xu, Y. and Vrbka, P. 2010. A conceptual model for the development and management of the Cape Flats Aquifer, South Africa. *Water SA*, 36,4: ISSN 1816-7950

Bennett, N.J. and Dearden, P. 2014. Why local people do not support conservation: Community perception of marine protected area livelihood impacts, governance and management in Thailand. *Marine Policy* 44: 107 -116

Bonan, G. B. 2002. *Ecological climatology: Concepts and applications*. Cambridge: Cambridge University Press.

Brauman, K.A., Daily, G.C., Duarte, T.K. and Mooney, H.A. 2007. *The nature and value of ecosystem services: an overview highlighting hydrologic services*. *Annual Review of Environment and Resources*, 32:6.1-6.32

CBD. 1992. *Convention on Biological Diversity*. United Nations Convention on Biological Diversity. [Online]. Available: <https://www.cbd.int/doc/legal/cbd-en.pdf>.

CCT Development Service. *Catchment, Stormwater and River Management*. <https://www.capetown.gov.za/en/CSRM/Documents/CSRM%20Strategy%20May%202002.pdf>. Accessed 29/01/2016.

Clark, B. and Foster, J.B. 2010. Marx's Ecology in the 21st Century in *World Review of Political Economy* 1, 1: 144

Constanza, R., DE Groot, R., Sutton, P., van der Ploeg S., Anderson, S.J., Kubiszewski, I., Farber, S. and Turner, R.K. 2014. Changes in the global value of ecosystem services. *Global Environmental Change*, 26:152-158.

Costanza, R. and Ruth, M. 1998. Using dynamic modelling to scope environmental problems and build consensus. *Environmental Management*, 22(2):183-195.

COWI. 2014. *Support policy development for integration of ecosystem services assessments into WFD and FD implementation*. [Online]. Available: https://circabc.europa.eu/sd/a/79584b30-a2a34fa8-9d07-85303dfdf9b1/Ecosystem%20services_WFD_FD_Annex%20report_Final.pdf. Accessed 26/01/2016

Cox, M. 1995. *Integrating Public Input Into Environmental Decisions: How Far Have We Come?* 2 INTERACT 46

De Certeau, M. 1984. *The practice of everyday life*. University of California Press. Berkley.

Duraiappah, A.K., Scherkenback, C., Munoz, P., Bai, X., Fragkias, M., Gutscher, H. and Neskasis, L. *Human Well-being for a Planet Under Pressure: Transition to Social Sustainability*. <http://www.igbp.net/publications/policybriefsforrio20summit/policybriefsforrio20summit/humanwellbeingforaplanetunderpressure.5.705e080613685f74edb800014787.html>

Evans, D. 2004. *A comparative valuation of ecosystem services: Lents project case study. Prepared for city of Portland watershed management program*. ECONorthwest.

Fernald, A., Tidwell, V., Rivera, J., Rodriguez, S., Guldan, S., Steele, C., Ochoa, C., Hurd, B., Ortiz, M., Boykin, K. and Cibils, A. 2012. *Modeling sustainability of water, environment, livelihood, and culture in traditional irrigation communities and their linked watersheds. Sustainability*, 4:2998-3022.

Georgiou, S., Whittington, D., Pearce, D. and Moran, D. 1997. *Economic Values and the Environment in the Developing World*. Edward Elgar: London.

Glover, T., Shinew, K. and Parry, D. 2005. Association, sociability and civic culture: The Democratic effect of community gardening. *Leisure Sciences*, 27: 75-92

Gomez-Baggethun, E., Gren, A., Barton, D.N., Langemeyer, J., McPhearson, T., O'Farrell, P., Andersson, E., Hamstead, Z. and Kremer, P. Urban Ecosystem Services. In T. Elmqvist et al. (eds.), *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities: A Global Assessment*, DOI 10.1007/978-94-007-7088-1_11

Haines-Young, R. and Potschin, M. 2013. *Common International Classification of Ecosystem Services (CICES) Consultation version 4*.

Haraway, D. 2003. *The companion species manifesto*. Prickly Paradigm Press. Chicago.

Hung, Y. 2004. East New York Farms: Youth Participation in Community Development and Urban Agriculture. *Children, Youth and Environments*, 14,1: 56-45

Jansen, H.C. 2008. *Water for food and ecosystems in the Baviaanskloof Mega Reserve: land and water resources assessment in the Baviaanskloof, Eastern Cape Province, South Africa*. Wageningen, Alterra, Alterra-report 1812.

Kirkwood, C.W. 2013. Chapter 1: *System behaviour and causal loop diagrams*. [Online]. Available: <http://www.public.asu.edu/~kirkwood/sysdyn/SDIntro/ch-1.pdf>. Accessed 23/01/2016

Lane, D.C. 2008. The Emergence and use of diagramming in system dynamics: a critical account. *Systems Research and Behavioral Science*, 25:3-23.

Latour, B. 2005. *Reassembling the Social – An Introduction to Actor-Network-Theory*. Oxford University Press.

Malan, H., Day, B., Ramjukadh, C. and Olivier, N. 2014. *Trajectories of change in wetlands of the fynbos biome: Status reports for the individual wetlands sampled during the project*. WRC Project K5/2183.

McDonnell, R. A. 2008. Challenges for Integrated Water Resources Management: How Do We Provide the Knowledge to Support Truly Integrated Thinking?: *International Journal of Water Resources Development*, 24(1): p131 – 143

Maree, D. 2017. Why Western Cape Agriculture Matters to S.A economy. *Business Report*. <http://www.iol.co.za/business-report/why-western-cape-agriculture-matters-to-sa-economy-10007415>. Retrieved 29 June 2017.

Mearns, R. and Norton, A. 2010. *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World*. The World Bank. Washington, DC.

Meyer-Ohlendorf, L. 2009: *Climate change, vulnerability, and adaptation in Sub-Saharan African cities: New challenges for development policy*. DIE Research Project "Climate Change and Development". Bonn (Discussion paper, 25/2009). Online verfügbar unter [http://www.die-gdi.de/CMS-Homepage/openwebcms3.nsf/%28ynDK_contentByKey%29/ANES-82DCF5/\\$FILE/DP%2025.2009.pdf](http://www.die-gdi.de/CMS-Homepage/openwebcms3.nsf/%28ynDK_contentByKey%29/ANES-82DCF5/$FILE/DP%2025.2009.pdf).

Millennium Ecosystem Assessment. 2005. Ecosystems and Human well-being. <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>. Accessed 13/01/2016

Mnguni, D and Alletson, A.J. 2008. *Environmental Impact Assessment and Public Participation*. DWAF Report number P WMA 10/C31/ 00/1508. <https://www.dwa.gov.za/orange/Docs/Taung%20Dam/11.%20EIA%20and%20Public%20Participation/EIA%20and%20Public%20Participation%20-%20Final%20Report.pdf>

Mollinga, P.P. 2008. Water, Politics and Development: Framing the political sociology of water resources management. *Water Alternatives*. 1 (1): p7-23.

Morecroft, J.D.W. 1982. *A critical review of diagramming tools for conceptualising feedback system models*. *Dynamica*, 8:20–29.

Ohmer, L., Meadowcroft, P., Freed, K. and Lewis, E. 2009. Community gardening and community development: Individual, Social and Community Benefits of a Community Conservation Program. *Journal of Community Practice*, 17,4: 377 - 399

Richardson, G. P. 1986. Problems with causal-loop diagrams. *System Dynamics Review*, 2(2):158-170.

Schaffernicht, M. 2010. Causal loop diagrams between structure and behaviour: A critical analysis of the relationship between polarity, behaviour and events. *Systems Research and Behavioural Science*, 27:653-66

Senge, P.M. 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*. Doubleday: New York.

Snyman, S. 2014. The impact of ecotourism employment on rural household incomes and social welfare in six southern African countries. *Tourism and Hospitality Research*, 14, 1-2: 37 -52

State of Rivers Report. 2005. Greater Cape Town's Rivers. [https://www.capetown.gov.za/en/CSRM/Documents/State_of_rivers_report_greater\(resize d\).pdf](https://www.capetown.gov.za/en/CSRM/Documents/State_of_rivers_report_greater(resize_d).pdf). Accessed 18/11/2015

Statistics South Africa. 2015. National Provincial Labour Market: Youth. Accessed from <http://www.statssa.gov.za/publications/P02114.2/P02114.22015.pdf>

Sterman, J. 2000. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. McGraw-Hill, Boston, p. 982.

Rawling, J., de Lange, W. and Fraser, G. 2015. *Investigation of aquatic ecosystem services, their value and market in South Africa*. WRC Research Project. K5/2341

United Nations Environment Programme (UNEP) (2011), *Why a green economy matters for the least Developed Countries*. United Nations Environment Programme, Nairobi.

TEEB. 2010. *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB*.

Turpie J, Joubert A, van Zyl H, Harding B and Leiman T. 2001. *Valuation of open space in the Cape Metropolitan Area: a pilot study to demonstrate the application of environmental and*

resource economics methods for the assessment of open space values in two case study areas: Metro South and Metro South-east. City of Cape Town

UN World Urbanisations Prospects. 2014. *Economic and Social Affairs*. <http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf>. Accessed 21/01/2016

Van Den Berg, J., Ingram V.J., Bogaardt, M.J. and Harms, B. 2013. Integrating ecosystem services into the tropical timber value chain; Dutch policy options from an innovation system approach. Wageningen, The Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu). WOT-werkdocument 344. 113 p. 10 Figs.; 10 Tabs. 169 refs. 4 Annexes.

Van Staden, F. 2013. *Urban Green Spaces: An essential element in city life*. www.capechamelon.co.za. Accessed 20/01/2016

VEENEKLAAS, F.R. 2012. Over ecosysteemdiensten: een afbakening. WOT-paper 16, WOT Natuur en Milieu, Wageningen UR, Wageningen [In Dutch] in Rawling, J., de Lange, W. and Fraser, G. 2015. *Investigation of aquatic ecosystem services, their value and market in South Africa*. WRC Research Project. K5/2341

Voigt, W. and Porter, H. 2007. <http://pza.sanbi.org/typha-capensis>