DBSA Project Document

Development Bank of Southern Africa

Unlocking Biodiversity Benefits through Development Finance in Critical Catchments

Project Document prepared by SANBI for the DBSA

Executive Summary/Brief Description

Through its focus on planning, finance and development in the water value chain, this project will unlock simultaneous biodiversity and water benefits in South Africa, especially in two demonstration catchments. South Africa is one of the most biologically diverse countries in the world due to its species diversity and endemism as well as its diversity of ecosystems. As such, the Berg-Breede and the Greater uMngeni demonstration catchments extend into three global biodiversity hotspots. These rich endowments of biodiversity assets underpin the delivery of ecosystem services and enhance the resilience of natural systems, working landscapes and open spaces to support the country's development path and contribute to the Sustainable Development Goals (SDGs). While there have been major strides in conserving and managing South African biodiversity over the past two decades, there are still experiences high rates of biodiversity loss. The National Biodiversity Assessment (2012) reports that freshwater ecosystems in particular are most threatened, facing pressures such as flow alterations, pollution, degradation and conversion to other land uses and climate change.

Failure to address these pressures threatens the country's ability to meet global and national biodiversity conservation targets, while undermining the ability of naturally functioning ecosystems to provide crucial ecosystem services to millions of people, thereby reducing water security. Referred to as ecological infrastructure, ecosystems such as rivers, wetlands and terrestrial ecosystems in key water-producing catchments play an especially crucial role in the delivery of water-related services such as water provisioning and purification, flow regulation and disaster risk reduction, amongst others. These services are of increasing importance to water security as available surface water yields approach full utilization, security of supply is a growing concern and water quality is declining. Both demonstration catchments for instance are at their limits of water supply. They support South Africa's second and third largest cities, which generate a gross domestic product (GDP) in the order of R400 billion per annum and are home to over 16 million people. While built infrastructure, such as dams, remains essential for addressing these challenges, there is a growing need to recognise the role of ecological infrastructure in supplementing, sustaining and, in some cases, substituting for built infrastructure solutions for water resource management. This role, and the impacts and dependencies of infrastructure on natural capital, are insufficiently internalised in water sector development and finance planning.

This project thus responds to an urgent need to integrate biodiversity and ecosystem services into planning, finance and development in the water sector to improve water security and avoid further loss of biodiversity and ecosystem services. The project will address this need through a three-pronged approach. First it will work with national and sub-national level stakeholders to strengthen the enabling environment through: developing natural capital accounts; influencing applicable policy frameworks, regulatory instruments and institutions; and supporting the operationalization of mechanisms for financing ongoing rehabilitation and maintenance of biodiversity and ecosystem services. Second, the project will work with catchment-level stakeholders to test the application of policies and financial mechanisms to improve water security in the Berg-Breede and the Greater uMngeni demonstration catchments. Third, the project will work with a range of national, regional and local stakeholders from the biodiversity and water sectors to improve the integration of biodiversity and ecosystem services into the water value chain through strengthening social learning, co-generation of credible evidence, and knowledge management. These investments will help avoid further loss of biodiversity and ecosystem services in global biodiversity hotspots, and enhance social development and transformation that is ecologically sustainable (as envisaged in South Africa's National Development Plan (NDP)) and contribute to the achievement of SDGs and the Aichi Targets.

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Acronyms

Acronym	Description
ACMEN	African Ministerial Conference on the Environment
ANCA	Advancing Natural Capital Accounting
APR/PIR	Annual Project Review/Project Implementation Reports
BBBEE	Broad-based Black Economic Empowerment
BIOFIN	Biodiversity Finance Initiative
BO CMA	Breede-Overberg Catchment Management Agency
BRIP	Berg River improvement plan
CARA	Conservation of Agriculture Resources Act
CBD	Convention on Biological Diversity
CCT	City of Cape Town
CEO	Chief Executive Officer
CER	Centre for Environmental Rights
CITES	Convention on International Trade in Endangered Species
CMA	Catchment Management Agency

CME	Compliance monitoring and enforcement
CMRA	Centre for Municipal Research and Advice
CMS	Catchment Management Strategy
CoGTA	Cooperative Governance and Traditional Affairs
CSIR	Council for Scientific and Industrial Research
CSO	Civil Society Organisation
CSP	Cities Support Programme
CWRR	Centre for Water Resources Research
DAFF	Department of Agriculture, Forestry and Fisheries
DBSA	Development Bank of Southern Africa
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Plan
DPW	Department of Public Works
DRDLR	Department of Rural Development and Land Reform
DST	Department of Science and Technology
DUCT	Duzi Umngeni Conservation Trust
DWA	Department of Water Affairs (now Water and Sanitation)
DWS	Department of Water and Sanitation
EI	Ecological Infrastructure
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPWP	Expanded Public Works Programme
FEPA	Freshwater Ecosystem Priority Areas
FETWater	Framework Programme for Research, Education and Training in the Water Sector
GDP	Gross Domestic Product
GEB	Global Environmental Benefits
GEF	Global Environment Facility
ha	Hectare
IAPs	Invasive alien plants
IAPS	Invasive alien plant species
IAS	Invasive alien species
IDP	Integrated Development Plan
IFC	International Finance Corporation
INR	Institute for Natural Resources
IWRM	Integrated water resource management
km	Kilometre
KSA	Key strategic area
KZN	KwaZulu-Natal
m	Metre
M&E	Monitoring and evaluation
m3	Cubic metre
MAR	Mean annual run-off
MEC	Members of Executive Councils
MPAH	Maputaland-Pondoland-Albany Hotspot
MTSF	Medium Term Strategic Framework
NAWASIA	National Water and Sanitation Infrastructure Agency
NBA	National Biodiversity Assessment
NBF	National Biodiversity Framework
NBI	National Business Initiative
NBSAP	National Biodiversity Strategy and Action Plan
NCA	Natural capital accounting
NCC	Natural Capital Coalition
NCD	Natural Capital Declaration
NDP	National Development Plan
NEMA	National Environmental Management Act
NEPAD	New Partnership for Africa's Development
NFEPA	National Freshwater Ecosystem Priority Areas
NGO	Non-governmental organisation
NPAES	National Protected Area Expansion Strategy
NRM	Natural resource management

NWA	National Water Act (Act 36 of 1998)
NWASS	National Water and Sanitation Strategy
NWRS	National Water Resource Strategy
NWRS2	National Water Resource Strategy 2
O&M	Operation and maintenance
PIF	Project Identification Form
PMU	Project management unit
PPG	Project Preparation Grant
PSC	Project Steering Committee
RCU	Regional Coordinating Unit
RQO	Resource Quality Objectives
RWU	Regional Water Utilities
SADC	South African Development Community
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SDG	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
SIP	Strategic Integrated Project
SIPs	Strategic Integrated Projects
SNA	System of National Accounts
SPLUMA	Spatial Planning and Land Use Management Act
STAP	Scientific and Technical Advisory Panel
Stats SA	Statistics South Africa
SWPN	Strategic Water Partners Network
SWSA	Strategic Water Source Area
TCTA	Trans Caledon Tunnel Authority
UEIP	Umgeni Ecological Infrastructure Programme
UKZN	University of KwaZulu-Natal
UN	United Nations
UNEP	United Nations Environment Programme
UNEPFI	United Nations Environment Programme Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
UWSS	uMngeni Water Supply System
WAVES	Wealth Accounting and the Valuation of Ecosystem Services
WC	Western Cape
WCWDM	Water conservation and water demand management
WCWSS	Western Cape Water Supply System
WESSA	Wildlife and Environment Society of South Africa
WG	Working group
WISA	Water Institute of Southern Africa
WMA	Water Management Area
WRC	Water Research Commission
WRIC	Water Resources Infrastructure Charge
WSA	Water Services Authorities
WSP	Water Service Providers
WTE	Water Trading Entity
WUA	Water User Association
WWF-SA	World Wide Fund for Nature South Africa
WWTW	Waste Water Treatment Works

Section 1 – Elaboration of the Narrative

Part I. Situation Analysis

1. Introduction

South Africa is considered one of the most biologically diverse countries in the world due to its species diversity and endemism as well as its diversity of ecosystems. Much of this biodiversity underpins the delivery of ecosystem services and enhances the resilience of natural systems, working landscapes and open spaces to support economic sectors and local livelihoods, even under future climatic conditions (DEA 2013:17).

Naturally functioning ecosystems that deliver valuable services to people (referred to as ecological infrastructure) play an important role in the delivery of services. Ecological infrastructure plays an especially crucial role in the delivery of water-related services such as water provisioning and purification, water flow regulation and disaster risk regulation amongst others. In a water scarce country such as South Africa and with full appreciation of the very real development needs of the country, South Africa's rich endowment of biodiversity assets and ecological infrastructure can support the country's development path in a range of ways (DEA 2014a). This is however possible only if these assets and infrastructure are effectively managed, invested in, and maintained, as is the case with other forms of infrastructure.

It is insufficient for the maintenance of naturally functioning ecosystems to be seen as the responsibility of conservation authorities and protected areas. The importance of ecological infrastructure in working landscapes and open spaces in contributing to service delivery, the economy and poverty alleviation necessitates that biodiversity and ecosystem services be integrated into all aspects of planning, decision-making and execution of development. This requires management, investment in and maintenance of ecological infrastructure in ways that also support social and economic development objectives.

An emerging focus on ecological infrastructure is helping unlock investment in South Africa's ecosystems, with multiple social, environmental and economic benefits (DEA 2014a). This new focus **emphasizes the value of ecological infrastructure in supplementing, sustaining and, in some cases,**

substituting for built (grey)[1] infrastructure. This is especially illustrated in the water value chain[2] where ecological infrastructure can quite directly support the delivery of water-related services and strengthen water security[3]. In the face of changing climatic conditions, achieving water security and meeting the SDG's related to water service delivery is a complex societal challenge and requires creative, collaborative and coordinated approaches involving the public, private and civil society sectors. It also requires novel, innovative ways of doing business beyond traditional approaches that have demonstrated their limits.

There is a gap between the rising demand and diminishing supply of access to clean affordable water in South Africa to meet SDGs and build resilience to climate change. There is also a gap of investment needed to address ecosystem management needs. To close these gaps it is necessary to create an enabling environment to better value natural capital and ecosystem services. This is also necessary to mobilise resources from private and public sector to promote water security whilst providing sustainable infrastructure responsive to the needs of ecosystems and people dependent on the services these ecosystems provide.

Investment in infrastructure in South Africa, and across much of Africa, is considered critical to economic growth, job creation and poverty alleviation. Yet South Africa is only investing half of the targeted 10% of GDP in infrastructure, further highlighting the need for alternative approaches to development. Engineering solutions alone are too costly and in some cases, technologically too demanding, to be the sole means of achieving the levels of development and service delivery required. The challenge, reinforced in global agreements such as the SDGs and the Paris Agreement, and South Africa's NDP, is to achieve the necessary levels of development and service delivery sustainably and in support of transitioning to a green, decarbonised economy. This requires working with the public and private sectors, including finance institutions, to internalise externalities and integrate the value of biodiversity and ecosystem services into decision-making at all levels in order to ensure positive development outcomes (UNEPFI 2016). This includes the policy environment, project level planning and risk assessment, and project finance - where responsibilities for externalities need to be allocated to the construction of infrastructure as well as ongoing operations, maintenance and monitoring. This project demonstrates how this can be done.

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[1] Built (or grey) infrastructure refers to *man-made or engineered systems* and other land features. In the context of storm water management for instance, grey infrastructure refers to the hard, engineered systems to capture and convey runoff, such as storm water drains, gutters, culverts, detention basins, and related systems. Green Infrastructure refers to the interconnected set of natural and man-made *ecological* systems, green spaces and other landscape features that provide services to society, such as flood attenuation, water and air filtration, and microclimate regulation, which can be used as an alternative, or partner to traditional infrastructure (Schaffer et al. 2013, Bobbins and Culwick 2015). It includes planted and indigenous trees, wetlands, parks, and green open spaces, as well as possible building and street-level design interventions that incorporate vegetation, such as green roofs. Green infrastructure is a more broadly inclusive term than ecological infrastructure, which refers explicitly to naturally functioning ecosystems that delivers services of benefit to people.

[2] The NWRS describes the **water value chain** as including protection and control of the use of raw water, the development and management of raw water infrastructure, including inter-basin transfers, raw water abstraction and treatment, bulk distribution and reticulation and wastewater and effluent collection and treatment, and its return back to the resource (DWS 2013).

[3] There are many definitions of **water security**. It is taken here to refer to "the reliable availability of an acceptable quantity and quality of water for health, livelihoods and production, coupled with an acceptable level of water-related risks" (Grey and Sadoff 2007).

The goal of this project is to demonstrate that **integrating biodiversity and ecosystem services into planning, finance and development in the water sector improves water security.** Improving water quality will increase opportunities to meet societal needs for water services in a more sustainable (equitable, efficient, effective) manner. Financed through the Global Environment Facility (GEF) Biodiversity Strategy programme 10 (Integration of biodiversity and ecosystem services into development and finance planning), the project objective is "**to develop policy and capacity incentives for mainstreaming biodiversity and ecosystem values into national, regional and local development policy and finance in the water sector, with application demonstrated in two catchments"**[4]. Focused on unlocking simultaneous biodiversity and water benefits from investments in water infrastructure, this project ensures alignment with national development priorities, seeks to ensure greater returns from those investments over the long term and seeks to address the pressures on biodiversity and ecosystem services from a key development sector.

In focusing on the water sector, this project also ensures further alignment with the priorities outlined in the National Water Resources Strategy (NWRS), established under the National Water Act (Act 36 of 1998; NWA) to provide the framework for the protection, use, development, conservation, management and control of water resources for the country as a whole. The second NWRS, covering the period 2013-2018), envisages water supporting development and the elimination of poverty and inequality, contributing to the economy and job creation, and being used sustainably and equitably. It also explicitly considers ecological and built infrastructure as mutually supportive elements of an integrated approach to managing water.

Infrastructure is considered a key enabler of economic growth, employment creation and poverty alleviation in South Africa. The challenge is to develop infrastructure in a sustainable way in support of transitioning to a green, decarbonised economy. This project therefore provides an opportunity to serve as a benchmark for integrating ecological infrastructure into built infrastructure financing and service delivery. It aims to find the levers to do this by addressing a number of enabling level barriers including in policies, plans, institutions and financing approaches. In terms of infrastructure financing, the project will develop and test innovative approaches that allocate a financial cost to the impacts and dependencies of built infrastructure on ecological infrastructure in project balance sheets, income statements and the credit decision-making processes of infrastructure delivery. This will address how ecological infrastructure is costed across the lifecycles of projects, through project preparation, project financing, implementation, operations and maintenance and will depend on the types of finance used (e.g. public sector allocations, grants, including donor funding, private loan or equity finance).

[4] Incentives are understood broadly to mean interventions that encourage a shift or change towards mainstreaming biodiversity and ecosystem values. The value of something is, in environmental economics, taken to mean the worth of something (Natural Capital Protocol; NCC undated: p3). This is not in terms of financial value alone, but more broadly in terms of the relative importance, worth or usefulness to people in a particular context (for example water security). Development policy and finance refers to "development and finance policy and land-use planning and decision-making" as per the GEF Outcome 10.1 and is understood to mean institutional mechanisms that impact on the management of water and land.

This project will also implement interventions in two sets of river basins, commonly referred to as catchments in South Africa,[5] in order to strengthen water security at regional and local levels. The first group of catchments is the Berg-Breede system in the Western Cape Province and second is the Greater uMngeni system in KwaZulu-Natal Province. These are hereafter referred to as the demonstration catchments. The sections that follow will address the broader context as well as the catchment level context of biodiversity, water and socio-economic conditions in the demonstration catchments.

2. Biodiversity and water context

Biodiversity is the variety of genes, species, and ecosystems on Earth. It is important not simply for its own sake but also because it a central element of natural capital[6], including ecological infrastructure, on which human wellbeing depends (Driver *et al*. 2012). Ecological infrastructure refers to naturally functioning ecosystems that deliver valuable services to people.

Traditionally one thinks of infrastructure as built or engineered substructure or underlying foundation (such as roads, dams, railway, pipelines, pylons or water treatment plants) on which growth and development of a community or state depends. However, naturally functioning ecosystems also provide a substructure or foundation upon which the growth and continued functioning of society depends (Driver *et al*. 2012). Components of biodiversity in the form of ecological infrastructure therefore provide beneficial services to people and can be thought of as the nature-based equivalent of built infrastructure.

Water-related ecological infrastructure includes, for instance, healthy mountain catchments, grasslands, rivers, and wetlands, connected by nodes and corridors of natural habitat, that together deliver a range of water-related ecosystem services such as water provisioning, flood risk reduction, improved water quality, increased base flow in dry season (assurance of water supply), or reduced sediment load in rivers. The delivery of these ecosystem services results in benefits to human well-being, such as improved water security, decreased exposure to natural disasters such as floods, and improved livelihood security. Additionally, the quantity and quality of freshwater flowing into estuaries is an important driver of the condition of estuarine ecosystems, and thereby their ability to provide ecosystem services. Thus, addressing upstream ecosystems has potential knock-on benefits for estuaries and coastal ecosystems with benefits to coastal and fishing communities and economies. Naturally functioning ecosystems can also help to reduce climate vulnerability and increase resilience and adaptive capacity of people, particularly in rural and peri-urban settlements (DEA 2014a).

If ecological infrastructure is degraded or lost, however, the flow of ecosystem services will diminish. While ecosystems can recover from a certain amount of degradation, once an ecosystem is damaged beyond repair, its social and economic benefits are also likely to be lost. The interconnections between naturally functioning ecosystems and socio-economic growth, development and human well-being are not always well understood or recognised. This lack of understanding extends from the dependencies of socio-economic growth and development on naturally-functioning ecosystems,

[5] A separate report covers the criteria and process used to select these catchments.

[6] Natural capital is another term for the stock of renewable and non-renewable natural resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people (NCC undated). It is not be confused with 'ecological infrastructure' as natural capital includes abiotic resources such as air and minerals.

on one hand, to the impacts of development activities on biodiversity and ecosystem services on the other. These complexities, dependencies and externalities are even less well integrated into planning, finance or development decisions.

Figure 1 illustrates the connections between ecological infrastructure and built infrastructure in the water supply and use chain from upper catchments to the ocean. In this context, improving water security means viewing water security broadly as being influenced by both the built infrastructure (that supports bulk water infrastructure and water distribution infrastructure) and by the ecological infrastructure[7]. As the nature-based equivalent of built infrastructure, ecological infrastructure has the potential to supplement, sustain and, in some cases, substitute for built infrastructure solutions for water resource management (Dini *et al*. 2015). Additionally, choosing to utilize ecosystems to provide water-related services to people also generates a range of other benefits that extend beyond the water sector, such as contributing to food security, the creation of long-term green jobs, resilience to climate change and biodiversity conservation (Dini *et al*. 2015).

The Department of Water and Sanitation (DWS) and the Department of Environmental Affairs (DEA) have a shared mandate for freshwater biodiversity. The policy and legislation relevant to this shared mandate are described in Annexure A. The sections that follow detail the biodiversity, water and socio-economic context in South Africa and in the demonstration catchments.

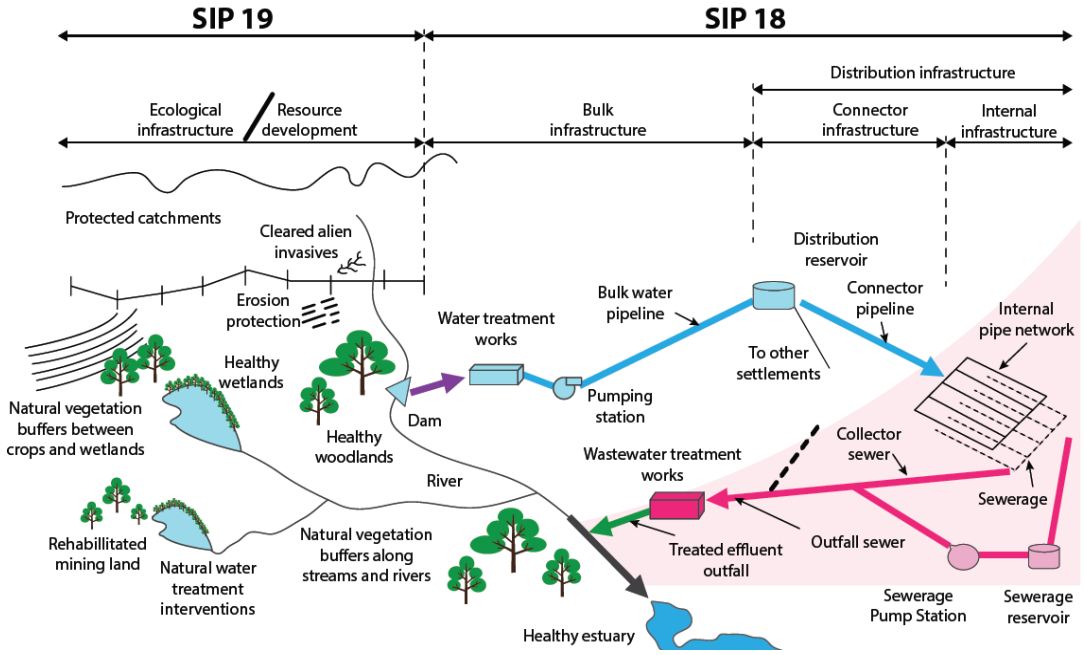

Figure 1. Illustration of how a potential Strategic Integrated Project (SIP) 19: "Ecological Infrastructure for Water Security" complements SIP 18: "Water and sanitation infrastructure in addressing water security" (DEA 2014a)

2.1. Global and national biodiversity context

South Africa is one of the world's 17 megadiverse countries due to its high species diversity and endemism. Occupying only 1% of the planet's land area, South Africa is home to over 95 000 known

[7] Ecological infrastructure is "Naturally functioning ecosystems that generate or deliver valuable services to people. It is the nature-based equivalent of built infrastructure, and is just as important for providing services and underpinning economic development" (SANBI 2016).

species, contributing a significant proportion to world plant species (6%), reptile species (5%), bird species (8%) and mammal species (6%), with more species regularly discovered and described and many of which are found only in South Africa (DEA, 2014b). Three of the world's 34 globally recognized biodiversity hotspots are found in South Africa, namely the Cape Floristic Region, the Succulent Karoo and the Maputaland-Pondoland-Albany hotspots.

With climatic, altitudinal, topographical and geological variety contributing to high alpha, beta and gamma[8] diversity, South Africa hosts a range of habitats, ecosystems and landscapes, which are grouped into biomes based on shared ecological and climatic characteristics. South Africa has nine biomes, ranging from Desert and Grassland to Forest (Figure 2). The demonstration catchments selected fall across five of the nine biomes (described below).

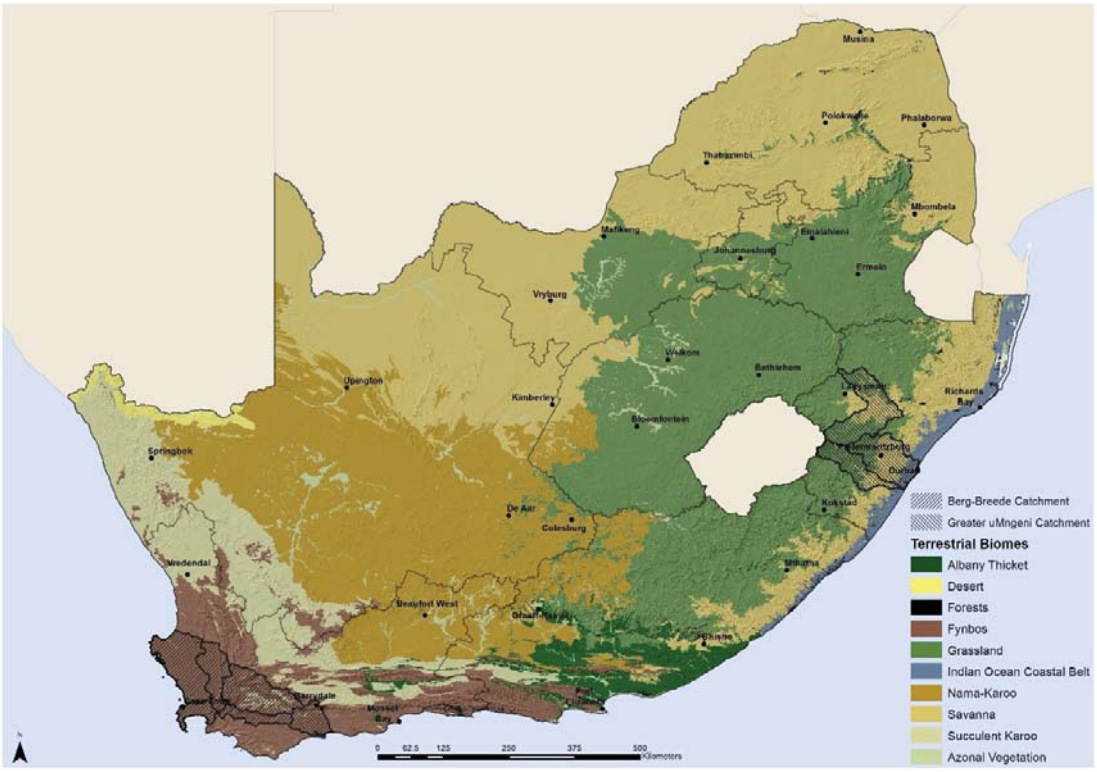

Figure 2. Biomes of South Africa overlaid with the Berg-Breede and Greater uMngeni demonstration catchments

In terms of freshwater biodiversity, South Africa has 223 different types of river ecosystems and 792 different types of wetlands ecosystems (Driver *et al*. 2012). These represent a huge diversity in physical conditions – from the seasonally flooded pans of the southern Kalahari Desert to the perennial wetlands of the Natal Coastal Plain, and the short isolated catchments of the southern coastal belt (illustrated in Figure 2) to the vast drainage basins of the Orange and Limpopo rivers. Two-thirds of South Africa's water resources are shared with six neighbouring countries. South Africa's freshwater ecosystems have been mapped and classified, and Freshwater Ecosystem Priority

[8] Refer to different spatial levels of biodiversity in ecosystems (Whittaker 1972). Alpha diversity is the diversity within a particular area or ecosystem and is usually expressed by number of species. Beta diversity represents the diversity between areas or ecosystems. Gamma diversity is the overall diversity of ecosystems within a region.

Areas (FEPAs) have been identified as part of the National Freshwater Ecosystem Priority Areas project (NFEPAs) (Nel *et al*. 2011). Given the increasing pressure these ecosystems face, the biodiversity they hold, and the potential ecosystem services they provide, the NFEPAs are the priority rivers and wetlands that need to be kept in a good ecological condition in order to support the sustainability of the entire network of freshwater ecosystems.

The NFEPA project also identified Strategic Water Source Areas (SWSAs)[9] which are areas of the country that have disproportionately high levels of mean annual run-off (MAR)[10] and thus support a large proportion of the country's water supply. (WWF 2013). These areas are indicated in shades of blue in Figure 3. The darker shades represent the areas with highest mean annual runoff. SWSAs cover only 8% of the collective surface area of South Africa and neighbouring countries Lesotho and Swaziland (with whom South Africa shares several river basins), yet contribute 50% of the mean annual runoff of these three countries. These areas are therefore crucial ecological infrastructure for South Africa's water security. Given their strategic importance for water security, formal protection and management of these areas should be essential, but currently only 18% of the SWSAs have any formal protection (WWF 2013). Because rivers are linear ecosystems and are impacted on by land uses and activities throughout their catchments, protected areas alone will seldom do the full job of protecting river ecosystems. This highlights the importance of integrated water resource management tools provided by the NWA, including the ecological reserve, classification of water resources into management classes, and resource quality objectives (RQOs), which contribute to the protection of freshwater ecosystems.

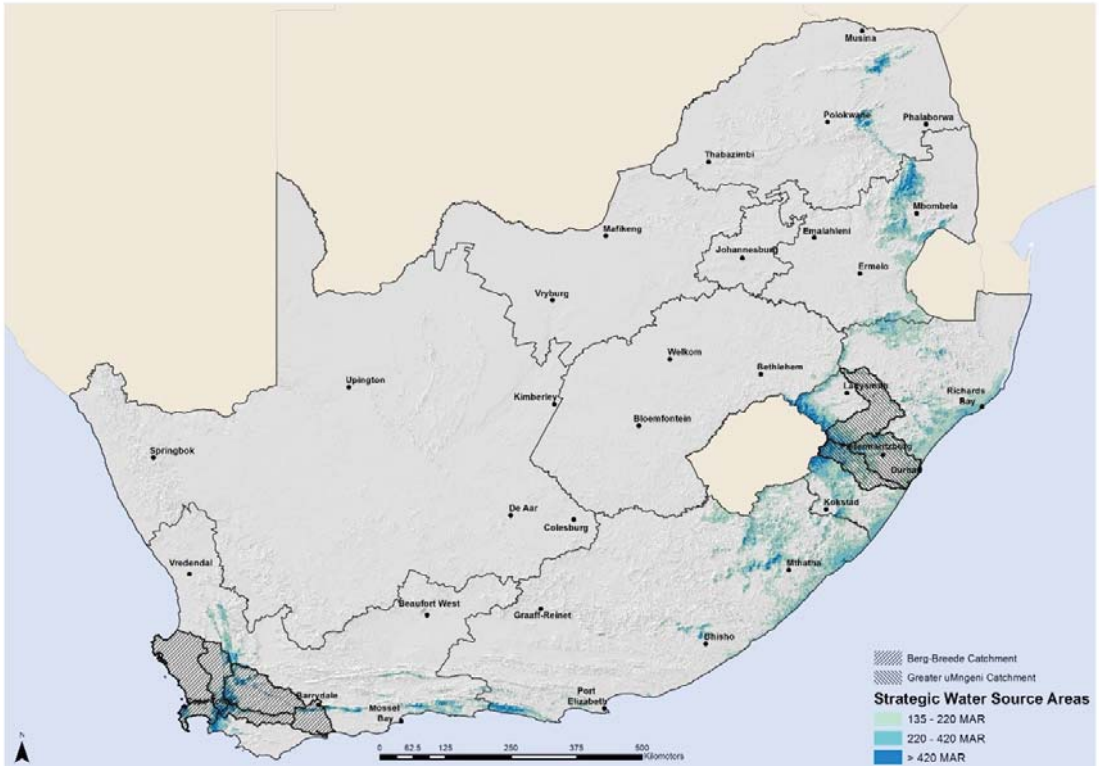

Figure 3. South Africa's Strategic Water Source Areas overlaid with the Berg-Breede and Greater uMngeni demonstration catchments

[9] Initially called "high water yield areas".

[10] A project is currently underway to identify of subset of these areas which are critical for South Africa's water security.

Figure 3 also shows the two demonstration catchments, which extend over several SWSAs. The following section describes the demonstration catchments biodiversity context, including SWSAs. The water management and socio-economic context of the catchments is covered in section 2.2.5.

2.1.1. Biodiversity context of the Berg-Breede demonstration catchments

The Berg-Breede system lies predominantly in the Fynbos Biome, home to the Cape Floristic Region global biodiversity hotspot and one of the world's six floral kingdoms. The Fynbos biome covers nearly 90 000 km^2 and supports 9 600 recorded plant species, 70% of them found nowhere else on the planet. The biome has a number of critically endangered ecosystems (Figure 4) and the highest number of critically endangered taxa in South Africa, which relates to why the biome is a global biodiversity hotspot. In the Berg-Breede demonstration catchments 9.7% of its area is critical biodiversity area and as little as 15% of the critically endangered ecosystems remain in natural or near-natural condition. Threatened species that occur in the area include 8 critically endangered butterflies and the critically endangered Geometric tortoise (*Psammobates geometricus*), 6 endangered butterflies and critically endangered Leatherback Turtle (*Dermochelys coriacea*). Wetlands make up 3.6% of the demonstration catchments, 53.7% of which are FEPAs that should stay in good ecological condition to support sustainable use of water resources as well as conservation goals. 15% of the river length in the Berg-Breede demonstration catchments have been identified as FEPAs. As much of 20% of the biome has been formally protected and the biome contains the Cape Floral Region Protected Areas World Heritage Site (shown in brown in Figure 4). Comparing this Figure with Figure 5, it is evident that the World Heritage Site area overlaps with SWSAs in the demonstration catchment.

A small area of the Berg-Breede system lies in the Succulent Karoo biome, also a global biodiversity hotspot. Covering almost 84 000 km^2 this biome is home to over 6 000 plant species, of which 40% are endemic. Succulents make up 29% of all plant species in the biome, which supports the richest succulent flora on Earth. In addition to the rich plant life, this area is also a centre of diversity for reptiles and various invertebrate groups, and supports a variety of mammals and many of South Africa's endemic birds.

The Berg-Breede system extends across four SWSAs, namely the Grootwinterhoek, Table Mountain, the Boland Mountains, and the Langeberg (Figure 5). The Grootwinterhoek in the Cederberg is the source of the Doring River, the longest (200km) free-flowing river in the Western Cape, and is relatively well protected (protected areas include Grootwinterhoek Wilderness Area and Cederberg Wilderness Area (WWF 2013)). The importance of clean water from naturally functioning ecosystems for people reliant on natural resources is illustrated in Figure 6.

The area is well known for some of the country's greatest San rock art, and is home to the Cape mountain leopard, and a variety of freshwater fish. The Langebaan and Verlorenvlei Ramsar sites occur downstream. The Boland Mountains are the main water source area for the City of Cape Town and surrounds. Originating in the Boland Mountains, the Breede River is the largest river in the Western Cape and is a key resource for many economic activities in the region. This area is also South Africa's frog hotspot with the most frog species, including mossy, marsh and the micro frog (WWF, 2013). Protected areas include Jonkershoek Nature Reserve and the Hottentots Holland Nature Reserve. The Langeberg Mountains form part of the Cape Fold mountain belt, and water inside these mountains flows to a depth of several thousand metres underground where it heats up and returns to the surface as hot springs – found at Calitzdorp, Montagu and Warmwaterberg. De Hoop Vlei Ramsar Site is found in the Langeberg Mountains, as are Boosmansbos Wilderness Area; Bontebok National Park and the Grootvadersbosch Nature Reserve protected areas. (WWF 2013).

These mountains were also home to the Khoi and San people, evident from the rock art that has been left behind.

The lower Berg floodplain and estuary is an Important Bird Area and is South Africa's second most important estuary for conservation of estuarine birds, fish, invertebrates and vegetation. Winter flooding of the Berg River inundates 5 500 ha of floodplain, which supports at least 127 species of water birds (85 observed regularly, 31 of regional significance, 25 of national importance and 5 listed as red data species). Migratory birds from Europe and northern Asia use the floodplain as feeding grounds during summer. Lack of flushing during floods gradually results in increased salinity levels in floodplain soils. The South Africa's River Health Program rated the Berg river condition as fair to poor, as did the Estuaries health status report (SANBI 2011).

The estimated total economic value of the Cape Floristic Region's biodiversity, including vital ecosystem services such as water purification and erosion control, is over R10 billion per year, which is the equivalent of over 10% of the Western Cape's Gross Geographic Product (CAPE 2011). These services benefit many people.

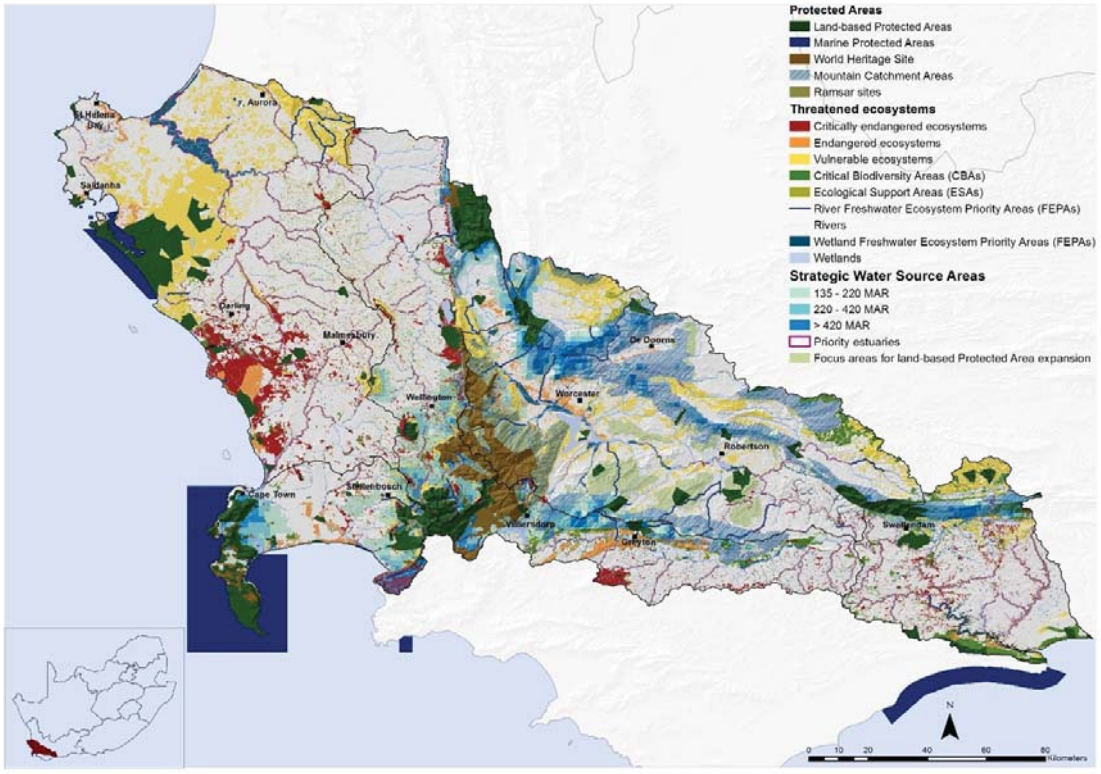

Figure 4. Biodiversity priority areas and protected areas in the Berg Breede demonstration catchment

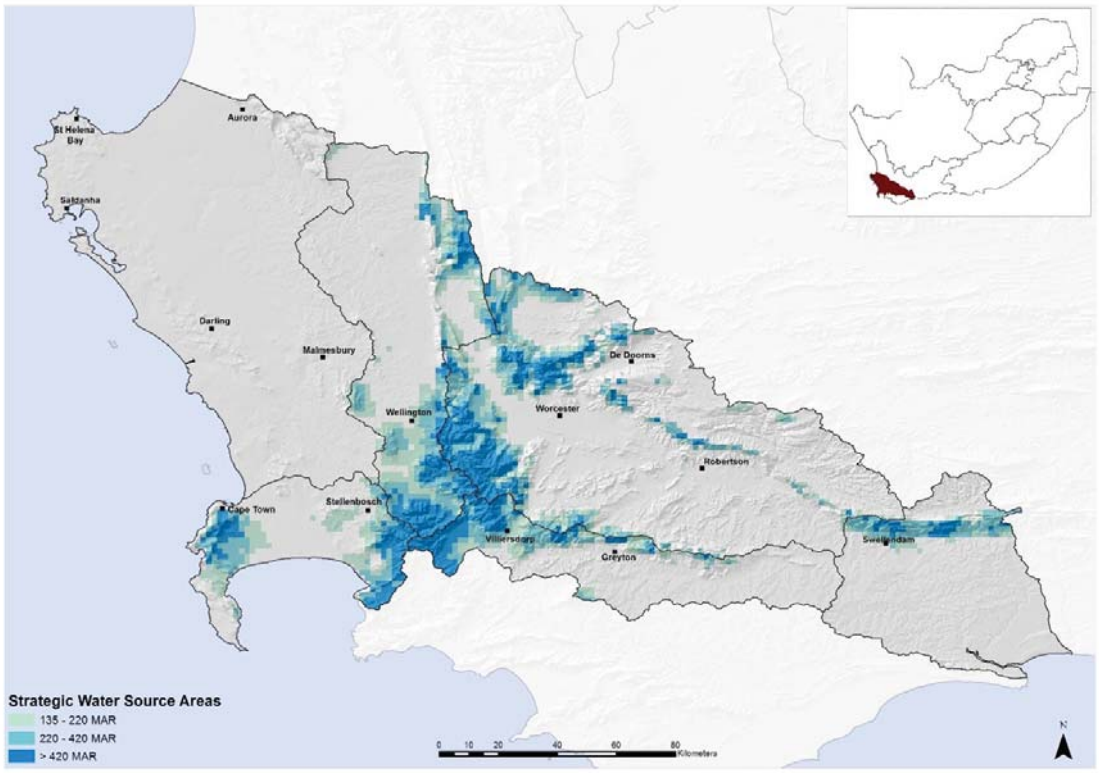

Figure 5. Strategic Water Source Areas in the Berg Breede demonstration catchment

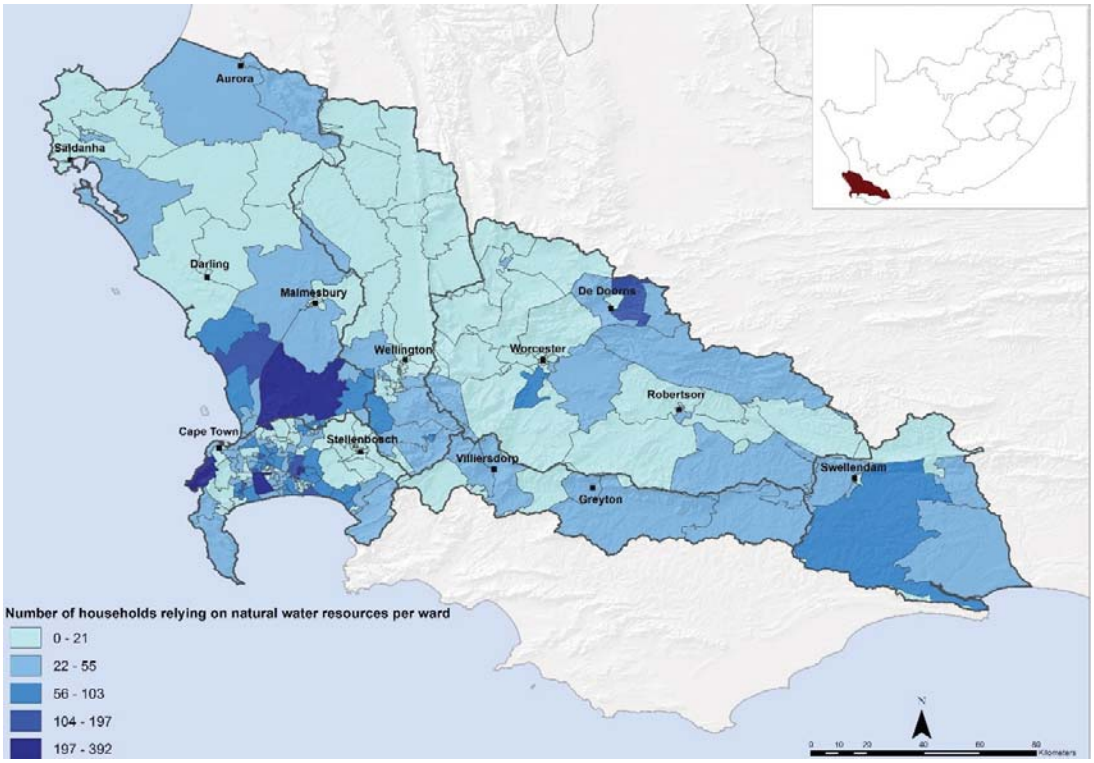

Figure 6. Number of households relying on natural water resources per ward in the Berg Breede demonstration catchment

2.1.2. Biodiversity context of the Greater uMngeni demonstration catchments context

The Greater uMngeni system lies predominantly in the Grasslands biome, which is the second largest biome in South Africa, occupying 29% of the country's land territory. The biome is a repository of globally significant biodiversity, constituting, in particular, a rich storehouse of floristic, avian and invertebrate diversity. In common with other temperate grasslands across the globe, South Africa's grasslands are threatened by high of habitat conversion to other land uses, particularly in KwaZulu-Natal. 30% of the area has already been irreversibly transformed by anthropogenic activities and only 2% is formally conserved in protected areas. The combination of high species diversity and endemism and high threat of biodiversity loss is why the area falls into one of the global biodiversity hotspots, the Maputa-Pondoland-Albany global biodiversity hotspot.

The Greater uMngeni demonstration catchments contain two Ramsar sites, one World Heritage Site, two Protected Environments and numerous Nature Reserves and Forest Wilderness Areas (Figure 7). The World Heritage Site is recognised for its exceptional natural beauty and the diversity of habitats protecting a high level of endemic and globally important plants and other species such as the endangered Cape vulture (*Gyps coprotheres*) and the bearded vulture (*Gypaetus barbatus*). The area also contains many caves and rock-shelters with the largest and most concentrated group of rock paintings in Africa south of the Sahara, painted by San people who lived in the area over a period of 4,000 years. In the Greater uMngeni demonstration catchments 26.8% of its area is critical biodiversity area and only 45% of the critically endangered ecosystems remain in natural or near-natural condition. Threatened species that occur in the area include the critically endangered Durban Dwarf Burrowing Skink (*Scelotes inornatus*), 3 endangered butterflies and endangered Guenther's Dwarf Burrowing Skink (*Scelotes guenther*i). Wetlands make up 2.9% of the demonstration catchments, and 51.8% of those wetlands are FEPAs. As much as 33% of the river length in the Greater uMngeni demonstration catchments have been identified as FEPAs that should stay in good ecological condition to support sustainable use of water resources as well as conservation goals.

The Greater uMngeni system includes the Southern Drakensberg SWSA and borders on the Northern Drakensberg SWSA (Figure 8). The Southern Drakensberg SWSA includes the three highest mountains in South Africa, namely Mafadi, Njesuthi and Champagne Castle. The SWSA is home to country's newest Ramsar site, the uMngeni Vlei, and is the source of the longest free-flowing river[11] in South Africa, the Mkomazi (WWF 2013). The Mtamvuna, Mzimkhulu and Nsonge are other free-flowing rivers sound found in this area (WWF 2013). The importance of clean water from naturally functioning ecosystems for people reliant on natural resources is illustrated in
Figure 9.

[11] A free-flowing river is a long stretch of river that has not been dammed, flowing undisturbed from its source to the confluence with another large river or to the sea (Nel *et al* 2011). Free-flowing rivers are rare in South Africa.

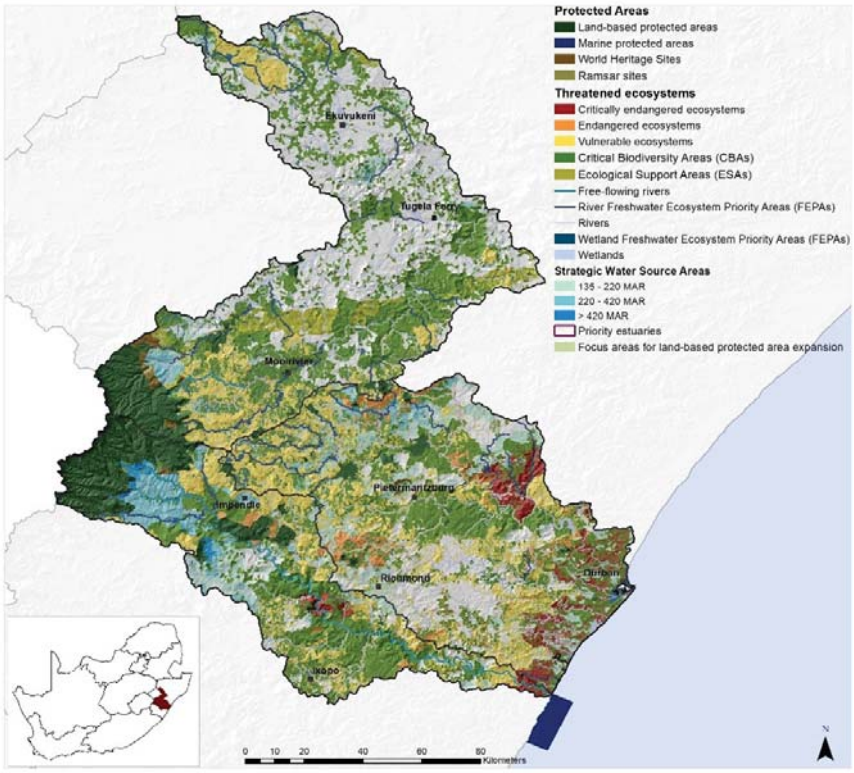

Figure 7. Biodiversity priority area and protected areas in the Greater uMngeni system

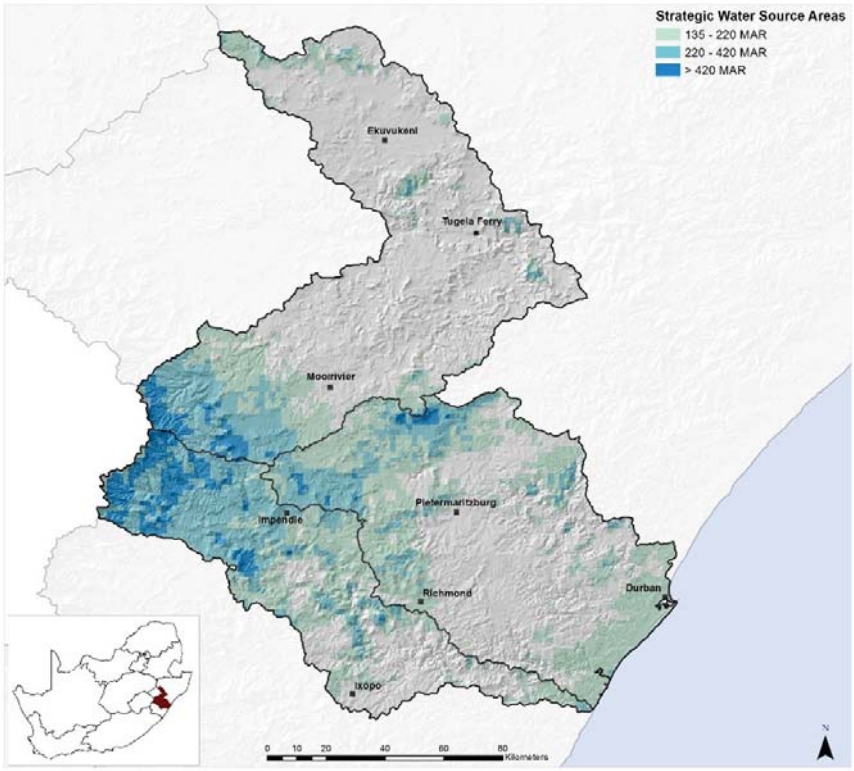

Figure 8. Strategic Water Source Areas in the Greater uMngeni system

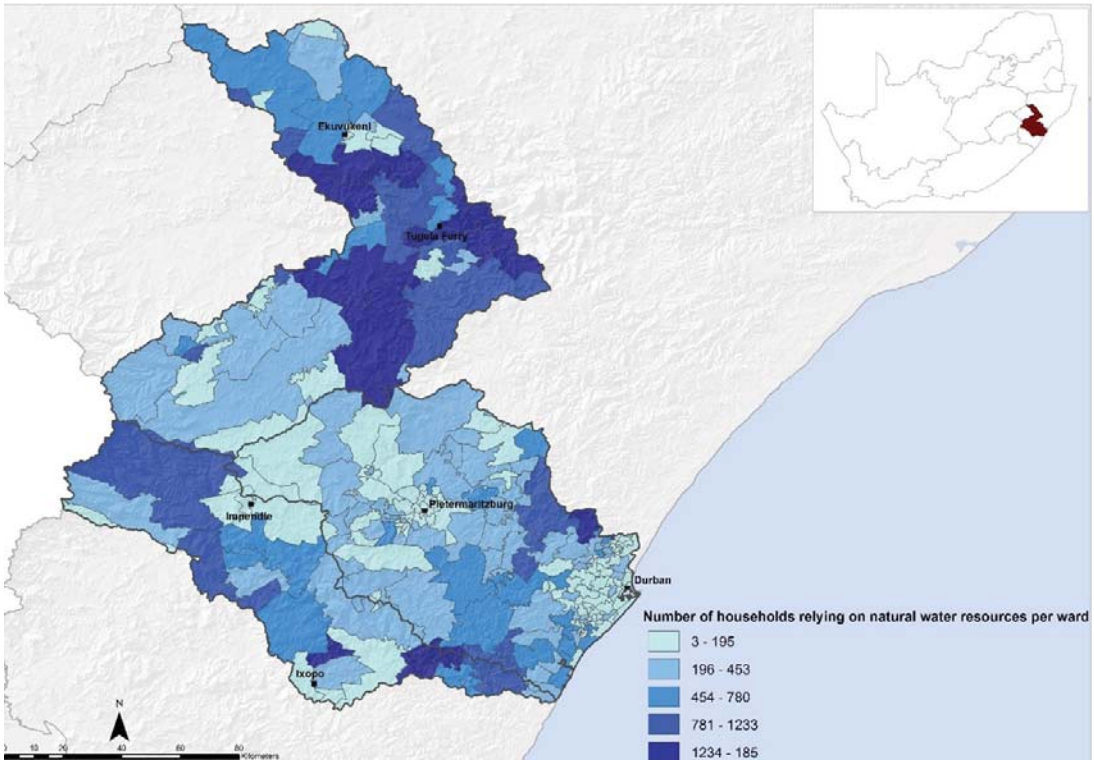

Figure 9. Number of households relying on natural water resources per ward in the Greater uMngeni system

2.2. Water and socio-economic context in South Africa

As a water scarce country in which available surface water yields are approaching full utilization, security of supply in South Africa is a growing concern and water quality is declining (DWS 2013c). This is compounded by extreme spatial and temporal variability of rainfall and streamflow, and rapid rates of evaporation from the surface of reservoirs. Home to approximately 55 million people, water demand is particularly high in three provinces, namely Gauteng, KwaZulu-Natal and the Western Cape, which make up more than two thirds of the national domestic product and are home to the majority of the population (24% in Gauteng and 20% in KwaZulu-Natal). The bulk of the value added by the agriculture, forestry and fishing industry in South Africa stems from KwaZulu-Natal (27%) and the Western Cape (23%).

As already illustrated by the map of SWSAs (Figure 3) water resources are unevenly distributed in South Africa with 50% of river flow draining from only 8% of the land. This uneven spread of water resources is not aligned with the major demand centres and so a complex network of large inter-basin transfers exist between water management areas[12]. Two thirds of the country's mean annual runoff is stored in large dams (DWA 2013b).

[12] The geographical region of South Africa, Lesotho and Swaziland has been divided up by the Department of Water and Sanitation (DWS) into a 4-level hierarchical system of catchments, consisting of Primary Catchments containing nested, Secondary, Tertiary and Quaternary level catchments. South Africa's first NWRS established 19 water management areas (WMAs) which would be linked to 19 Catchment Management Agencies responsible for water resource management in the WMA. Only 2 of the 19 CMAs became operational. Since

Increasingly, water resources within South Africa are under pressure (DWA 2013a). These pressures are multiple and include resource directed issues that include increasing water use demands, climate uncertainties and disasters, as well as declining resource quality that incorporates water quality as well as terrestrial and aquatic habitat quality. In addition, there are a range of governance related challenges that serve to further threaten the water security that is required to support the social development and transformation as outlined in the NDP (National Planning Commission 2012).

After many years of developing the water resource, most of the economically available water yield has been developed and the NWRS (Edition 2) notes that opportunities for developing new dams are relatively few when compared to the demand (DWS 2013b). The NWRS further indicates that the majority of the water management areas have water deficits in that the water requirements exceed the available resources, despite the significant transfer of water between catchments (DWS 2013b). In addition, it is estimated that invasive alien plants reduce the available yield of the country's catchments by 3.5% per year. With few economically-viable options to significantly increase supply, there is therefore a growing recognition of the need to make better use of what we have, through increasing the focus on a suite of measures that improve efficiencies in use, reduce losses from aging built infrastructure and improve regulation.

Additionally, past policies within the country has resulted in an extremely unequal society and as a result the economy of the country still struggles with the challenges of ensuring improved livelihoods and social development whilst guiding the national economy within complex global economic circumstances. There are very significant rural and urban divides with some 40% of the population residing within rural contexts, where approximately 78% of the rural population are described as chronically poor. Supply of water is already a significant concern in service delivery protests in South Africa (Runciman 2013; Water Wheel 2013), and is therefore an important social stability issue. As the National Planning Commission warned in 2011, South Africa has to pay urgent attention to management of water resources or risk having its development slowed (NPC 2011).

The NWRS2 notes the centrality of water in terms of supporting the development of many economic sectors (DWA, 2013a). Water can catalyse or constrain growth within these sectors. Inter-sectoral engagement in terms of developmental, operational, managerial, planning and regulatory aspects becomes increasingly important as resources become more limited (Grey and Sadoff 2007). Water resources infrastructure is then understood as an important element of South Africa's social and economic infrastructure. This has been further emphasised by the economic consequences of the drought and water restrictions that have been experienced in different parts of the country over the last few years. Predictions related to climate change and South Africa's already variable rainfall highlight that actions to ensure sustainability of water resources and infrastructure are critical. The growing demand for water coupled with uncertainties related to climate change is likely to have marked negative effects on social, economic and environmental spheres.

The NDP provides an important blueprint for an array of interventions to support the socio-economic development of the country. Most sectors have developed strategies that support the NDP by ensuring these strategies support development, deepen democracy and build a more inclusive society. From the water sector perspective, the NWRS is very clearly developed with the

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then, the 19 WMAs were consolidated into 9 WMAs, the boundaries of which take into account catchment and aquifer boundaries, financial viability, stakeholder participation and equity. These are not aligned with provincial or local government boundaries. (NWRS2 - https://www.dwa.gov.za/nwrs/LinkClick.aspx?fileticket=xQF4Z9OaFvM%3D&tabid=72&mid=435)

understanding that water resources need to be carefully managed and developed in order to support continued socio-economic development. Further, DWS is in the process of developing a National Water Security Plan in order to ensure an integrated and balanced approach to ensuring the country's water security, including consideration of the role of water in the SDGs.

South Africa has a relatively good core network of built water infrastructure. The challenge is to maintain and expand it to enable further economic growth and development. The country needs to make large investments to promote and support economic activity. There have however been challenges in ensuring that the much-needed investments are well conceived, are initiated timeously, and are well structured. As a result, there is recognition that greater use of public-private financing is likely to foster better decision-making and improved spending discipline, resulting in more rigorous assessment, shareholder accountability and reporting.

Built infrastructure, such as dams, water treatment plants and inter-basin transfers, remains essential for addressing these challenges. However built infrastructure has its limits, particularly in the illustrated in the water value chain where ecological infrastructure can quite directly support the delivery of water-related services and strengthen water security, and especially in the face of changing climatic conditions. There is a growing recognition of the role of ecological infrastructure in supplementing, sustaining and, in some cases, substituting for built infrastructure solutions for water resource management. Water security is improved through ecological infrastructure that provides, for instance, services that improve assurance of supply over time, reduce costs associated with clean water, ameliorate hazards that pose risks to people, livelihoods or built infrastructure.

The next section sets out the current policy and institutional context for water resource management, and then the current context for infrastructure development and investment in South Africa, with a focus on the water sector. Current options available for infrastructure finance are noted as well as the current approach to national accounting which is used as a tool to inform development and investment decision-making. Thereafter an overview of the water security and infrastructure situation in the demonstration catchments is described.

2.2.1. Water policy, institutions, planning and regulations

The NWA (Act 36 of 1998)[13] and the Water Services Act (Act 108 of 1997) provide the institutional framework for water resource management and water services delivery. A subsidiary instrument enabled by the NWA, the NWRS has the goal to ensure that "water is efficiently and effectively managed for equitable and sustainable growth and development" (DWA 2013a). Despite having some of the most progressive water legislation in the world, targeted initiatives that lay out clear plans, and timelines for the implementation of the various institutional and systemic changes, the water sector in South Africa is still struggling to realise integrated water resource management (IWRM) in practice.

Shifts in the overarching national policy frameworks have resulted in the need to amend operational approaches, systems and implementation plans. For example, the NWA entrenched the concept of

[13] The NWA fundamentally changed the ownership and management of water, from water rights vested in the ownership of land under apartheid, to recognizing water as a basic right and a natural resource under the trusteeship of the national government. Priorities for socio-economic redress, service delivery and devolved management set in motion a reconfiguration of the institutional landscape linked to water resource and water service management and delivery. In support of this, the NWA provides for the transformation of the water sector through the establishment and transformation of institutions that would support DWS in its mandate to protect, use, develop, control, manage and conserve the country's water resources.

IWRM. Whilst still seen as a key philosophy there is an understanding that giving effect to this is complex and resource intensive. In particular, IWRM is difficult to implement within a developing state context where capacity and resources are limited. The NWRS (edition 1) provided the blueprint for implementing IWRM (DWA 2004).

DWS's Institutional Reform and Realignment process (in 2010) aimed to clarify institutional roles, responsibilities and accountability within the water value chain towards a separation in policy making, implementation and regulatory functions. It also sought to rationalise and align institutions in order to improve delivery, good governance, economies of scale, financial viability, transparency and accountability. The result is an institutional framework for the water sector that is simple, clear and pragmatic and which will be progressively implemented (DWA, 2013b). This is detailed in AnnexureA2.

The NDP and the NWRS (edition 2) highlights the importance of establishing Catchment Management Agencies (CMAs), as provided for in the NWA. These CMAs operate at the scale of water management areas (illustrated in Figure 10) and whilst having water resource management responsibilities that are underpinned by the NWA and delegated powers and duties, their strategic intent for the management of water resources needs to be captured within their Catchment Management Strategy (CMS). CMAs have a key coordination function as provided in the initial functions outlined in Section 81 of the NWA and this role is seen as imperative in giving effect to cooperative governance. Clearly land use activities have a significant impact upon water resources but these mandates are the responsibility of other institutions and agencies, and hence the role of CMAs in fostering cooperative government becomes critical (see section 2.2.2.1 on institutions at the water and land-use interface).

However, there are very real and significant challenges. The establishment of the CMAs has been an extended process. There are real concerns as to the necessary capacity, resources and systems for CMAs to effectively function. There has also been a lack of clarity on specific mandates, powers and duties for CMAs, especially pertaining to their role in managing freshwater ecosystems and encouraging sound land use practice by all water users that could impact on the resource. This is also exacerbated by the DWS undertaking a restructuring process that will influence the understanding of the roles of DWS and CMAs, and the transition between the two.

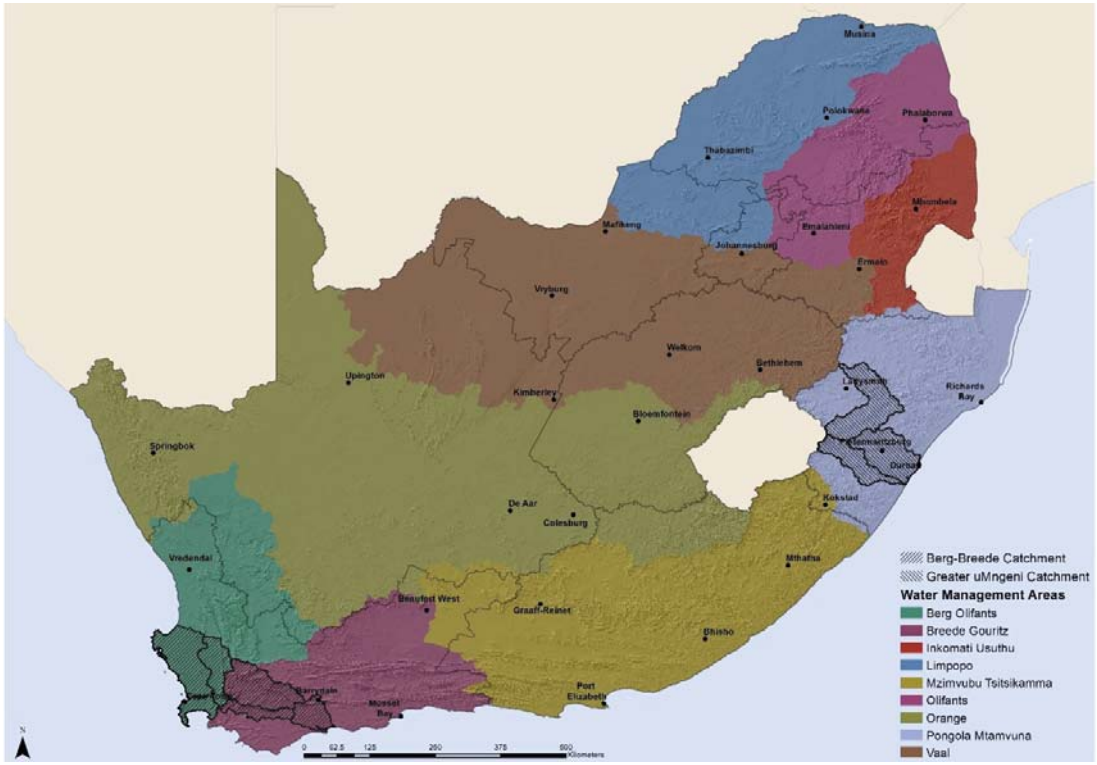

Figure 10. Water management areas in South Africa for which Catchment Management Agencies are established, overlaid by the Berg-Breede and Greater uMngeni demonstration catchments

Fundamentally important is the fact that only a CMA can develop a CMS. Key line functions are now realizing that they cannot give effect to many aspects of water resource management without the CMS. This is having consequences in terms of how effectively South Africa manages its limited resources. So for example, the allocation of water use needs to be captured in the water allocation plan of the CMS and this guides the water use authorization process. Likewise, interventions to realise RQOs and the implementation of the Ecological Reserve also need to be outlined within the CMS. The roles and responsibilities of various stakeholders and role-players in supporting these various interventions and the attainment of water resource management objectives will be a central theme to the CMS and will be an important departure point for improved approaches to water resource management.

It is envisaged that revised formal delegations of certain mandates, powers and duties will still occur in 2016, but even then, significant effort will be required to understand what these mandates mean in practice. In particular, although the draft Water Pricing Strategy provides CMAs with the power to levy users for the costs of rehabilitating ecosystems with demonstrable water benefits, this has not yet been done anywhere beyond calculations for invasive plant control. Likewise the Waste Discharge Charge System is yet to be implemented despite the fact that the system has been designed. A range of issues need to be addressed before this system goes live.

Compliance monitoring and enforcement (CME) is similarly constrained. Although CME posts have been on budget for a number of years in DWS, these posts have not been filled, and only limited training done to date.

2.2.1.1. Institutions at the water and land-use interface

In South Africa, the imperative for cooperation within government is explicitly articulated in the Constitution. The system of intergovernmental relations established by the 1996 Constitution

represents a marked divergence from the centralised structure of the previous dispensation. This approach entailed the creation of three "distinctive, interdependent and interrelated" spheres of government to which were assigned various roles, powers and functions. The Constitution sets out the prescripts and principles for what it terms "cooperative government", requiring that all spheres of government function as a unified whole (Dini 2008).

Of relevance in exploring the potential for biodiversity and ecosystem services to improve water security, are the institutions at the water and land-use interface. Where the water sector is led by DWS as a national competency, supported by a number of national public entities and local government, the management of land and its interface with the water sector is far more complex with concurrent national and provincial competencies (Figure 11).

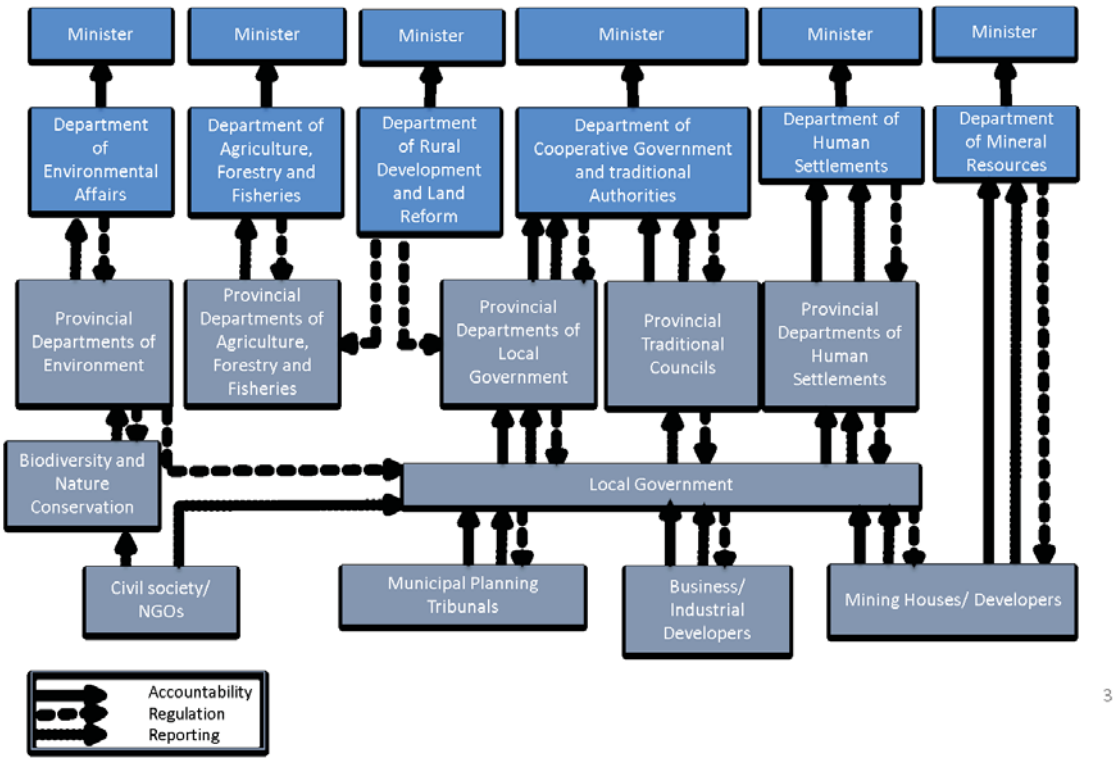

Figure 11: Institutions engaged in management and regulation of land use

Provincial government and local government are central to matters of land use planning and regulation, with Spatial Land Use and Management Act (SPLUMA) (Act 16 of 2013) providing the basis for spatial development planning. SPLUMA highlights the importance of provincial departments in providing legislative and policy guidance as well as integrated authorisations (see Schedule 1 of the SPLUMA) and local government in terms of ensuring coordinated planning and regulation at municipal levels. Coordinated, seamless planning across land and water thus requires alignment of the NWRS and Catchment Management Strategies (developed within the water sector) with the array of planning instruments and institutions described above, as well as with other instruments important to socio-economic development of regions, such the Provincial Growth and Development Strategies and the municipal Integrated Development Plans (IDPs).

Across these different sectors, the importance of the "competent authority" for environmental impact regulation is central to land use management. The provincial Member of the Executive Council (MEC) for environment or the Minister of Environment Affairs are the competent authority dependent upon the nature of the land use and its environmental implications. It is important to

note that many of these institutions have a range of programmes that engage in how land is managed and used, including DEA's Natural Resource Management programme (including Working for Water, Working for Wetlands and Working on Fire) and the Department of Agriculture, Forestry and Fisheries (DAFF) LandCare programme.

2.2.2. Development and infrastructure in the water sector

The Institutional Reforms and Re-alignment programme also provided strategic insights regarding the institutional arrangements for the development and management of water resource infrastructure (DWA 2012a). Often there is not a clear distinction between water resources and water services, and as a result the institutional responsibilities for development, operation and funding are not always clear or consistent (DWA, 2013b). This is an issue of importance and concern in light of the focus on infrastructure development in the NDP (GSA 2012).

The NDP identifies poorly located, inadequate and under-maintained infrastructure as one of nine major challenges facing South Africa. Currently, the network of municipal wastewater treatment works that treat sewage and effluent discharges are not keeping up with the rapid growth in many towns and cities, with poor operations and maintenance regimes resulting in raw sewage being discharged into rivers and wetlands[14]. As a result, there are concerns about resource degradation and impacts on the human health, environment and the economy. Addressing the failings in the country's infrastructure base is seen as an enabling milestone in achieving the development goals of eliminating income poverty and reducing inequality by 2030 (GSA 2102).

The NDP targets a public infrastructure investment of 10% of gross domestic product (GDP), financed through tariffs, public-private partnerships, taxes, and loans, focusing particularly on transport, energy and water[15]. The NDP sees that growing investment, improving infrastructure and skills will achieve faster and more productive economic growth. The NDP goes on to identify a number of infrastructure priorities that were further developed in the National Infrastructure Plan adopted in 2012.

The National Infrastructure Plan details eighteen Strategic Integrated Projects (SIPs)[16], the eighteenth being a nation-wide project to fast track delivery of water and sanitation infrastructure. It comprises a 10-year plan to address the estimated backlog of access of 1.4 million households to adequate water and 2.1 million households to basic sanitation. SIP 18 has been designed to ensure a sustainable supply of water to meet social needs and support economic growth as well as a comprehensive sanitation service that enhances community wellbeing, reduces health care costs and improves productivity. SIP 18 projects include new infrastructure, rehabilitation[17] and upgrading of existing infrastructure, as well as improved management of water infrastructure (including

[14] The recent Green Drop Report cites 55% out of 821 wastewater treatment works as being in a collapsed state (DEA 2014).
[15] See "critical actions" on page 24 of the executive summary of the NDP.
[16] The SIPs comprise 5 geographically focused SIPs, 3 energy SIPs, 3 spatial SIPs, 3 social infrastructure SIPs, 2 knowledge SIPs, 1 regional integration SIP and 1 water and sanitation SIP.
[17] Rehabilitation means to return/repair something that was damaged or degraded to a condition of good health, ability to work or the like. In the context of ecological infrastructure, rehabilitation refers to returning an ecosystem to as near as its former ecosystem structure, function or state that resources or local conditions allow (Grenfell *et al*. 2007). A distinction is made with restoration, refers to the attainment of former (prior to anthropogenic disturbance) ecosystem structure, function and/or state. In the context of ecological infrastructure, where the focus is on restoring ecosystem function (and resultant services) with biodiversity composition and structure being secondary benefits, restoration and rehabilitation are often referred to interchangeably.

revision of water sector institutions). The development impact outcomes of SIP 18 include job creation, addressing spatial imbalances particularly in the quality and delivery of services across the country, promoting rural development, industrial development and localization, economic growth of poor provinces, greening the economy and regional integration with neighbouring countries.

SIP 18 focuses on the "water supply and use chain" (refer back to Figure 1) from the river or dam and back to the river or ocean, including the development of water resources (i.e. dams), treatment and pumping of water from dams to reservoirs and into distribution systems in settlements. It also includes the return and treatment of waste water through sanitation systems and networks back to the environment. What SIP 18 does not explicitly consider are the impacts and dependencies of the built components of the water value chain on the surrounding natural environment. This includes the recognition that investments needed to address the SIP 18 priorities could be significantly enhanced, complemented and sustained by investments in the ecological infrastructure in the surrounding environment. Additionally, in lesser-developed areas of South Africa where access to water and sanitation is limited, communities are highly dependent on direct abstraction of water from the natural environment for domestic and agricultural use. Ecological infrastructure becomes key in these areas in order to ensure human health and to secure livelihoods.

As supply options for large surface water reservoir systems decrease, alternatives for augmentation, such as water conservation and demand management, water reuse, desalination, waste mitigation, green and ecological infrastructure[18] are increasing being explored. To this end, a 19th SIP, focused on *Ecological Infrastructure for Water Security*, was submitted for consideration by the Presidential Infrastructure Coordination Commission. Complementing SIP 18, SIP 19 aimed to significantly contribute to ensuring a sustainable supply of fresh, healthy water to equitably meet South Africa's social, economic and environmental water needs for current and future generations through the implementation of ecological infrastructure projects in priority catchments (DEA 2014). SIP 19 is dormant but the project described in this document is fundamentally aligned with its objectives and aims to demonstrate its potential.

2.2.3. Opportunities for financing ecological infrastructure

Water resource development in South Africa has been largely financed through the public sector to date, namely by National Treasury through the DWS and the Trans Caledon Tunnel Authority (TCTA), and water boards, private entities and municipalities to a lesser extent. Water infrastructure plays a prominent role in national expenditure, with 14% (R37.3 billion) of the total infrastructure budget in 2014/15 allocated to water and sanitation (McPhail 2015, referenced in Colvin *et al*. 2015). In addition to public finance, off-budget projects are also being implemented by the public sector, using commercial debt finance. However this investment is not aligned to, or complemented by, efforts to manage natural resources.

Water resource development finance to date has been directed largely at traditional engineered water solutions (built (grey) infrastructure) that is often expensive to build and operate, suboptimal in efficiencies, and effectiveness and unsustainable. Conventional built infrastructure solutions often depend on expensive skilled management which, if lacking in supply, increases the risk of project failure (therefore adding to increased risk to ecosystem health, community environmental health and increased risk of failure to meet expected returns on investments). Conventional infrastructure

[18] Green Infrastructure is a more broadly inclusive term and is defined as a set of natural *and man-made* ecological systems that provide services to society, such as flood attenuation, water and air filtration, and microclimate regulation, which can be used as an alternative, or partner to traditional infrastructure (Bobbins and Culwick 2015). Ecological infrastructure refers to naturally functioning ecosystems only.

is also dependent on ecological infrastructure and vulnerable to declining efficiency as the natural environment in which they operate degrades (Colvin *et al*. 2015). Substituting and or enhancing conventional engineering infrastructure with greener technologies and or increased investment in ecological infrastructure can improve the performance and life span of built water infrastructure such as dams or water treatment works. By seeking more sustainable technologies new opportunities and created for mobilising resources to address ecosystem needs as a net positive outcome of a water infrastructure investment.

Given the current policy environment, the prevailing financial mechanisms available for investment in ecological infrastructure include development finance and recurrent public finance.

Sources of development finance include:

- Commercial loan finance available through financial institutions such as the development and commercial banks;
- Public sector grant finance, such as the Water Services Infrastructure Grant and Regional Bulk Infrastructure Grant administered by the DWS.
- Water bonds are currently being considered, but none have yet been issued. The balance sheet strength of the issuing authority, along with the required revenue stream to finance this debt are the main constraints currently.[19]

Major sources of recurrent public finance include:

- User tariffs: The national Water Pricing Strategy provides a supportive framework for ecological infrastructure under the water resource management and development components of the tariff;
- Expanded Public Works Programmes in the Environmental and Culture Sector[20] directed at natural resource management, such as LandCare and Working for Water.

A significant investment in natural resource management comes in the form of the Environment and Culture sector of government's nationwide Expanded Public Works Programme (EPWP), which seeks to draw significant numbers of unemployed people into the productive sector of the economy, gaining skills while they work and increasing their capacity to earn income. Relevant programmes within sector departments include Natural Resource Management in DEA and LandCare within the Department of Agriculture, Fisheries and Forestry. Nested within the Environment and Culture sector of the EPWP, these programmes are part of a coherent strategy for realising the sector's objectives around securing South Africa's natural and cultural heritage, while utilising this heritage to create both immediate and long-term jobs and social benefits.

An analysis of the current approach to infrastructure finance reveals that water project balance sheets fail to effectively consider and therefore adequately internalise the impacts and dependences of the particular infrastructure project on the surrounding environment. The result is that the costs or impacts of the infrastructure on the environment are frequently externalised. In addition, opportunities for an approach to be followed that integrates ecological infrastructure elements as part of the project, thereby complementing, enhancing and lengthening the lifespan of the built infrastructure components, are not explored or costed. A key example of this is the impact of degraded upper catchment landcover on dam siltation rates, and water availability. Given South

[19] The potential for water bonds in South Africa were explored in Colvin *et al*. 2015.

[20] More details available at the following website for readers who wish to understand the structure of the overarching Expanded Public Works Programme in South Africa.
http://www.epwp.gov.za/sector_environmentl_and_culture.html

Africa's our water constrained circumstances, industries which are reliant on water need to factor future water availability into their project risk analysis. The financial and economic impacts of inadequate water infrastructure extend to multiple sectors of the economy, from mining, to agriculture and related food-production. Given this systemic risk, long-term investors who seek stable long-term returns have much to gain or lose, depending on future water security.

While the policy environment recognises the value of ecological infrastructure and provides a financial mechanism in the form of components of the water tariff, implementation has lagged. The reasons for this include a focus on service delivery, free basic services and affordability, and a reluctance to allocate funding to elements which appear to be "extra", such as namely the management of ecological infrastructure. Water sector infrastructure engineers and planners, designers and funders have not built in the true cost of water services and often underprovided for the do not yet recognise the impacts and dependencies of water built (grey) infrastructure on ecological infrastructure. , or incorporate ecological infrastructure into their asset planning. Even when attempts are made to integrate ecological infrastructure into built (grey) infrastructure plans there is a confusion of roles and responsibilities and financial flows between organisations and institutions and this makes it difficult to achieve a desired outcome.

While significant amounts of funds are currently allocated to activities of an ecological infrastructure nature (such as work done under DAFF's LandCare programme and DEA's Natural Resource Management Programmes) these funds are not allocated in ways which measure or maximise water security and ecosystem integrity outcomes. Current natural resource management funding is significant, but water outcomes are subservient to job-creation and other criteria and the presence of national programmes can overlook priorities identified at a catchment level.

The key financial problems identified can therefore be grouped into two themes, namely delayed application of the mechanism contained within the national water pricing policy, and the allocation of available funding that does not optimise ecological infrastructure outcomes. This latter point also relates to the lack of an enabling environment and models that can clearly assign the responsibilities and resources in the management of ecological infrastructure.

The failure to ensure that available funds for ecological infrastructure optimise water outcomes has resulted in insufficient funds being directed to ecological infrastructure management due to:

- Insufficient evidence (and/or poorly articulated) and demonstrable return on investment in actual water-related benefits as a result of active catchment management in South African settings;
- Reluctance based on fears that water tariffs will have to rise, and sensitivity that water is a basic human right for which the poor cannot afford to pay[21];
- Lack of clarity on exactly what ecological infrastructure-related activities are required in particular catchments, and the costs of undertaking this work;
- Tools used by planners and financiers of infrastructure fail to effectively consider the full impacts and dependencies of an infrastructure project on the receiving environment, and therefore fail to include these costs in project budgets and decision-making.

[21] These arguments are consistent with a myopic approach to bulk water supply and or water service delivery which is based on ecological infrastructure management being viewed as a reactive process rather than a proactive one (proactive responses are nearly always cheaper and more cost-effective in the long run as evidenced in the interest the insurance industry has developed towards investing in disaster prevention responses)

There is an increased momentum within the financial sector to ensure that projects finances do consider the environmental impacts and dependencies more systemically. This is discussed further in the project baseline.

2.2.4. Natural capital accounting

Natural capital accounting (NCA) is the process of accounting systematically for stocks and flows of natural resources[22]. It offers a tool to inform development planning and decision-making in the economy, but its potential is some way from being realised.

The current approach to water sector management and infrastructure development does not make effective use of the opportunities that natural capital accounts offer to inform planning and decisions for at least two reasons:

- Natural capital accounts are still in their infancy in South Africa, with significant data gaps and other challenges for the production of regular accounts. The lack of complete accounts in regular time series limits their usefulness.
- Those water-related natural capital accounts that exist have not necessarily been effectively interpreted for use by the water sector. Accounting tables in themselves can be difficult to understand, and the underlying data can be difficult to interrogate to extract the information needed for a particular user or decision. Similarly, the links between ecosystem accounts and water accounts have not been fully explored.

It is important to clarify the relationship between natural capital accounting and accounting for impacts and dependencies on natural capital at the project or business level, as shown in Figure 12. NCA refers to accounting for stocks and flows of natural capital at the national level, in other words for a country as a whole. It is implemented by governments and guided by the UN's System of Environmental-Economic Accounting (SEEA). Natural capital accounts are intended to complement national accounts, which provide measures of national economic activity (such as national income, expenditure, investment and savings) and are guided by the UN's System of National Accounts (SNA). In some cases it is possible to disaggregate natural capital accounts to the sub-national level (for example, to the provincial or broad catchment scale); however, in many cases data limitations mean that natural capital accounts can be meaningfully reported only at the national level.

As illustrated in Figure 12 below, assessing impacts and dependencies on natural capital for specific projects or businesses requires a different approach from NCA at the national level. There are currently several frameworks or approaches available, with no clear agreement on standard methods or guidelines. The Natural Capital Protocol, developed by the Natural Capital Coalition, focuses on business decision-making and provides a broad framework and an overview of available tools.

[22] The United Nations has developed the SEEA to guide natural capital accounting, in the same way that the System of National Accounts guides national accounting. Natural capital accounting includes accounting for individual environmental assets (such as water or minerals) as well as accounting for ecosystems (such as rivers, wetlands, or terrestrial ecosystems). The SEEA Central Framework was approved as an official standard only in 2012, and guidelines for ecosystem accounting are still seen as experimental. Natural capital accounts are intended to be satellite accounts to the national accounts.

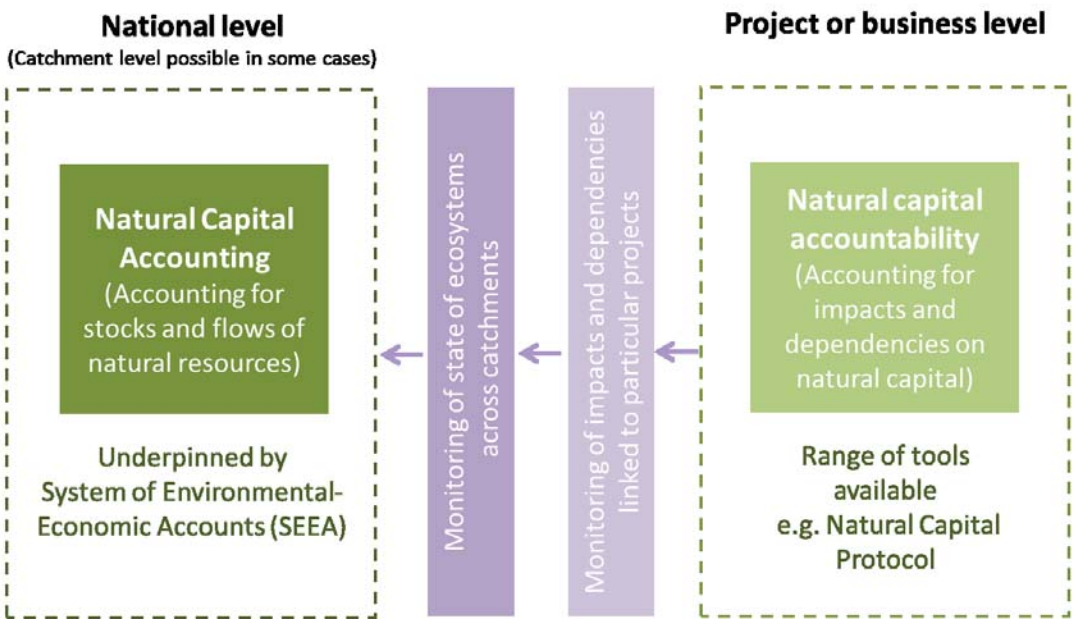

Figure 12. Relationship between natural capital accounting and accounting for impacts and dependencies on natural capital at the project or business level

2.2.5. Water security context in the demonstration areas

Noting that the Kwa Zulu-Natal and Western Cape provinces provide significant inputs into the national economy, interventions in these demonstration areas will have influence upon the way in which ecological infrastructure is understood in supporting the economy.

2.2.5.1. Berg-Breede

The Berg River and Breede River catchments are adjacent to each other whilst falling within two different water management areas, respectively the Berg-Olifants and Breede Gouritz water management areas (Figure 13). However, they are hydrologically connected through inter-basin transfers and are both are part of the Western Cape Water Supply System (WCWSS) (Figure 14). This system serves an estimated 5 million people living in the City of Cape Town and various towns, as well as serving irrigators along the Berg, Eerste and Riviersonderend rivers, and the rural and stock-watering schemes in the West Coast, Swartland and Overberg areas.

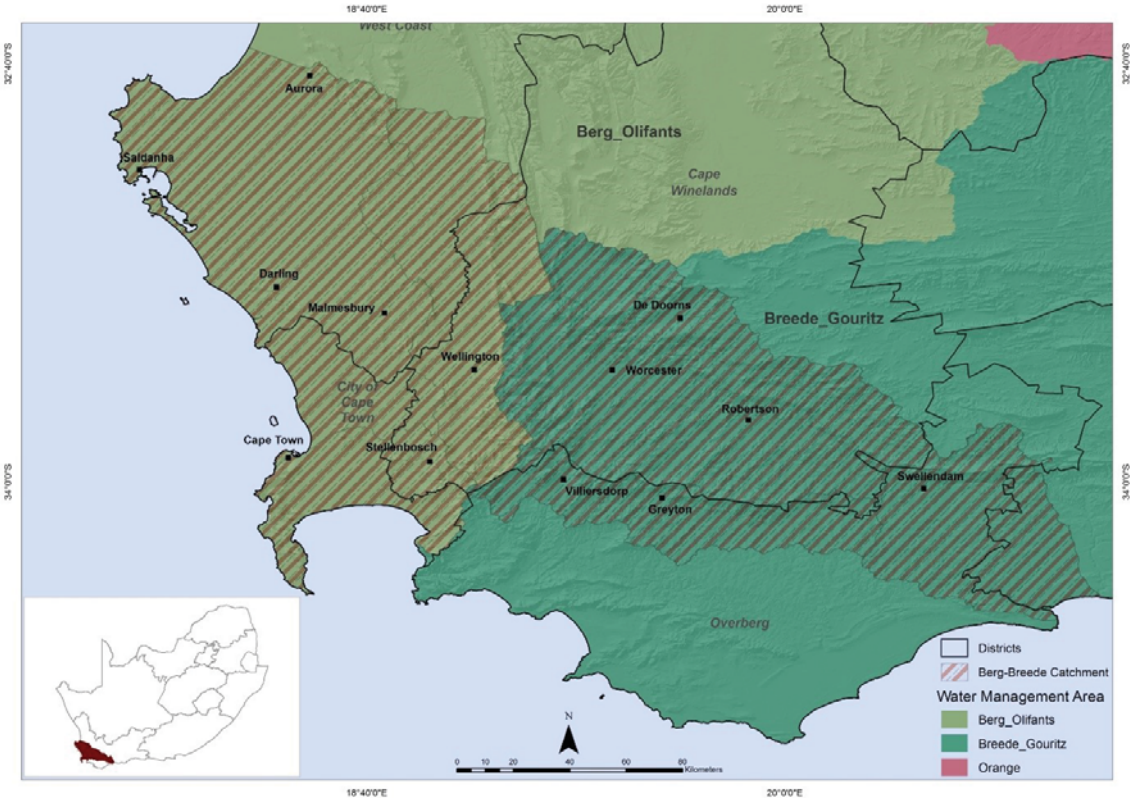

Figure 13 Location of the Berg-Breede demonstration catchments in relation to the water management areas

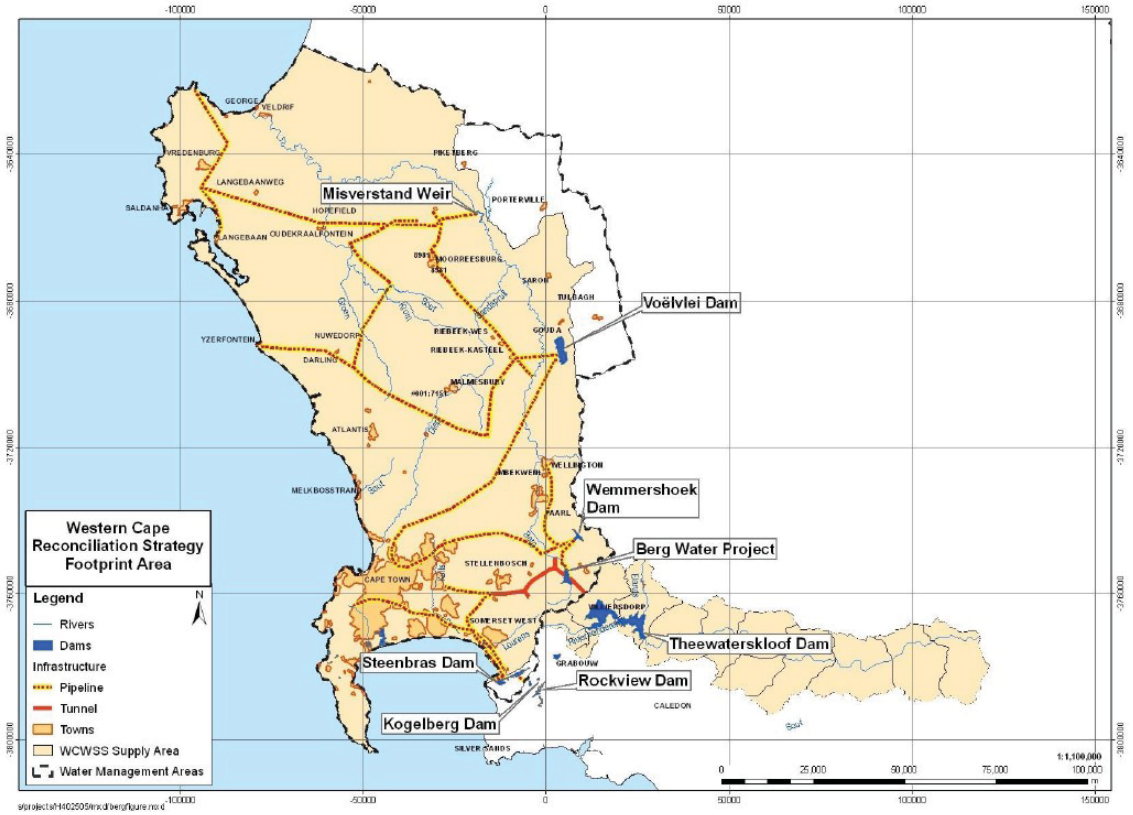

Figure 14: Western Cape Reconciliation Strategy footprint area in the Berg and Breede River Catchments (from DWA 2004)

The GDP of the City of Cape Town is in the order of R195 billion per annum and is dominated by the financial, real estate and business services sectors. This is supported by strong retail, trade, catering and accommodation sectors, linked with a thriving tourism industry. Juxtaposed to this the Western Cape hinterland is dominated by commercial agriculture, ranging from intensive irrigation in the Breede and Riviersonderend valleys as well as in the west of the Overberg, to extensive rain fed cereal cultivation and livestock in the Overberg. Irrigated agriculture (wine and table grapes, dairy and deciduous fruit), livestock farming, dry land agriculture (wheat and canola cultivation) and associated activities such as processing and packaging are the primary economic activities in these regions. Clearly, the region is largely dependent upon its agricultural economy, which itself is predominantly based on high-value fruit cultivation supported by grains and livestock where a third of the estimated R17 billion economic output is directly linked to agriculture (BO CMA 2010). Whilst agri-business is not the largest part of the regional economy it is significant in that it provides an important source of employment for rural communities.

The towns and manufacturing activity largely support the agricultural economy, except along the south coast tourism-residential strip. There are strong social and economic linkages between the Breede-Overberg region and Cape Town, which is located less than 100 km to the west (BO CMA 2010).

In addition to the economic dimensions of water use, household livelihoods and social development are highly dependent upon the way in which water is allocated and shared in the region. Responding to these challenges is at the heart of water management initiatives, particularly in addressing the country's historical inequities (BO CMA 2010). Poverty (Figure 15) and unemployment (Figure 16) are a reality in the demonstration catchment and there are also many households reliant on natural water sources for their water supply (referring back to Figure 6).

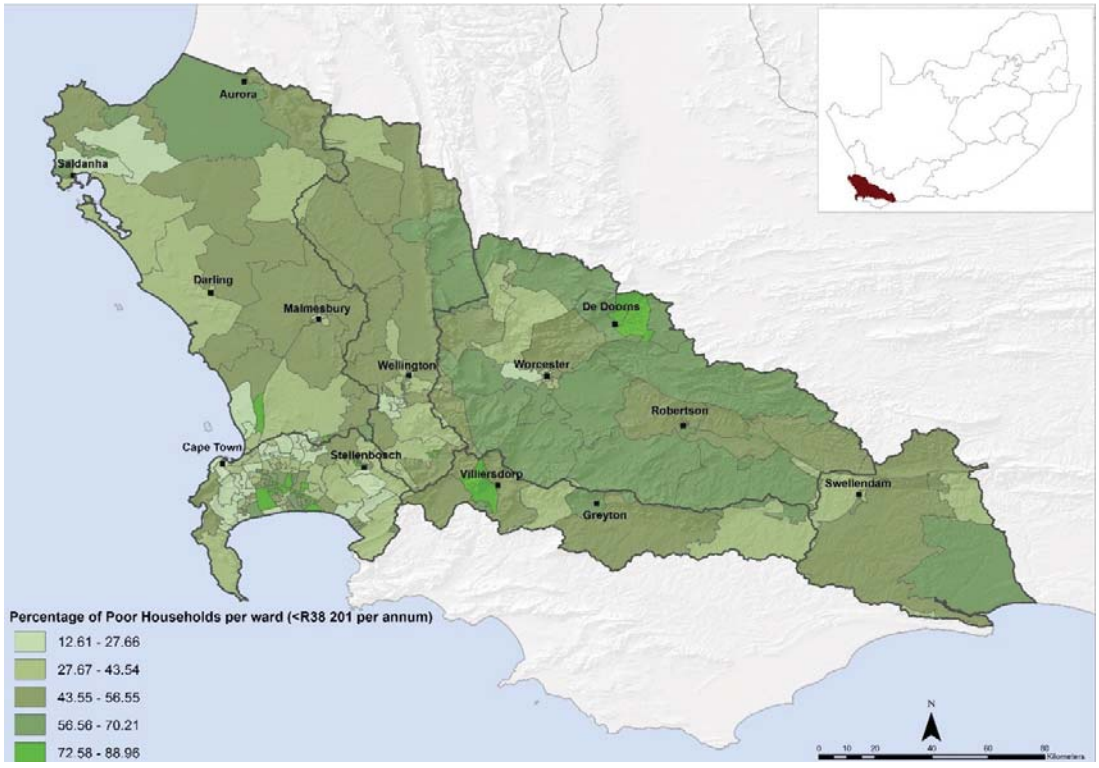

Figure 15. Percentage of poor households per ward (defined as earning <R38 201 per annum)

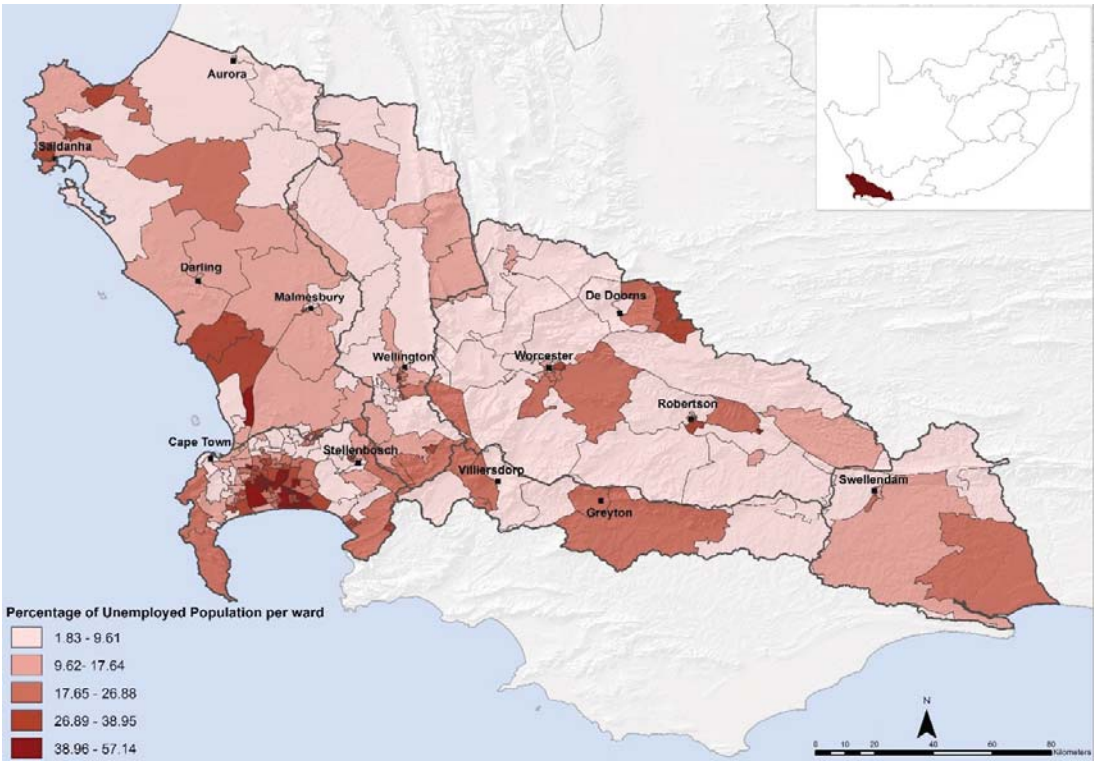

Figure 16. Percentage of the unemployed population per ward

The main storage dams of the WCWSS are the Theewaterskloof and Voëlvlei dams (owned and operated by the DWS; the Berg River Dam (owned by TCTA and operated by the DWS) and the Wemmershoek, Upper Steenbras and Lower Steenbras dams (owned and operated by the City of Cape Town). Transfers from the Breede catchment into the Berg catchment are important to the regional economy, with the City of Cape Town being the economic hub of the Western Cape Province and second most important economic centre of the country. In order to support the growing economy of this region some 22% of the yield of the Breede River catchment is transferred to the Berg River catchment.

Within the WCWSS, urban use within the City of Cape Town represents the largest water use at some 63%. Irrigation accounts for 32% of water use with the remaining 5% being used by other local authorities within the region (DWA, 2009). In this context, increases in water use will be driven by population growth as well as economic growth across all sectors, particularly within the urban setting. Furthermore, whilst there may be options for future infrastructure development within the Breede (DWS, 2013c) it is apparent that water conservation and water demand management may yields results in forestalling the need for further infrastructure development.

Between 1999 and 2006 the City of Cape Town managed to reduce total water use by 7%. During the WCWSS study (DWA, 2009), the approved 10-year water conservation and water demand management (WCWDM) Strategy targeted a saving of approximately 90 million m^3 by 2016/2017 which is approximately 25% of the estimated high water requirement for the City of Cape Town in 2016/2017. A proposed budget of R759 million was linked to this 10-year strategy and initial efforts have focused on pressure management, an integrated water leaks detection and repair project, consumer education programmes, and the installation of flow devices and the implementation of water re-use schemes. However, significant further water conservation and demand management opportunities are very low in the City of Cape Town (Peter Flower, Director: Water Services of the City of Cape Town; pers comm.). Similarly, Drakenstein municipality has managed to reduce it's

unaccounted for water from 43% to 15% between 1999 and 2008. Ongoing leak detection and repair programmes have realised a 23% saving.

The removal of invasive alien plants (IAPs) has had hydrological benefits for the system, especially the upper catchments of the Wemmershoek and Berg rivers, and significant opportunities still exist to improve catchment yields within the Riviersonderend (as part of the Breede river catchment) from invasive alien plant control in riparian zones.

Prioritised schemes being considered to augment the WCWSS are the Berg River-Voëlvlei Augmentation scheme and the Berg-Breede (Michell's Pass) Water Transfer Scheme. These options can augment current levels of supply over a two to three year period, dependent upon the efficacy of the City of Cape Town WCWDM strategy. If the Michell's Pass transfer scheme is initiated in the next 2 years, there are opportunities to further control IAPs and improve ecosystem services as part of the capital costs of dam construction and licence conditions which this project could explore. Augmentation of the WCWSS includes the development of groundwater supplies and the re-use of water (using treated effluent water, including to recharge aquifers). The potential for seawater desalinisation is understood to be a later augmentation option, noting that this is a costly option.

Water quality concerns are increasing across this region and initiatives such as the Berg River Improvement Plan seek to address these. Issues relate specifically to increased nutrient loads and microbial contamination as a result of poorly operated and maintained wastewater treatment works, to microbial contamination downstream of dense informal settlements that are not adequately serviced, as well as from a range of anthropogenic activities within riparian zones that cause disruption of the aquatic ecosystem as well as increased sediment loads. The challenges in terms of managing water quality are many and often relate to the ability of DWS and the CMAs, as well as those authorities responsible for land use management, to ensure effective compliance monitoring and enforcement. This is hindered by limited resources, stretched capacity and poorly integrated systems. Furthermore, the failure to apply regulatory approaches on local government enables the pollution from poorly performing wastewater treatment works to continue. In 2011 the agriculture sector in the Breede system received notification from the European Union that the quality of water used for the irrigation of export crops (largely table grapes and deciduous fruits) was not meeting the required Global Good Agricultural Practices (GlobalGAP) standards. The problem specifically related to microbial contamination of water from wastewater treatment works and informal settlements and placed R6 billion of the regional economy at significant risk. The CMS for the Breede Overberg WMA that was under preparation at that time then developed a suite of interventions with local government to address these issues. However without significant financial input to improve the capacity and the operations and maintenance of wastewater treatment works these water quality issues will re-emerge.

Increased nutrient loads (nitrogen, phosphorous and others), related to ineffective wastewater treatment and urban and agricultural runoff, lead to algal and Water Hyacinth (*Eichhornia crassipes*) blooms which block channels, damage water infrastructure and reduce water quality below admissible levels. Although the irrigation boards have put in place early warning systems in the event of a sewerage spill, the resulting contamination persists for too long in the summer dry season when water is most needed for irrigation. In addition, ultraviolet light, which can help in destroying microbial contaminants, is prevented from reaching the water surface by excessive IAPs in riparian zones. Successful removal of IAPs has significantly improved the resource quality within reaches of the Breede and it is perceived that the heavy infestations in the Zonderend River are having serious impacts upon both quantity and quality in the Breede. The construction of weirs and artificial water level regulation inhibit riparian wetlands and vegetation from being able to adequately remove

pollution and as a result the degraded rivers' ability to naturally cleanse the water column is compromised.

Climate variability within this region is significant with resultant droughts and localized flooding. The degradation of wetlands and river systems has served to exacerbate these disasters. There is broad scientific agreement that climate change will impact upon the Western Cape through increased temperatures and more extreme weather events. This will have an impact on this water dependent region by reducing soil moisture and increasing the severity of wildfires during dry periods, as well as changing the suitability of growing conditions for different crops. It is also expected that the frequency and severity of extreme floods and droughts will increase. It is not clear what the impact on rainfall and water resources will be, except that rainfall in the mountains may increase, while winter rainfall in the valleys and plains may decrease and occur at different times during the growing season. This could have impacts upon the agricultural economy of the Western Cape as well as the fynbos biome.

2.2.5.2. Greater uMngeni demonstration catchment

KwaZulu-Natal is the second most populated province in South Africa with 10.9 million. The Greater uMngeni system (Figure 17) comprises both large city centres in Durban and Pietermaritzburg, an array of small towns supporting the local agricultural and forestry sector, as well as deeply rural, communal areas that were previously a part of the KwaZulu homelands. Within these rural areas, traditional authorities play a vital local governance role and are an important part of the local cultural and socio-economic fabric. The region is characterised by mixed land use on commercial farms, with livestock and dairy farming, and a strong emphasis on tourism. Approximately 20% of the surface is cultivated for agriculture, with an additional 15% under commercial tree plantations (WWF 2013).

The region is dominated by the economy of Durban and the corridor from the port of Durban through Pietermaritzburg up to the country's economic hub, Gauteng. The estimated R220 billion GDP of the Durban area is dominated by the financial and services sectors which makes up some 70% of the Gross Value Add. However, as is common in South Africa, there are significant disparities in terms of poverty and livelihoods (Umgeni Water, 2016). Poverty (Figure 18) and unemployment (Figure 19) are a reality in the demonstration catchment and there are also many households reliant on natural water sources for their water supply (referring back to
Figure 9).

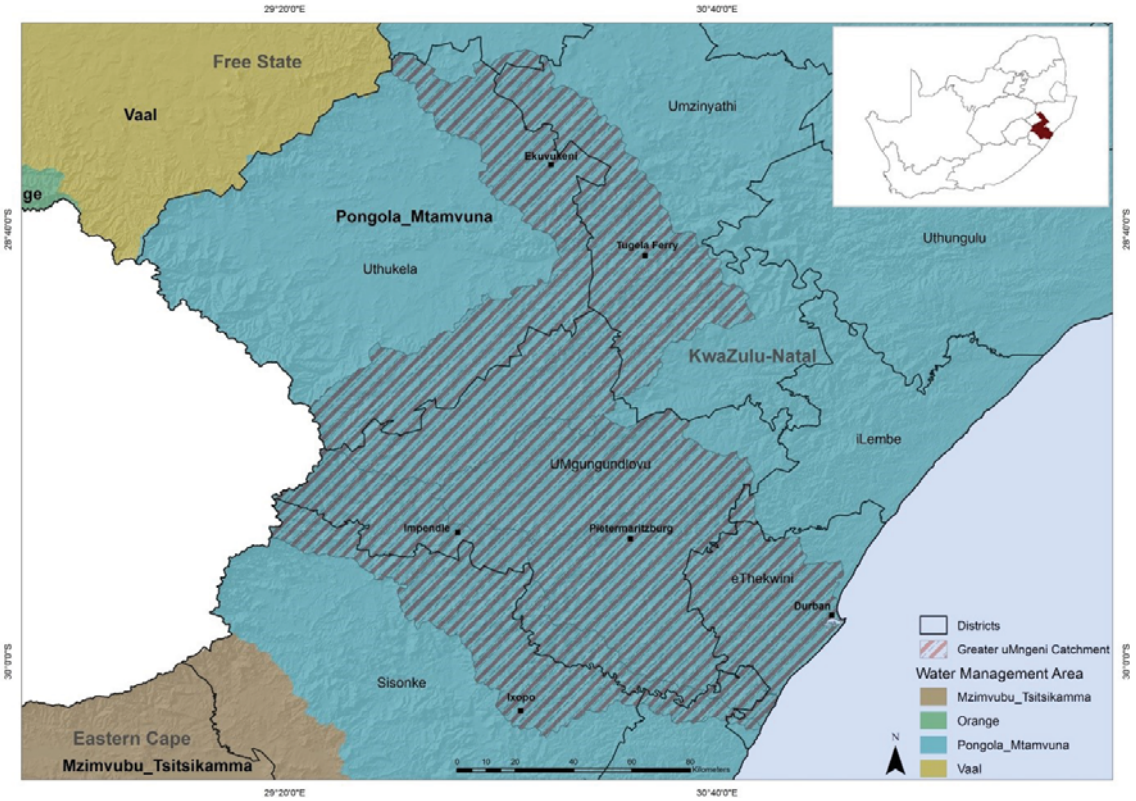

Figure 17 Location of the Greater uMngeni demonstration catchment in relation to water management areas

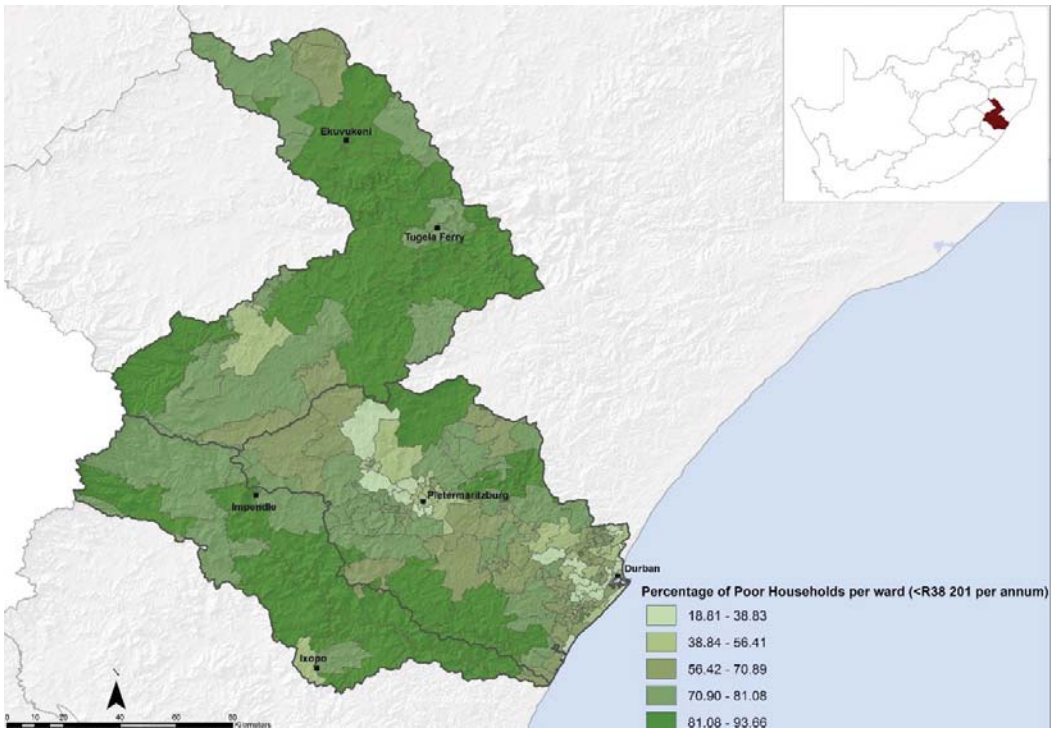

Figure 18. Percentage of poor households per ward (defined as earning <R38 201 per annum)

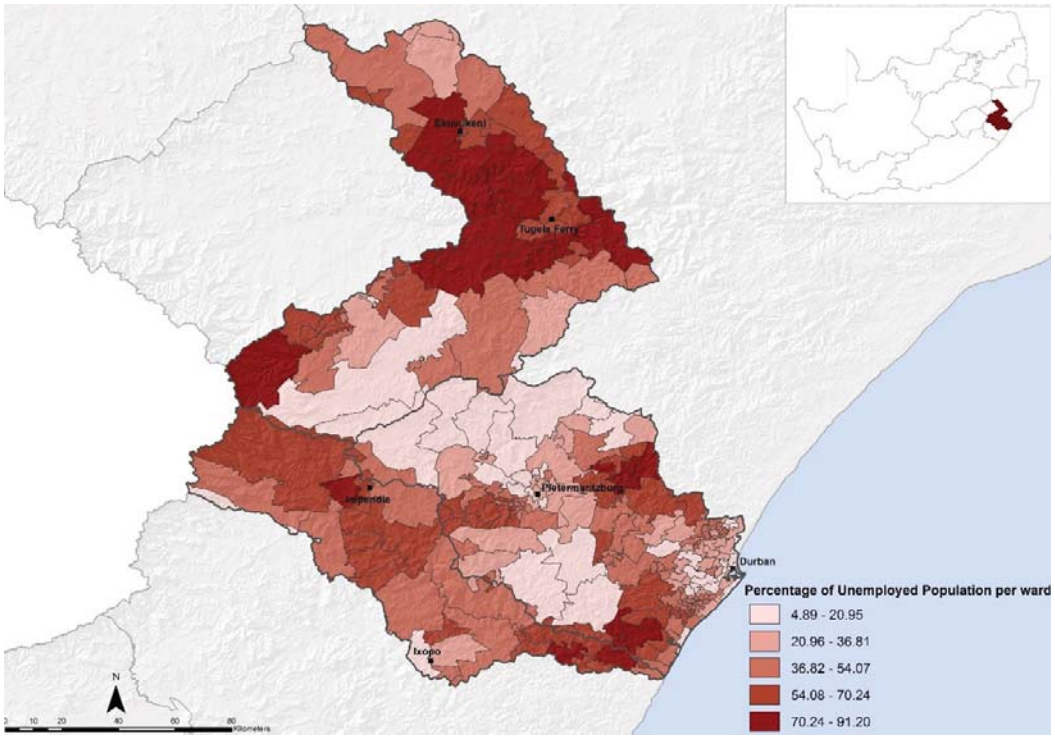

Figure 19. Percentage of the unemployed population per ward

The Greater uMngeni system is home to about 5 million people of which 3.4 million reside in the greater Durban area. Water needs are largely served by the uMngeni Water Supply System (UWSS). The UWSS comprises of a number of catchments that jointly act as the main water source for people and industries in the eThekwini Metropolitan Municipality (Durban), Msunduzi Local Municipality (Pietermartizburg), and Ilembe, Ugu and Umgungundlovu District Municipalities' areas of jurisdiction (DWS 2015).

The Greater uMngeni demonstration catchments includes the uMkhomazi, Mooi, uMlazi and uMngeni rivers, which are increasingly connected by an array of inter-basin transfers to enable improved water supply to the economic hubs in this region (Figure 20). eThekwini Municipality requires 74.2% of the Umgeni Water's total water sales, whilst Msunduzi Municipality (Pietermaritzburg area) accounts for 15.7% of the total demand. Other municipalities use the remaining 10.1% of demand (Umgeni Water 2016). From a planning perspective, water from the uMngeni system is required to be supplied at a 99% level of assurance (i.e. a 1:100 year risk of failure) due to the economic and strategic significance (based on the industrial and commercial output) of the greater eThekwini-Msunduzi region(Umgeni Water 2016). However, despite the augmentation of the uMngeni system from the Mooi River, demand exceeds available yield from the uMngeni system, which is currently in deficit with a worsening situation predicted into the future. As a result, water is being supplied at a lower assurance than is required meaning that the risk of a shortfall being experienced has increased (and the risk increases as the size of the deficit increases.

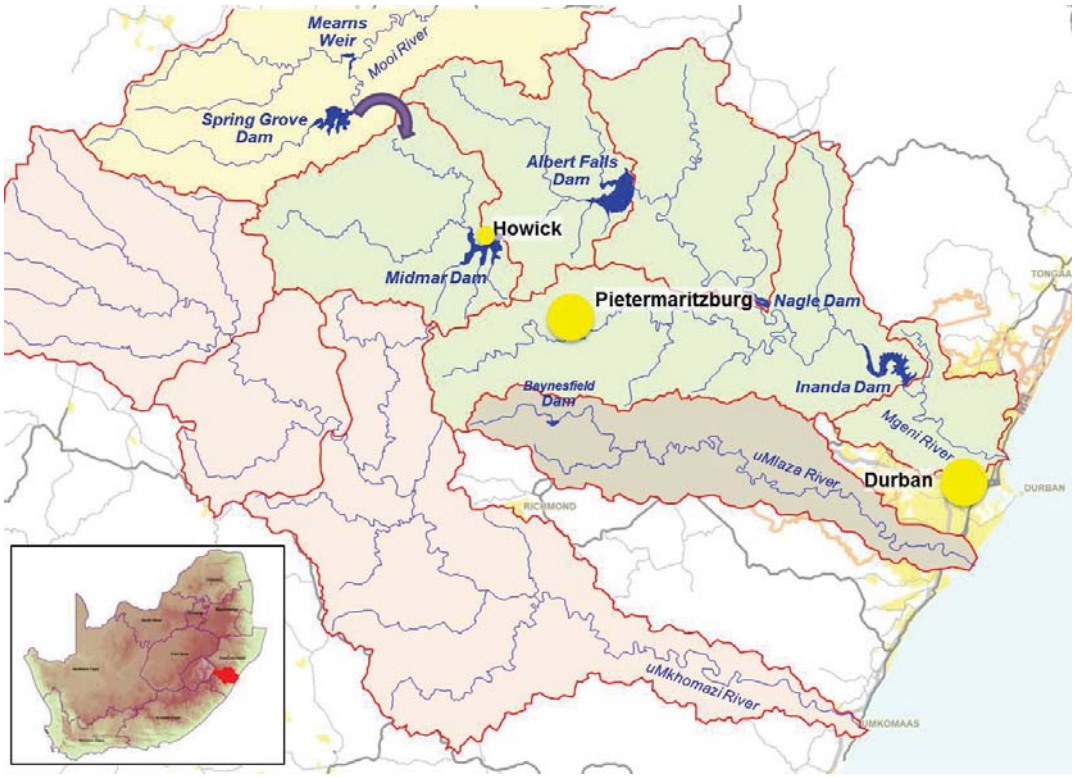

Figure 20: uMkhomazi, Mooi and uMngeni catchments as part of the Greater uMngeni system (from DWS, 2015)

There are four major dams in the UWSS, namely Nagle, Midmar, Albert Falls and Inanda dams on the uMngeni River. This is augmented by the Mooi-uMngeni Transfer Scheme, comprising of the Mearns Weir and Spring Grove Dam, both on the Mooi River. This will most likely be augmented by the development of a dam on the uMkhomazi River, at Smithfield. The feasibility studies for this development have been completed and currently the Environmental Impact Assessments are being undertaken. Two smaller irrigation dams (Kamberg and Hlatikulu) are currently being planned for the Mooi system.

Water conservation and water demand management (WCWDM) measures are being initiated by the various municipalities. Analyses have indicated that potential savings between 40 million m^3/year and 86 million m^3/year can be realised. Historically, eThekwini Municipality initiated significant WCWDM measures and this resulted in a downturn in demand. However, the demand levels will increase with economic growth and the requirements for improved levels of service will outweigh any savings made through WCWDM (Umgeni Water 2016). Planned infrastructure developments include:

- The Western Aqueduct, funded by several banks including the Development Bank of Southern Africa (DBSA) as lead arranger, will extend the existing pipeline system that runs from Midmar Dam to the western area of eThekwini.
- Transfer water from the adjacent uMkhomazi River into the uMngeni catchment. An interbasin transfer scheme, known as the uMkhomazi Water Project, is currently being investigated that entails the construction of two dams on the river, viz. Smithfield Dam (Phase 1) and Impendle Dam (Phase 2), a new Water Treatment Plant, and a conveyance system of a tunnel and pipelines.
- Raising the embankment of Hazelmere Dam by 7m will increase the yield (98% assurance) that can be supplied to the northern part of eThekwini Municipality and the northern coastal strip by an additional 20 Ml/day excluding Reserve requirements

- Transfers from the uThukela River near Mandini and can be linked to the supply from Hazelmere dam.
- Wastewater re-use options are being considered and eThekwini Municipality have identified two wastewater works as potential reclamation plants to treat the effluent back to potable standards on site and feed directly into the local bulk supply network (Umgeni Water 2016).
- Two desalinisation options are being investigated.

From a water quality perspective, this system is under increasing pressure from poorly performing sewage systems, wastewater treatment works as well as non-point source pollution from urban, agricultural, and informal settings. This has resulted in some rivers being heavily polluted particularly within urban settings; these include a wide variety of problematic contaminants ranging from heavy metals to microbiological issues. Poorly performing wastewater treatment works are a source of nutrients and microbial pollution as are storm water flows from dense informal settlements. The nutrient enrichment of the uMngeni has realised very significant algal blooms and the growth of invasive aquatic plants such as Water Hyacinth and Parrots Feather. These choke up sections of the river and have significant impact upon the aquatic ecosystems.

The water quality in the middle and lower Msunduzi River is very poor, with a high faecal coliform content and nutrient over-enrichment. There is a significant risk of possible health effects if water is used for drinking and contact recreation. Outbreaks of water related diseases such as cholera are regular occurrences within rural communities that draw water for domestic purposes directly from the resource (Jewitt *et al*. 2015). This also threatens urban agriculture to a great extent and by that food security, health and livelihoods of already vulnerable communities (e.g. Bayne's Spruit tributary to the Msunduzi River).

The deteriorating trophic status in some key dams is resulting in algal blooms and the spread of invasive alien aquatic plants. This is particularly bad in some of the larger impoundments such as Inanda Dam, and more recently in Midmar Dam, where blooms of blue-green algae have been experienced. Both of these dams have large communities living within close proximity to the dams. The trophic status of the impoundments and rivers across the system are currently oligotrophic to mesotrophic. The reconciliation strategy completed by DWS noted that if indirect re-use of treated sewage effluent is proposed as a reconciliation option, then the further removal of phosphorus will have to be undertaken before discharge to the dams can be considered.

The water quality in terms of salinity is good when compared to the guidelines. However, there is a trend of increasing conductivity within the Msunduzi River and Inanda Dam. There are also very specific pollution events and spills that occur across the system from time to time and linked to the various industries. There is a need to monitor and track these from time to time in order to not only understand more about this type of pollution, but also to inform the management actions required.

2.3. Threats to biodiversity, root causes and impacts from current approach to water resource management and development

2.3.1. Threats to biodiversity

South Africa has a relatively long history of assessing aspects of biodiversity and ecosystems through spatial and non-spatial biodiversity information. This provides a knowledge base on biodiversity that continues to grow, and is the basis for assessments of the status and trends of biodiversity and the identification of priority areas for biodiversity management and conservation.

South Africa's second National Biodiversity Assessment, completed in 2011, assesses two headline indicators, namely ecosystem threat status and ecosystem protection level, across terrestrial and

aquatic (marine and freshwater) environments. The results are summarised in Figure 21 and Figure 22.

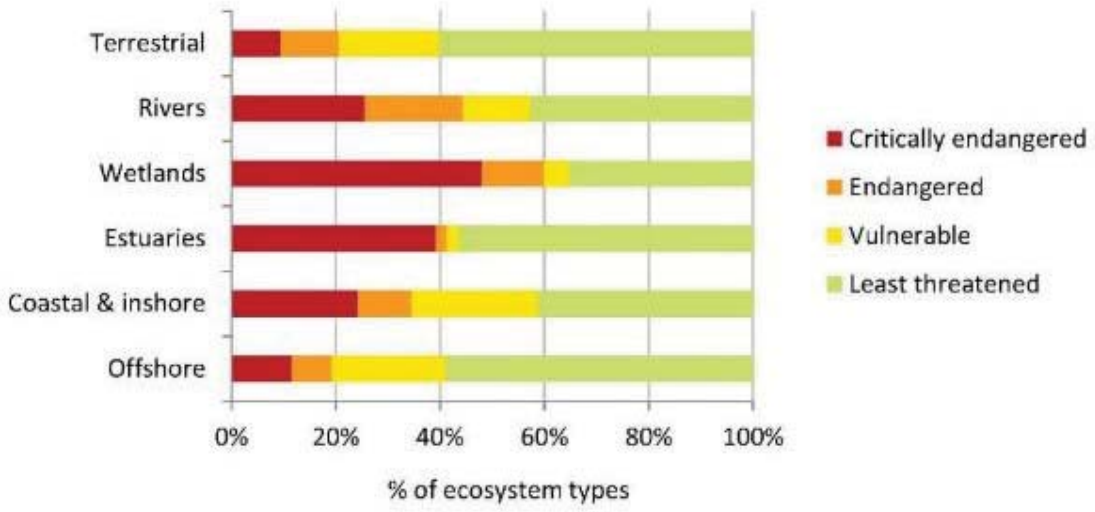

Figure 21. Summary of ecosystem threat status across terrestrial and aquatic ecosystems (Driver et al. 2012)

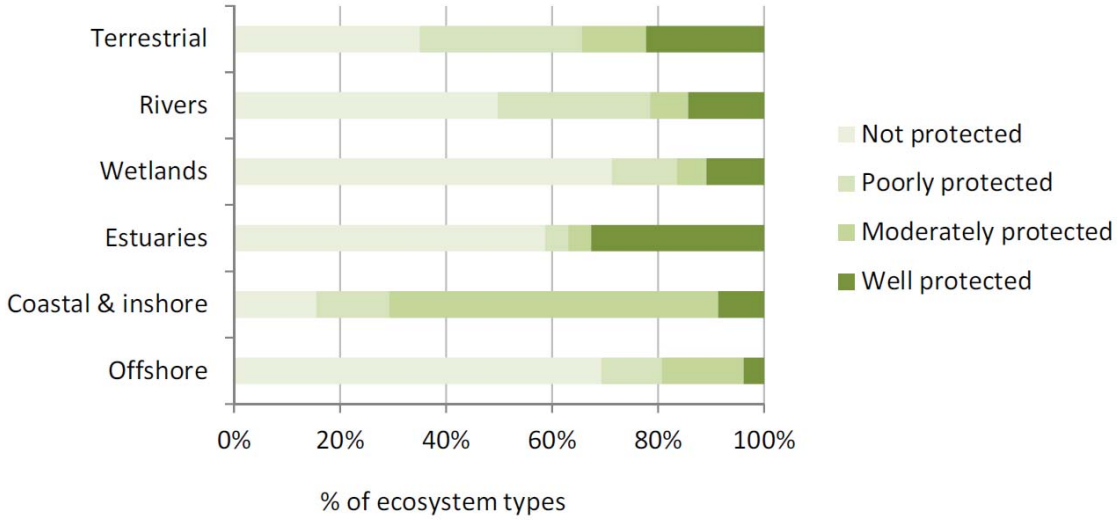

Figure 22. Summary of ecosystem protection level across terrestrial and aquatic ecosystems (Driver et al. 2012)

These indicators show that biodiversity loss through habitat degradation is a particular problem in freshwater ecosystems. Wetland ecosystems are the most threatened, with a disturbing 65% of wetland ecosystem types threatened (48% critically endangered, 12% endangered and 5% vulnerable). Only 11% of wetland ecosystem types are well protected, with 71% not protected at all. River ecosystems are the third most threatened with 57% threatened (25% critically endangered, 19% endangered and 13% vulnerable). Estuary ecosystems are more threatened than river ecosystems, but, in turn, river ecosystems are more poorly protected than estuary ecosystems. Only 14% of river ecosystem types are well protected (compared to 33% of estuary ecosystem types). Loss and degradation of these freshwater ecosystems is also resulting in impacts on species.

Biodiversity loss through decline in species numbers is also a reality in freshwater ecosystems, as it is in other ecosystems. Red List assessments show that one in five freshwater fish species is threatened, which is the highest proportion of threatened species in a taxonomic group (equally high as inland mammals). There are still some knowledge gaps with respect to the conservation status of species in the country, particularly for marine species and invertebrates (DEA 2014b).

By indicating how intact an ecosystem still is, the ecosystem threat status tells us about the degree to which the structure, function or composition of an ecosystem is still intact, features on which their ability to provide ecosystem services ultimately depends (Driver *et al*. 2012). Degradation of ecosystems and decline in species numbers also results in disruption of ecological processes that underpin biodiversity and ecosystem services. No systematic quantitative assessment has been done on how changes in biodiversity have impacted on the provision of ecosystem services in South Africa, or how the production of ecosystem services has impacted on biodiversity (DEA 2014a). However there are examples of where decline in ecological condition of ecological infrastructure or decline in species numbers have impacted on availability of traditional medicine species, impact on pollination services from wild pollinators, or impacted on fisheries (DEA 2014b).

Biodiversity and ecosystem services are threatened by a range of pressures that result in irreversible damage and alter the ability of these ecosystems to provide ecosystem services. Wetland and river ecosystems share pressures that threaten them, namely:

- **Disruptions or alterations to the timing and quantity of freshwater flows** in a catchment: for example from over-abstraction of water from rivers, as a result of dams or transfer schemes between catchments
- **Spread of invasive alien species**: present a large and growing challenge in SA, they threaten indigenous biodiversity, and have serious socio-economic impacts including threats to water security (links to disrupting freshwater flows), reduced productivity of rangelands, increased fire risk and impacts on crop agriculture.
- **Pollution**: pollutants and sediments from surrounding land uses is a serious and growing problem affecting all aquatic ecosystems, and is often exacerbated by destruction of natural vegetation along river banks. Pollution is also a major threat particularly to aquatic ecosystems, driven by poor or illegal land use practices and poorly maintained infrastructure such as wastewater treatment works.
- **Conversion of wetland and riparian areas** along rivers due to cultivation, urban development, mining, dam construction and poor grazing management.
- **Degradation of catchment area** feeding into freshwater ecosystems: terrestrial ecosystems, particularly those in SWSAs that are degraded or converted by other land uses, such as agriculture, plantation forestry or mining.
- **Climate change** is altering biodiversity and ecosystems in varying ways across the country and is placing pressure on institutions to manage resources adaptively.

These are pressures that affect all freshwater ecosystems nationally and some terrestrial and marine ecosystems too. The description of the water security context of the two demonstration catchments described how many of these pressures exist in those catchments. The table below summarises these per pressure and highlights some of the specific biodiversity impacts in order to inform the root cause analysis and the identification of long term solutions.

Table 1. Pressures that threaten biodiversity

	Berg-Breede	Greater uMngeni
Disruption/ alteration of freshwater flow	Over-allocation of available water resources impacts on freshwater biodiversity, river and wetland health, and estuarine productivity. Several commentators ventured that all systems, except perhaps the Sonderend, were already over-allocated and insufficient flows were made available to maintain the 'Ecological Reserve'. Water infrastructure (including dams, weirs, irrigation offtake points etc.) has significantly impacted the ability of the rivers to function.	The levels of river impoundment and the transfer of water from adjacent catchments has altered the flow regimes in this system significantly.
Invasive alien species	Uncontrolled invasions of riparian areas by large alien invasive trees cause significant water loss, threaten infrastructure, and cause unprecedented flooding at choke points in the Berg and Breede river systems. Invasive trees also shade out the native Palmiet (*Prionum serratum*), which acts as a channel stabiliser against floods and filter of sediment and nutrient pollution. Despite significant investment over the last decades, the problem persists in several sections of the Berg, Breede and Sonderend Rivers. Most rivers have been infested with alien fish (such as carp, catfish, smallmouth bass and rainbow trout). These fish, together with habitat degradation (see next point), have caused the localised extinction of the Berg River redfin, Cape kurper and Berg-Breede Whitefish (*Barbus andrewi,* locally referred to as the witvis). The witvis was previously abundant, and now endangered, are no longer found in the main-stem of the Berg River, being confined to more pristine tributaries.	Infestations of woody invasive alien plants, most particularly wattle, have reduced the availability of water resources in the Greater uMngeni. Infestations in riparian zones have significant impact due to their ability to access deeper water resources as well as having higher rates of evapotranspiration than the grassland or bushland vegetation that would naturally occur. In their analysis of the impact of Black Wattle, Jewitt *et al* (2015) found the impact of this species alone to be significant in reducing both quickflow and baseflow in catchments impacted by these plants. Concern about these infestations is largely focused upon the upper uMngeni and uMkhomazi catchments where these have most significant impact upon water resources. These infestations are found in the Uhkahlamba Drakensberg Park as well as in the Impendle Nature Reserve. The introduction of alien fish species such as Trout, Carp and Bass have placed indigenous species such as the Natal Mountain Catfish (*Amphilius natalensis*) and the Scaly Yellowfish (*Labeobarbus natalensis*) under considerable pressure.
Pollution	Overloaded wastewater treatment works and sanitation failure in informal settlements are cause eutrophication and microbial pollution in the Berg River (although this is only an isolated issue in the Breede and Sonderend Rivers, e.g. at Greyton). The resulting nutrients cause algal and Water Hyacinth (*Eichhornia crassipes*) blooms which block channels, smother indigenous invertebrates and rob the water column of oxygen. This habitat degradation, together with the spread of certain invasive alien fish species, has exacerbated the extinction of some local fish species. A lack of flushing of the lower Berg flood plain and estuary during floods gradually results in increased salinity levels in floodplain soils.	Water quality is of growing concern across the catchment with nutrient enrichment being of particular concern. This is as a result of poorly serviced informal settlements, under-performing and poorly maintained sewage infrastructure and Waste Water Treatment Works (WWTW), as well as high levels of agricultural activities including dairies and piggeries. The middle reaches of the uMngeni River have notably poor quality and as a result, impoundments such as Inanda Dam, are often eutrophic and stretches of river are choked with aquatic weeds such as Water Hyacinth. Industrial discharges are of growing concern around urban centres across the length of the system.

	Berg-Breede	Greater uMngeni
Conversion of freshwater ecosystems to by other land uses /	Agriculture has encroached on key wetlands and riparian zones, and damaged or canalised many small tributaries. Combined with the negative effects of nutrient pollution, these ecosystem components have not only lost their attendant rich species complement, but also their role in provision of water-related ecosystem services. Irrigation infrastructure has compromised the functioning of many riparian zones. These impacts result in rapid runoff (often sediment laden and nutrient rich), erosive floods and excessive debris which damage infrastructure downstream, and hinder rehabilitation activities on riparian zones.	Despite efforts to protect some wetlands in the upper catchment, these ecosystems are under threat from outright destruction of wetlands or increased pressure. The tributaries between Midmar Dam to Albert Falls Dam are heavily impacted due to plantation forestry, irrigation and dry land agriculture (formal), weirs and dams, and removal of riparian vegetation (DWS, 2013). The canalisation of urban rivers has removed valuable habitat and reduced key ecosystem services that were important for recovering from flooding, reducing flow velocities and as a result has damaged downstream river morphology. The value of conserving rare and endangered habitats in the upper uMngeni cannot be overestimated and species such as the Wattled Crane in the uMngeni Vlei and the endemic mountain malachite dragonfly are increasingly at risk. Also notable is the rare plant *Hydrostachys polymorpha* which grows in waterfalls in this region.
Degradation of catchment		Extension of urban and residential areas, major infrastructure as well as some agricultural expansion (e.g. sugarcane), are driving biodiversity loss. Primarily in communal areas, overgrazing by livestock combined with inappropriate fire regimes is accelerating the degradation of grasslands and erosion. Large-scale cultivation of mono-crops such as sugarcane in KZN regions reduces the amount of water available in rivers, wetlands and aquifers (WWF – SA, 2013). The degradation of water quality and habitat destruction place further pressure on aquatic ecosystems. The Karkloof mist-belt forests, typified by giant Yellowwood trees, have been heavily harvested and cleared for agriculture and plantation forestry. The upper reaches of the Karkloof River, home to a rare burrowing mayfly, *Ephemera mooiana*, has only ever been found in this region. With the removal of these indigenous forests and the conversion of the grasslands to agriculture, it appears that this species may now be extinct.

2.3.2. Root causes

The Millennium Ecosystem Assessment noted that changes in biodiversity and in ecosystems are almost always caused by multiple pressures (or drivers) that interact across spatial, temporal and organisational scales and that it was often combined effects of multiple drivers that amplified biodiversity loss. It is therefore useful to consider the root causes behind these pressures faced by biodiversity and ecosystems. The preceding sections enable consideration of the often complex and inter-related root causes (highlighted in bold below) of these pressures.

South Africa has developed a robust suite of tools that the water sector uses to ensure water resource protection and provide a basis for sustainable water resource development. However, there remain significant challenges in ensuring the implementation as well as enforcement of water resource protection programmes (DWA 2013a), which contribute to a number of pressures on biodiversity. **Institutional and regulatory flux is a root cause of this.** Institutional instability, particularly in the water sector, hinders the sector's ability to respond to the various water resource management challenges. This feeds into the exceedingly slow establishment of institutions responsible for coordinating the management of water resources, particularly catchment management agencies with only two of the nine CMAs currently operational. This significantly undermines capacity for integrated water resource management.

Institutional fragmentation of responsibilities in the water value chain (as described in 2.2.1) is part of this. Governance challenges exist vertically within the water sector in terms of levels of coordination within the water sector. They also exist horizontally between sectors that influence water governance, planning and resource management. This has implications for the more operational aspects of managing resources, but also has impacts upon the regulatory aspects. Effective CMAs however could go some way to addressing aspects of institutional fragmentation if they are given the profile necessary to be institutions through which cooperative governance could be coordinated. Related to this is complicated and/or untested institutional arrangements pertaining to financial management limitations make it difficult for a downstream municipality to invest its own funds in another upstream municipality to improve water security in the downstream municipality.

Under-capacitated institutions responsible for managing water resources and infrastructure, exacerbated by declining capacity and skills in the institutions, is another root cause of many of the pressures on biodiversity. The loss of engineering and scientific and strategic planning skills in organisations responsible for managing wastewater treatment works and water resources, and the decline in agricultural extension support are examples where the loss of skills is affecting resource management.

Capacity constraints combined with poor alignment between differing sectoral policies are directly related to another root cause which is **weak regulation, monitoring and enforcement.** Hydrological performance is further hindered by an inadequate incentive or penalty regime for land users to maintain catchment ecological functioning (such as meeting RQOs, pursuing conservation agriculture, installing contour bunds, riparian buffers, clearing IAPs. The development and maintenance of monitoring networks and associated information systems that are important to good planning and decision-making are not receiving the financial support required.

The lack of integrated ecological and socio-economic data will increasingly hinder integrated and adaptive management, as well as the ability to measure the hydrological benefits of ecological infrastructure interventions. A focus on water as a resource in isolation from underpinning ecosystems and catchments supports in-stream management and management of built infrastructure, rather than land-based management in catchments (including of ecological infrastructure) which has a direct influence on in-stream and infrastructure condition. Additionally, the lack of reliable information on water and ecosystems means that decisions are insufficiently informed by an ecosystem perspective. It also reduces the ability to link information about ecosystems to other socio-economic information such as national accounts and census information. This in turn leads to sub-optimal management of water resources, biodiversity and ecological infrastructure, linking directly to the next root cause.

Failure to make decisions based on integrated socio-economic and environmental information is related to another root causes that relate to **funds not being allocated to manage ecological**

infrastructure to maximise water outcomes. While current water policy recognises the value of ecological infrastructure, and is supportive of allocating funds to the management of ecological infrastructure, this has proven difficult to implement in practice. An example is the sub-optimal allocation of available funds to manage or restore ecological infrastructure in particular areas that will maximise water outcomes at the catchment level. Under the auspices of the EPWP, significant amounts of funding are allocated to activities that support the management and rehabilitation of biodiversity and ecosystem services under programmes such as LandCare and Working for Water. However, concerns have been raised that this funding mechanism doesn't sufficiently integrate environmental outcomes with socio-economic targets such as job creation or support to poorer communities. These targets result in funds not being allocated to projects that maximize biological or water resource outcomes, despite the economic returns from upper catchment management. Another example is that authorities responsible for managing the ecological infrastructure that generates water (often protected area agencies and private or communal land owners) receive inadequate budget linked to the hydrological performance of the land they manage. This also applies to infrastructure project balance sheet financing where amounts allocated for operations and maintenance do not consider hydrological performance of the infrastructure investment linked to ecological infrastructure.

Linked to the above is the failure to integrate non-market services (ecological infrastructure and biodiversity) into the planning, design, financing and operations of water infrastructure (short, medium and long term). Current water infrastructure design and planning does not factor in the dependencies on ecological infrastructure, in particular dams with respect to the condition of upper catchments, or riverine ecosystems that improve water quality and reduce treatment costs. This leads to sub-optimal planning and budgeting over the life of the investment, in most cases failing to recognise that ecological infrastructure has a significant role to play in realizing the planned useful life of the asset, or possibly extending it. The cost of managing ecological infrastructure which provides services to specific water infrastructure, is not built into the on-going cost of maintaining that infrastructure, or incorporated into the relevant component of the water price (namely the direct cost component of the operations and maintenance charge).

Another issue is the **failure to adequately include the costs of ecological infrastructure related catchment management into the Water Resource Management Charge**. In other words the basic price of water does not reflect the full costs of catchment management, including rehabilitation, restoration[23], compliance, monitoring and enforcement. Part of this is that these costs have not been properly calculated and are not included in the basic price of water, which is a revenue generated from a service produced by functioning ecosystems. Funds raised would then need to flow to the relevant landowning authorities in upper catchments, and the responsibilities for managing water-related ecological infrastructure linked to the hydrological performance of the land they manage would need to be clearly allocated or agreed to by all stakeholders.

Failure also speaks to the challenges of how decision-makers make choices that factor ecological infrastructure into the management of water resources. An aspect of this is a lack of appreciation (full understanding) at an individual level of the role biodiversity and ecological infrastructure in

[23] In the context of ecological infrastructure, rehabilitation refers to returning an ecosystem to as near as its former ecosystem structure, function or state that resources or local conditions allow (Grenfell *et al*. 2007). A distinction is made with restoration, refers to the attainment of former (prior to anthropogenic disturbance) ecosystem structure, function and/or state (Grenfell *et al*. 2007). In the context of ecological infrastructure, where the focus is on restoring ecosystem function (and resultant services) with biodiversity composition and structure being secondary benefits, restoration and rehabilitation are often referred to interchangeably.

ensuring water security, and the impacts and dependencies of infrastructure on natural capital. **The failure to integrate consideration of the value of biodiversity and ecological infrastructure to water security is however not solely as a result of lack of information.** There are many examples of decisions being made that are mindful of the risks and costs and proceed nonetheless with short-term benefits at the expense of long term costs of ecologically unsustainable development. For instance, although the Reserve (for meeting the basic human needs and the ecological reserve) in the NWA is given highest priority for water allocation, there is still failure in practice to implement and enforce the Reserve and other RQOs. Partly, this has to do with insufficient translation of RQOs into concurrent economic and land-use planning framework in support of water sector development and finance planning (linked to horizontal fragmentation, above).

3. Long term solution and barrier to achieving the solution

3.1. Proposed long term solution

As discussed, South Africa is considered as one of the most biologically diverse countries in the world due to its species diversity and endemism as well as its diversity of ecosystems. These rich endowments of biodiversity assets provide immense opportunity to support the country's development path and contribute to the SDGs, especially as the knowledge base on the value of ecosystems and how to manage them effectively expands. An emerging focus on ecological infrastructure is helping to unlock investment in South Africa's ecosystems, with multiple social, environmental and economic benefits (DEA 2014a). The long term solution to addressing the threats described above, and therefore to realizing this potential is that **integrating biodiversity and ecosystem services into planning, finance and development in the water sector improves water security and in doing so, supports development and human well-being.**

Achieving this overarching goal requires:

- **Decision-making is informed by integrated socio-economic and ecological information, including natural capital accounts, which supports policy, planning and decision-making that is cognizant of the full range of benefits provided by biodiversity and ecosystem services.** South Africa has some capacity to undertake national water accounts. In addition, initial work on ecosystem accounting in South Africa has resulted in two promising pilot accounts published in 2016, but there is no embedded capacity in either South African National Biodiversity Institute (SANBI) or Statistics South Africa (Stats SA) to take this work forward. Currently a 'catch-22 situation' exists: until accounts are produced in regular time series it is difficult to demonstrate their full usefulness, and until their full usefulness is demonstrated it is difficult to secure the resources and capacity needed to invest in the data foundations or to produce and interpret the accounts. Long-term solutions to address the threats identified include:
    - Demonstrating that it is feasible to produce a regular set of natural capital accounts in South Africa, including water, land and ecosystem accounts, and that these accounts are useful for informing decision-making and guiding investment, including but not only in the water sector (in the same way that national accounts are considered essential for guiding policy and decisions about the economy);
    - Ensuring that water-related natural capital accounts include an ecological perspective, and that effective links are made between water accounts, land accounts, ecosystem accounts and socio-economic information;
    - Ensuring that consistent time-series data required for producing priority accounts is available;
    - Embedding capacity to produce and interpret natural capital accounts in appropriate organisations e.g. Stats SA, DWS, SANBI, CMAs;
    - Ensuring that capacity to apply the accounts in planning, decision-making and management exists among a range of users, including but not only CMAs;

- Ensuring that, where possible, links are made between natural capital accounts at the catchment level, and natural capital accountability at the project level, for informing decisions related to impacts and dependencies on natural capital.
- Establishing a vibrant South African community of practice on natural capital accounting.

- **The true price of water is more systematically and consistently calculated and informs infrastructure planning, design and budgeting to ensure a sustainable and adequate revenue stream for ongoing rehabilitation and maintenance of ecological infrastructure. This can include a suite of funding mechanisms such as compensation measures (including offset funds), licencing, insurance policies, and the water tariff. It further includes the material (including financial) cost of the impacts and dependencies of built (grey) infrastructure on ecological infrastructure be more systematically and consistently reflected in project credit risk assessments, balance sheets, income statements, and cash flows involved in infrastructure finance.** Achieving this requires interventions at several levels of the water sector value chain:
  - **Tariff-revenues are allocated appropriately to maximize water outcomes at the water catchment level.** Planning occurs at the right scale and scope, and is accompanied by a sustainable funding stream, allocated to the appropriate implementation channels, and targeted at the right locations:
    - Following identification of key water-related ecological infrastructure and the work required to manage this, the cost of doing so needs to be identified (including using a variety of implementation channels);
    - Appropriate elements of the water tariff should be used to fund ongoing management of ecological infrastructure which is relevant to the management of the water resource at the catchment level;
    - Funds should be directed to priority areas which achieve the optimal water benefit (based on data to be provided by the CMA);
    - Where additional funds are made available for ecological infrastructure management (through for example EPWP natural resource management projects), they should take the identified needs of the catchment into account in their prioritisation processes; and
    - The water tariff should be set at a level sufficient to manage water-related ecological infrastructure sustainably.
  - **The costs of managing ecological infrastructure is incorporated into the planning, design, financing and operations of water infrastructure.** Ensuring that financial decisions regarding water infrastructure investments are made recognizing both the impact and dependencies on ecological infrastructure requires that:
    - Infrastructure finance is conditional on proof of incorporation of supportive ecological infrastructure elements (or ecological infrastructure dependencies) into initial project design, and funding through the resource infrastructure operation and maintenance (O&M) component of the water tariff.
    - Capital grant-administering departments (Department of Cooperative Governance, DWS) ensure ecological infrastructure is included in grant conditions or business plan in the case of municipally constructed and owned water infrastructure.
    - Ecological infrastructure is integrated into design of relevant components of the Water Resources Infrastructure Charge (WRIC) to manage ecological infrastructure contributes to the optimal functioning of the infrastructure.
    - Permitting systems (e.g. water use licence) ensure the integration of the ongoing O&M cost of ecological infrastructure into licence conditions.

        - Guidelines for Safeguards, Environmental Impact Assessment (EIA) and Environmental Management Plans (EMP) follow good practice to include methods for risk assessment and positive ecological impact outcomes that are costed and that clarify roles and responsibilities across relevant stakeholder groups.
- **The establishment of stable and capacitated institutions ensures that biodiversity and ecosystem services are adequately taken into account in water resource planning and management.** The establishment of CMAs is an important step in providing a more locally based water management institutions that can coordinate across the water sector and between different sectors. The need to strengthen the CMAs, as well as the Provincial and Local Authorities with which they interact is important when noting the degradation of resource quality across these catchments. The appointment of staff with the skills and experience to bridge the gap on incorporating ecological infrastructure in planning tools and resource management is needed. Similarly, the need to invest in more targeted actions such as WCWDM, strengthened regulation and improved compliance monitoring and enforcement requires a catchment-based approach and localised presence. The clarification of mandates, roles and responsibilities for implementing integrated water resource management is an essential part of this solution.
- **Relevant planning frameworks ensure responsive governance and deliver outcomes for biodiversity and ecosystem services that benefit water security.** The need to support socio-economic development, against a backdrop of climate uncertainty, will see water resources under increasing levels of demand. In some cases, it is clear that the development of infrastructure is an important part of ensuring ongoing water security, however there is recognition that in many catchments there are now only very limited infrastructure augmentation opportunities (DWS 2013b). This is creating a requirement to look for alternative options to improve the way that existing resources are developed and managed. This includes more cooperative approaches to resource management between land and water. Ensuring that relevant planning tools, such as catchment management strategies (CMSs), water reconciliation strategies and others, are developed with the inputs of other sectors, implemented and account for the role of biodiversity and ecosystem services in water security, in alignment with local planning frameworks such as IDPs, is essential.
- **Regulatory decision-making and authorisations incorporate biodiversity and ecosystem services, and that compliance monitoring and enforcement is effective, and that monitoring and information frameworks support both planning, finance and management**. Poor agriculture practices that impede the delivery of ecosystem services downstream will be addressed by investing in ecosystem rehabilitation focussed extension capacity in local institutions, local level planning (e.g. River Management and Maintenance Plan process in the Western Cape), and strengthened compliance monitoring and enforcement by environment, agriculture and water regulators. Regulatory penalties (through licencing and administrative penalties) and financial incentives (through water price signals) should further encourage adoption of good practices by landowners and ongoing maintenance of rehabilitated areas.

Successfully integrating biodiversity into planning, finance and development in the water sector for water security also requires that part of the long-term solution be committing to, supporting and enabling the social process involved in changing the way people make decisions necessary to factor

ecological infrastructure into the management of water[24]. Addressing the complex resource dilemma that integrated water resource management presents us with involves enhancing social learning and change towards a deeper appreciation of the value of biodiversity and ecosystems for water security.

3.2. Barriers

Linked to the root causes of threats to biodiversity identified above, there are three main barriers to integrating biodiversity and ecosystem services into the water value chain for improved water security. These are:

- Weak institutional capacity, poor alignment and coordination between institutions along the water value chain.
- The lack of sustainable financing for managing ecological infrastructure in catchments for water security outcomes.
- Natural capital accounts related to catchments and ecosystems are not regularly produced and linked to socio-economic information, and therefore do not support planning, policy and decision-making and investments in favour of ecological infrastructure for water security.

- These barriers are further elaborated in Table 2 below, and long-term solutions are proposed.

[24] The sorts of decisions that are made along the full length of the water value chain, such as those that relate to grazing and cultivation decisions in important catchments, how investment decisions are framed, or how responsibilities are allocated for maintaining and using water as a common good that future generations (our children and grandchildren) also need to use.

Table 2. Barriers to mainstreaming ecological infrastructure into infrastructure planning, finance and development for improved water security

Elaboration	Long term solution
Barrier 1. Weak institutional capacity and poor alignment and coordination between institutions along the water value chain.	
Weak institutional capacity within water management institutions (within the sector) and poor alignment and coordination between institutions along the water value chain (between sectors) account for many of the challenges in the implementation as well as enforcement of water resource protection programmes. This (a) exacerbates many of the pressures of biodiversity, and (b) presents a barrier to the long-term solution. Elaborating on this: • Institutions are not effectively aligned, vested with the necessary roles, responsibilities and capacities for effective integrated water resource management. DWS continues to strengthen its role in developing policy and providing regulatory oversight whilst also undertaking other institutional reforms. This creates uncertainty as to roles and responsibilities (e.g. recent uncertainty with regards to CMA delegated powers and duties). • Limited coordination between government departments responsible for environment, water, mining and agriculture is exacerbated by contested space between these departments, and different boundaries of planning and management between sectors. Poor alignment, for instance, in the procedures to issue licenses, in the various conditions that licenses stipulate and in the enforcement of the license conditions creates an environment of inadequate compliance, ineffective monitoring and enforcement and where unlawful activities abound. Limited coordination in planning across the water sector, and between sectors, means that relevant planning frameworks do not effectively ensure responsive governance or deliver outcomes for biodiversity and ecosystem services that benefit water security. As capacity is stretched there is concern about who is responsible for restoration and the effective hydrological performance of riparian ecosystems and catchments. • Resistance to change within and between institutions at the level of the individual is another aspect of this barrier. Deeply ingrained ideas and views of the world held in place by working in disciplinary silos make integrated approaches to planning and decision-making more challenging. Combined with the fact that non-traditional ways of working may be perceived as risky, particularly in the face of limited credible evidence (e.g. to support the	In order to strengthen institutional capacity and improve alignment and coordination between institutions along the water value chain so as to better enable the project objective and long-term solution there is a need to: • Support the establishment of stable and capacitated institutions and strengthening the capacity within these is important to ensuring that biodiversity and ecosystem services are adequately taken into account in water resource planning and management. CMAs in particular are important to providing a more locally based water management institution that can coordinate across the water sector and between different sectors. They should play a central role in overseeing and regulating how water resources are used and developed. Effective and capacitated CMAs will also help to ensure that relevant planning tools, such as catchment management strategies (CMSs), water reconciliation strategies and others, are developed, implemented and account for the role of biodiversity and ecosystem services in water security, in alignment with local planning frameworks such as IDPs. • Strengthen relevant policy frameworks, regulatory instruments and institutions to enable the integration of biodiversity and ecosystems services into water sector planning, finance and development. • Creation and support of thriving communities of practice, enabled through stakeholder engagement and cooperative governance, support sharing of challenges and experience amongst different stakeholders (horizontally across the water value chain), peers and colleagues (vertically within the water sector) will help to enable change. The language of biodiversity and ecosystems services is different to that of the water sector and this requires ongoing capacity building and engagement. Strategic knowledge sharing and learning exchanges that facilitate discussion, problem-solving and social learning are needed. As is demonstration and strengthening of the evidence base through monitoring and evaluation of impact, which will help to provide proof of concept and support choices to integrate ecological infrastructure into decisions made about planning, financing and development in the water sector.

Elaboration	Long term solution
contribution of ecological infrastructure to water security) or examples, this can exacerbate resistance to change in the decisions people make that are necessary to factor ecological infrastructure into the management of water. In professions such as engineering for instance, where significant professional liability burdens are carried, working in non-traditional ways presents significant risks.	Strengthening monitoring networks and integrated information systems is needed to provide data required needed for integrated planning.
Barrier 2. The lack of sustainable financing for managing ecological infrastructure in catchments for water security outcomes	
The true price of water is not reflected in the water tariff, there is a lack of sustainable and an inadequate revenue stream for ongoing rehabilitation and maintenance and the financial cost of the impacts and dependencies of built infrastructure on ecological infrastructure are not reflected or correctly allocated in project balance sheets, income statements, cash flows and the credit decision-making processes of infrastructure delivery. Elaborating on this: • Available funds are limited and the allocation of available funds for ecological infrastructure is funds is based on economic rather than water sector needs. For instance the EPWP focus on jobs predominantly instead seeking multiple outcomes in the form of job creation where environmental or water sector outcomes could also be optimised (links to Barrier 1 and lack of inter-governmental coordination is part of this). There is also no guarantee that budgets will be available at the right time for specific projects. The source of funds is removed from the impacts in the catchments, and the beneficiaries and users of water. • Financial allocations made at the wrong institutional level: The institutions charged with designing and implementing water resource infrastructure do not have the catchment level view required to realize the benefits of ecological infrastructure across the water cycle. The absence of strong CMAs is a key gap in this regard. • Providers of commercial finance have weak commercial incentive to require ecological infrastructure to be integrated into built infrastructure projects they are funding. The full extent of systemic economic risk from water resource fails has not yet been adequately costed and integrated into design and financial costs, although there is growing recognition both locally and internationally. While the institutions tasked with providing sustainable water resources have an in-built incentive to manage water-related ecological infrastructure, a	In order to improve sustainable financing for managing ecological infrastructure in catchments for water security outcomes there is a need to: • Create an enabling environment that provides a framework for opening new markets for private sector investment in ecological infrastructure learning from experience in the renewable energy sector and information and communication technologies (ICT) sector (cell phones). • Tools to value natural capital and integrated findings into project plans and budgets • Influence the allocation of available funds. Improved matching of funding to water-related ecological infrastructure which is of significance to the water resource such that public works investments are better prioritised to focus on the most important rehabilitation projects, and have improved follow-up and maintenance programmes that are not hampered by job-creation strictures in such employment programs. • Increase the available funds through the Water Resource Management Charges. Develop and increase a revenue stream from water charges to invest in ongoing protection and maintenance of elements of water ecosystems that promote water security. Includes more comprehensive and robust cost models and recalibrating elements of the water price for different user groups. Remove cap on agriculture and forestry Water Resource Management Charges, and other implicit subsidies that distort the water economy. • Support fully functional and capacitated CMAs, with the ability to identify key ecological infrastructure resources at a catchment level, and direct resources accordingly through formal planning mechanisms and ring-fenced revenue. • Financial tools are needed to enable full impacts and dependencies of infrastructure to be included in project design, finance and operations. While CMAs and the DWS are ultimately tasked with achieving sustainable water

Elaboration	Long term solution
commercial entity providing loan finance has in general little incentive beyond the commercial ability of the owning entity to repay the loan. • Innovative finance solutions often require public and private partnerships which are challenging in various ways and are the exception rather than the rule. In part the failure to consider ecological infrastructure solutions in water resource planning and development has to do with weak capacity and poorly integrated and coordinated intergovernmental planning instruments (Barrier 1). Poor intergovernmental cooperation and lack of agreement or guidance (for instance in the case of biodiversity offsets) results in decisions that may not optimise benefit to society and/ or environment and are unlikely to provide for sustainable financing solutions.	resources, the financial sector and financial intermediaries are powerful allies in terms of responsible investment, and ensuring that water resource investments take account of ecological infrastructure impacts and dependencies. • Convene strategic dialogues and facilitate processes to encourage collaboration between private (including landowners) and public sectors and civil society: Needed to enable new ways of working together to realise the opportunities and tackle the challenges of shared risks and develop innovative finance mechanisms.
Barrier 3. Natural capital accounts related to catchments and ecosystems are not regularly produced and linked to socio-economic information, and therefore do not support planning, policy and decision-making and investments in favour of ecological infrastructure for water security	
The value of accounts is fully realised only when there is a regular time series that can inform planning and decision-making. Insufficient resources to build on initial pilot accounts to produce accounts in time series, to show that they are useful. Elaborated: • Natural capital accounts are an interdisciplinary endeavour, involving, for example, economists, statisticians and national accountants. For ecosystem accounts, the involvement of ecologists is an additional essential requirement. All of these skills are relatively scarce in the South African context. Additionally, the data requirements are not necessarily well-understood, there is often lack of clarity on roles and responsibilities for collecting and managing the required data as well as geographic, temporal and methodological variability in its collection and curation. In some cases, the physical infrastructure for collecting data, such as rain gauges, is deteriorating, resulting in increasing reliance on modelled data that has not been not calibrated or ground-truthed. • There is a lack of resources to appoint appropriately skilled staff and to commit to ongoing production of natural capital accounts and a lack of specialist skills to produce and interpret natural capital accounts. The environmental accounting unit in Stats SA is small and stretched, and there is no embedded capacity in partner organisations to take forward the production of natural capital accounts. Technical methods for linking land and ecosystem accounts with water accounts have yet to be developed, and require further exploration	Long term solutions to natural capital accounts related to catchments and ecosystems are to: • Build on pilot ecosystem accounts and catchment-level water resource accounts. • Build capacity for the ongoing involvement of ecologists in natural capital accounts. • Understand and address data requirements, including systems and resources for producing data to support time-series natural capital accounts. • Improve capacity in the environmental accounting unit in Stats SA as well as specialist skills. • Convene a small community focused initially on ecosystem accounting, and to build this over time to focus on the full suite of natural capital accounts, for example through an annual forum and possibly a series of working groups. An iterative process is required to test the use of accounts by a range of users to build their awareness and to elicit feedback on improved ways of presenting the information from accounts.

Elaboration	Long term solution
if the accounts are to effectively inform management of water infrastructure and ecological infrastructure in catchments. Lack of resources to convene and host gatherings of such a community. Accounts that do exist are highly technical and the information from the accounts is not necessarily interpreted or presented in an accessible form. Lack of familiarity of potential users with natural capital accounts, and lack of understanding of the relevance of accounts to their work.	

4. Baseline

This section provides an overview of interventions, currently underway or planned, which enhance the integration of biodiversity and ecosystem services in support of water security in line with the project objective. While the baseline reflects a huge and diverse sector (water infrastructure) with a considerable foundation of policy, planning and some degree of implementation, both at the enabling and catchment level, it also reflects very little integration of biodiversity and ecosystem services into how this sector plans, makes decisions and operates. There are however, important opportunities to work from.

4.1 Baseline for Policy, Institutional, Planning and Regulatory Environment

- Policy implementation:
    - The NWRS has a chapter on ecological infrastructure for which there is an implementation plan and DWS is developing a National Water Security Plan which is likely to happen during the project timeframe.
    - NDP and the NWRS (edition 2) highlights the importance of establishing CMAs and the development of CMSs. It is envisaged that while revised formal delegations of certain mandates, powers and duties by DWS will still occur in 2016, significant effort will be required to translate what these mandates mean in practice. In particular, although the draft Water Pricing Strategy provides CMAs with the power to levy users for the costs of rehabilitating ecosystems with demonstrable water benefits, this has not yet been done anywhere beyond the basic calculations for invasive plant control. Likewise the Waste Discharge Charge System is yet to be implemented despite the fact that the system has been designed.
    - The water sector continues to manage water resources with the perspective of meeting demands and protecting key resources with the purpose of protecting what has been identified as being ecologically important or threatened. There is still not a full understanding of the role that ecological infrastructure plays in the management and development of resources. For this reason, the requirements of the Reserve are only in a few instances being effectively implemented.
- Establishing institutions:
    - There have been ongoing efforts to strengthen institutions including an ongoing relationship with the Dutch Waterschappen through a support programme. The latest phase of support know as Project Kingfisher is aiming at establishing twinning relationships between each CMA and a Dutch Waterschappen (Regional Water Authority). This relationship will develop a series of exchanges and aims to provide support to the new CMA with technical and institutional issues.
    - The continued loss of key staff is eroding the ability of DWS and the Proto-CMAs to effectively manage catchments. Each Proto-CMA is comprised of approximately 70-80 staff members that have the responsibility to manage areas in the order of 90 000 km^2. Estimates for staff compliments for the new CMAs are in the order of 130 staff members reflecting a significant shortage of staff. In addition, during recent meetings with Proto-CMAs as part of the water quality management policy development, it was clear that about 30% of staff member had only been in the DWS for less than 3 years.

4.2 Baseline for Water Infrastructure Development

- There is still a need for the development of large infrastructure, however, the NWRS (edition 2) notes that the options for these developments are becoming significantly fewer. This places the emphasis on the need for better operations and maintenance of existing infrastructure, a suite of supporting water conservation and demand management measures well as a need for a revised and strengthened approach towards the management of ecological infrastructure, in order to support

the former approaches. The kind of water infrastructure required to meet current and future water requirements is evolving as the options for the more traditional large surface water reservoir systems decrease. These are being augmented by various conventional and non-conventional interventions that include water conservation and demand management, water reuse, desalination, waste mitigation, green and ecological infrastructure.

- Changes in the way that infrastructure is developed, operated and maintained can be expected. Despite the ring-fencing of the National Water Resources Infrastructure Branch within DWS, there are still challenges with DWS being responsible for both the management and development of water resources. As a result, there is a process being initiated to establish a National Water and Sanitation Infrastructure Agency (NAWASIA). It is likely that this will result in the merger of the DWS Infrastructure Branch with the Trans Caledon Tunnel Authority that has the responsibility for the raising of finance for large infrastructure development as well as managing design and construction. This process will take place during the course of this GEF funded programme which will be able to influence the outcomes from this institutional reform.
- The NAWASIA will play a significant role in supporting the NIP aims to transform the economic landscape whilst simultaneously creating significant numbers of new jobs, and strengthen the delivery of basic services. Government intention was to invest R827 billion in building new and upgrading existing infrastructure over three years starting in 2013/14.
- Under the guidance of the Presidential Infrastructure Coordinating Committee (PICC) 18 strategic integrated projects (SIPS) have been developed. SIP18 is dedicated to water and sanitation and provides a 10-year plan to address the estimated backlog of adequate water supply to 1.4m households and basic sanitation to 2.1m households. A potential 19th SIP on Water Security and Ecological Infrastructure has been submitted to the PICC.
- From a water quality perspective, the country is slowly losing the fight with nutrient enrichment as we fail to effectively treat waste water in municipalities. Local government often does not have the resources to effectively operate and maintain treatment works, or upgrade these works to meet growing demands as a result of rapid urbanization. Limited enforcement means that mining and industrial effluents continue to have very significant impacts on the environment and water resources. Whilst DWS is busy developing a revised policy and strategy for the integrated management of water quality, it is the activities at catchment level that require urgent redress.
- DBSA is an important player in the water and sanitation sector, both as a financier and as an advisor and project promoter. The 2013-2014 Annual Report reported that 7.7% of its investments were in the water sector, investing US$ 989 million of US$ 12.7 billion dollars. These funds are often loans to municipalities to support developments in water including reticulation and provision of bulk water, sanitation, including reticulation, upgrading and construction of WWTW. DBSA has taken a policy decision to increase its focus on water and transport, with attention being largely towards bulk water and sanitation supply and water conservation and demand management. The current pipeline of projects in the Water and Sanitation sector is worth nearly U$ 2.7 billion. DBSA is therefore likely to invest more than US$ 15 million in 2016-2020 in the project areas. There is still a need for the development of large infrastructure, however, the NWRS (edition 2) does note that the options for these developments are becoming significantly fewer. This then places the emphasis on the need for better operations and maintenance of existing infrastructure, a suite of supporting water conservation and demand management measures well as a need for a revised and strengthened approach towards the management of ecological infrastructure, in order to support the former approaches more nationally.

4.3 Baseline for Financial And Fiscal Environment

- The existing fiscal and financial mechanisms that serve as channels for investments in ecological infrastructure include the proposed revisions of the national water pricing strategy, gazetted for comment in 2015, and the natural resource management projects undertaken under the auspices of

the national EPWP, in particular Land Care and the DEA's Working for Water and Working for Wetlands programmes.

  - National Water Pricing Strategy: In terms of recurrent or operational revenue to fund ecological infrastructure management (which is largely an operational activity), current water policy in South Africa provides a good framework to work within. The 2007 National Water Pricing Strategy provides a framework for recognising the true cost of providing water to the end user. This framework provides for a water tariff which includes various components. The 2015 revision gazetted for comment has not yet been approved, and further work is required to encourage the implementation of the pricing strategy to optimise the benefit to ecological infrastructure and biodiversity, within socio-economic constraints.
  - Natural Resource Management Programmes: Public works programmes in the Environmental and Culture Sector directed at natural resource management, such as LandCare (administered by DAFF) and Working for Water (implemented by DEA) are currently a major source of finance for management of ecological infrastructure. The Environmental Programmes of the DEA aims to "restore and maintain the structure and function of vegetation to contribute to ecosystem services by: clearing or treating 211 075 ha of invasive alien plants; and restoring and rehabilitating 30 083 ha of land by 2018/19." DAFF's Forestry and Natural Resource Management Programmes aims (among other goals) to restore and rehabilitate 48 900 hectares of agricultural land, and 1 500 hectares of state indigenous forests and woodlands by 2018/19. There have been consistent and growing concerns that these funds are not being targeted to areas which contain priority ecological infrastructure, and that the water security outcomes are not being prioritised. It is hoped that this work can assist with improved targeting of these funds in support of water security. Further details on these funds included in Annexure Detailed Baseline.

- Other fiscal and financial mechanisms that do not currently serve as channels for investments in ecological infrastructure but which hold opportunities for doing so, include:
  - Public sector grants: Water infrastructure plays a prominent role in national expenditure, with 14% of the total infrastructure budget in 2014/15 allocated to water and sanitation – R37.3 billion in 2014/15. However this investment is not aligned to, or complemented by, efforts to manage natural resources. While focused on water services rather than water resources, there are several public sector infrastructure grants which have frameworks which are flexible enough to incorporate ecological infrastructure. These include grants targeted at water services infrastructure, namely Water Services Infrastructure Grant, the Regional Bulk Infrastructure Grant and broader municipal infrastructure grants such as the Municipal Infrastructure Grant, and the metropolitan equivalent, the Urban Settlements Development Grant. Current research indicates that while the frameworks are amenable, more evidence is required of the ability for ecological infrastructure to benefit infrastructure targeted at poor communities in particular. The Annexure A3 contains the budget forecasts for the main national water infrastructure capital grants administered by the DWS, namely the Water Services Infrastructure Grant and Regional Bulk Infrastructure Grant, and the Urban Settlements Development Grant administered by the Cities Support Programme (CSP) within National Treasury for metropolitan municipalities.
- The private sector generally currently only considers the costs of ecological infrastructure in the projects they finance from a mitigation or impact perspective, where ecosystems concerns have been built into project appraisal processes. There is growing recognition of the impacts and dependencies on businesses of biodiversity and ecosystem services and as a result, interest from the both the public sector responsible for the development of water resources (such as the DBSA and TCTA), and the private investment sector in the development of tools to help ensure that investments in water infrastructure are responsible, and ensure improved water security.

- Finance institutions such as the DBSA already provide guidance to project developers and funding applicants about the approach they adopt at each stage of the investment value chain, and the standards which should be applied during project preparation and implementation. These are an extension of the DBSA's Environmental Appraisal Framework and the Social and Institutional Appraisal Guidelines, and are aligned with the work of other Global and African finance institutions and especially the Global Environmental Facility (GEF). This provides a powerful entry point for shaping how water infrastructure projects are developed, and the intention of this output is to use it to encourage the incorporation of water-related ecological infrastructure into the design and budgeting of water infrastructure projects, from the pre-feasibility stage, and to make private sector funding conditional on optimal use of ecological infrastructure in support of water infrastructure.
- Natural Capital Declaration (NCD) projects such as the Advancing Environmental Risk Management project aims to benefit from the collective expertise of the NCD's 40+ financial signatories, as well as supporting organisations, to develop approaches to risk management that are customised for different sectors and regions. The aim of this NCD-backed project is to support financial institutions in the process of embedding natural capital-related risks within risk assessment methods and decision-making tools. South Africa is one of the pilot countries of this initiative and linkages have been established with this project.
- Supportive work is underway in the private sector through a 3-year initiative by the International Finance Corporation (IFC) to support the incorporation of "natural capital" into banking decisions in SA. A connection has been established with this work-stream, which promotes the 6 Principles for Responsible Investment[25], of which the first and most relevant is the commitment by signatories to "incorporate (environmental, social and governance) issues into investment analysis and decision-making processes."
- The financial sector in South Africa has already begun to recognize water security as a key financial risk to it, and are open to discussing ways of supporting initiatives which reduce their financial risk. A connection has been made with a new grouping of financial investors who have independently requested the development of a tool to assist them with assessing the water-related risk of a project when making financial decisions.

- Other opportunities to explore leverage within the finance sector to increase investments in ecological infrastructure include:
  - There are high levels of interest in ecological infrastructure investments, with three key 2015 research initiatives within South Africa aimed at the financing of ecological infrastructure, funded by the WWF-SA, Green Fund, DEA, the DBSA, and the National Business Initiative (NBI). There are currently related donor funded programs, including a 3 year IFC programme to support banking regulators and associations on sustainable finance (www.ifc.org/sbn), and a Swiss program, funded by the Swiss (SECO), to build capacity, facilitate dialogue, and support technical work around environmental and social risk management across the financial sector.

4.4 Baseline for Natural Capital Accounting

- Stats SA has a small environmental-economic accounting unit, currently with three staff members and one vacancy. This unit currently produces mineral, energy and fisheries accounts, which are published annually in a compendium. National water accounts were produced by this unit in 2000 and updated in 2006. However, no further national water accounts have been produced owing to lack of capacity and data constraints. In addition, from 2017 onwards Stats SA will participate in a 3

[25] https://www.unpri.org/about/the-six-principles

year project entitled 'Natural capital accounting and valuation of ecosystem services'. The project is funded by the European Union and is aimed at assisting participating countries to advance the knowledge agenda on environmental and ecosystem accounting, initiate pilot testing of SEEA experimental ecosystem accounting, ecosystem valuation and macro-economic analysis. This will improve the management of natural biotic resources, ecosystems and their services at a national level and mainstream biodiversity and ecosystems in national level policy-planning and implementation. The project will build upon the outcome of, amongst others, the Norwegian funded project 'Advancing the SEEA experimental ecosystem accounting' on which our institutions collaborated in the past.

- The Water Research Commission (WRC) currently has a project on National Water Accounts for South Africa, with a budget of R1.8 million, which is aimed at revitalising water accounts for the country. The intention is that Stats SA will continue to produce these accounts in-house once the WRC project is completed in 2018. There is thus some certainty that national water accounts, which deal primarily with water use in the economy at a broad spatial scale, will continue to be produced. Owing to a range of data limitations, national water accounts can be disaggregated only to the scale of the nine Water Management Areas.
- The WRC currently has a project on catchment-level water resource accounts, with a budget of R1.8 million, building on a previous project (2013 – 2015) (reported in Clark, 2015) which had a budget of R2.5 million. Water resource accounts focus on availability and use of water at the sub-catchment scale and provide a useful complement to broad-scale national water accounts. In the first project the methodology was developed and piloted in a small number of catchments in summer rainfall areas. In the current project the methodology is being further developed and will also be applied in a catchment in the winter rainfall region of the country. There and there has been some initial engagement with stakeholders at CMA level. However, no plan is in place for this work to be taken forward beyond the current WRC project (scheduled to end in early 2019).
- Two sets of pilot ecosystem accounts were produced as part of South Africa's participation in the global Advancing Natural Capital Accounting (ANCA) project: national river ecosystem accounts, and land and ecosystem accounts for the province of KwaZulu-Natal. South Africa received funding of US$ 100 000 from the Government of Norway via United Nations Environment Programme (UNEP) to support this work. No further resources are available nationally to pursue this work, and methodologies for linking water accounts and ecosystem accounts have not yet been developed. There is potential for a second phase of the global ANCA project, which could provide additional resources for South Africa's participation, but this has not been confirmed.
- National water accounts are useful for informing broad strategic questions around the water intensity of particular economic sectors at the national level, and the implications of this for the economy and its development trajectory as a whole. However, they are of limited use for the planning and management of water-related infrastructure, ecological infrastructure and ecosystem services at the catchment level. In order for planning, management and decision-making at the catchment level to support effective management of built infrastructure and ecological infrastructure, a consistent set of catchment-level water resource accounts is needed, as well as links between water accounts, land accounts, ecosystem accounts and socio-economic information.

4.5 Baseline for Knowledge Management and Social Learning

- There is a wealth of experience and lessons in the project baseline linked to knowledge management and social learning. However, there is little coordination across the breadth of activities and projects, and awareness and understanding continue to be cited as a challenge. Some

of the most directly linked (thematically or geographically) initiatives, platforms and organisations are listed below[26].

- The uMngeni Ecological Infrastructure Partnership (UEIP) is a network involving government, civil society, private sector and academic institutions who partner (on a case-by-case basis) on initiatives that "recognise the role that investments in ecological infrastructure can play in the enhancement of water and sanitation services in the uMngeni catchment" (Pringle *et al*. 2015). SANBI resources and houses the UEIP coordinator to the value of approximately R500 000 in 2015/2016. The coordinator, among other roles, convenes the partnership's coordinating committee and sub-committee and supports the various networks established by the partnership. This work is ongoing. The UEIP partners make significant in-kind contributions. Funding from the Green Fund (approximately R3.5 million) supported two initiatives in the past year[27].
- The NBI is a coalition of South African and multinational companies that plays an important convening role in the water space by focusing on thought leadership (understanding key water issues, risks and opportunities), building capacity for effective management, and strengthening collective action for implementation. They do this through convening dialogues, which help to enhance capacity of NBI members and the wider private sector to engage in effective water management and address water-related risks. Capacity is further enhanced through training sessions and other NBI hosted workshops. While the NBI focuses significantly on the private sector, their work often involves and supports the public sector and civil society.
- The Strategic Water Partners Network (SWPN) promotes discussion and collaboration between public and private sector parties on water issues and improved management. The SWPN is a partnership between the public sector (primarily the DWS), the private sector and civil society working collectively to close a 17% gap between water supply and demand that is anticipated to manifest by the year 2030 in South Africa. Established in 2011, it strives to contribute to efficient, equitable and sustainable water supply and access to water for all South Africans through the identification and application of innovative and cost effective solutions and programmes. The NEPAD Business Foundation is the host and secretariat of the SWPN.
- The WRC supports research in key strategic areas (KSA) allowing for multidisciplinary studies focused on solving problems related to national needs and supporting society and the water sector. KSA 2 on Water-linked Ecosystems in particular supports research that strengthens the body of evidence for integrating ecological infrastructure into water security. The main objective of this KSA is the provision of knowledge to enable good environmental governance that supports sustainable utilisation and protection of aquatic ecosystems; and to develop an understanding of the ecological processes underlying the delivery of goods and services from water-linked ecosystems. Various WRC projects are relevant to the project. Further, the WRC:
    - Implements the Framework Programme for Research, Education and Training in the Water Sector (FETWater) that supports training and capacity building networks in integrated water resource management in South Africa. The WRC and partners therefore facilitate alignment between capacity building agencies, prioritise and develop relevant occupational qualifications, delivery and quality assurance systems with expert practitioners in line with National Skills Development Strategy IV and NWRS2 requirements.

[26] Given the wide ambit of knowledge management and social learning, many other organisations, platforms and learning networks are involved in knowledge management and learning activities that relate to the project, including UNEPFI, the IFC, the World Bank, WWF and the Natural Capital Finance Alliance.

[27] One of those initiatives was a research project to identify potential ecological infrastructure investments in the uMngeni catchment to support the integration of ecological and built infrastructure approaches to water resource management. This included strengthening the ability to systematically identify important water-related ecological infrastructure, and to accurately predict the costs and benefits of particular rehabilitation and management interventions.

    - Convenes a space for strategic thinking and integration of Research, Development and Innovation through the WRC Lighthouses to implement its five-year planning cycle to direct research in key national areas identified by the WRC. These Lighthouses are flagship programmes, and are trans-disciplinary and inter-institutional mega-projects that will examine priority water issues across the innovation value chain.
    - Holds WRC Dialogues on topical water issues affecting the South African public.
    - Supports knowledge management and sharing through its online platform, the WRC Knowledge Hub.
    - Is catalysing the conceptualisation and joint establishment of a Hydrological Centre for South Africa. The Centre will facilitate the curation of water, climate and other environmental data and serve to develop long-term monitoring infrastructure and networks.
- The Water Institute of Southern Africa (WISA) aims to promote professional excellence in the water sector through building expertise and sharing knowledge in ways that strengthen water resource management and improve quality of life. WISA is a voluntary water institution to which anyone can become a member. WISA is also a professional body registered with the South African Qualifications Authority. As such WISA is able to register professional designations specific to the water sector.
- The Centre for Municipal Research and Advice (CMRA) is a technical service provider in the field of local government. They aim to support and strengthen municipalities and Local Government Associations in Southern Africa. As part of their Local Government Capacity Programme, which aims to contribute to sustainable local economic development, the CMRA runs the Kingfisher Project. This Kingfisher Project is the result of a partnership between VNG International, the Association of Regional Water Authorities and the DWS. The objective of the Kingfisher project is to contribute to the improved integrated water resource management in South Africa by increasing the capabilities of CMA's to define and agree on internal procedures and CMS's, to increase their ability to implement their CMS and finally to increase their capability to identify and relate to external stakeholders.
- WESSA (the Wildlife and Environment Society of South Africa) is an NGO with a track record of enabling individuals and organisations to use natural resources sustainably. Their critical focus areas of work include environmental education and training, conservation of biodiversity and water resources, climate change mitigation and adaptation, and environmental governance. WESSA's Environmental Governance Programme promotes effective environmental governance and is focused on the thematic areas of Water and Biodiversity, with environmental education and human capacity development having been identified as major catalysts to social change in these priority areas.
- SANBI plays a role in generating, coordinating and interpreting the knowledge and evidence required to support policies and decisions relating to all aspects of biodiversity. SANBI's Biodiversity Knowledge and Information Management strategy supports "greater efficiency in tacit and codified knowledge resource management and wide, equitable access to value-added biodiversity information for South Africa". SANBI manages several learning networks through which lessons are shared, including the Freshwater Ecosystem Network which meets annually.

4.6 Baseline for the Berg-Breede and Greater uMngeni systems

	Berg-Breede	Greater uMngeni
Water security	The WCWSS studies have reflected that the system needs to be augmented by 2019. This will continue through the Berg River-Voelvlei Augmentation Scheme and through the Breede-Berg Water Transfer Scheme. The removal of invasive alien plants is recognised in the WCWSS Reconciliation Strategy as being important in terms of increasing water availability. Equally the study notes the critical importance of WCWDM in that it is estimated to potentially save 90 million m3/year. Without a focused initiative to pull these disparate elements together there will be a need for further system augmentation by 2019 (DWA 2009).	Even with completion of Spring Grove Dam the uMngeni system is under considerable pressure to meet increased water demand. Under a scenario of strengthened WCWDM the system is essentially already in deficit and will require augmentation. The new dam at Smithfield on the uMkhomazi will resolve the immediate deficit, with longer options including infrastructure the proposed Langa dam or the Impendle dam. There is thus a need to look to alternatives beyond traditional built infrastructure in order to meet demands. The reconciliation studies outline the need to look to water re-use and desalinisation (DWA 2009b).
CMA, plans and RQOs	• The **Breede Gouritz CMA** emerged from the initial Breede Overberg CMA in 2013. In response to this institutional shift the CMA is currently extending its draft 2011 CMS to include the old Gouritz Water Management Area. The Business Case for the establishment of the **Berg Olifants CMA** was finalised in April 2015, and it is anticipated that the Minister will appoint the Board and finalise the delegation of functions to the CMA in 2017. • Although some informative studies have been initiated, including the verification and validation of water use and the setting of RQOs, there is no comprehensive CMS in place for the Berg. The Western Cape Water Supply System reconciliation strategy studies was developed in 2009. Both CMAs would be responsible for managing water resources in the area previously served by the Western Cape Water Supply System (WCWSS). • RQOs exist for most parts of the Breede system and are being developed for the Berg system but are not yet finalised. There is a gap in understanding of how to implement RQOs in practice, often as the mandates for catchment management stretches across an array of differing departments and institutions that are responsible for land use activities. The coordination required is complex and does require dedicated resources.	• Extensive public participation processes took place during 2000-2005, culminating in the establishment of the Mvoti-Mzimkulu CMA in May 2005. DWS's Institutional Reforms and Realignment programme recommended a revised water management area called the **Pongola to uMzimkulu Water Management Area** with one CMA. The Mvoti to uMzimkulu CMA was disestablished and the staff that would be transferred to the new CMA were ring-fenced into the Proto-CMA. **The Pongola-uMzimkulu CMA was legally established in May 2014** and the appointment of the Governing Board is expected in 2016. • The water reconciliation strategy study for the KwaZulu-Natal Coastal Metropolitan Areas was completed in 2009 and was focused upon ensuring sustainable water supply to the greater Durban coastal region. The development of a CMS of the water management area will be the next significant planning intervention after the CMA has been formally operationalised. • DWS has led the development of the management classes and the RQOs for the uMngeni.

	Berg-Breede	Greater uMngeni
Local organisations	• The Berg and Breede Rivers have an extensive network of irrigation boards and WUAs which provide operational support at localised levels. A number of Irrigation Boards have been effectively transformed into Water User Associations (WUA) under the NWA, among them the Zonderend WUA in the Breede. The Berg Main Irrigation Board manages 11 smaller irrigation boards or schemes under it. The transformation of irrigation boards into WUAs has been a lengthy and difficult process due to the nature of water use authorisations and the failure to effectively introduce water allocation reform. In addition, to this the process has been further halted due to the policy uncertainty regarding WUAs and how the DWS would like to see them established and managed. • These institutions also play a key role in local compliance monitoring as well as an important revenue collection role as billing agents for the DWS. At the beginning of the transformation process the Western Cape had 108 irrigation boards of which 61 were in the Breede water management area and 19 were in the Berg water management area. Many of these were being amalgamated to from larger WUAs which would include representation from nature conservation authorities as well as local government. • The institutions responsible for water services in this system are largely competent and resourced. City of Cape Town, Cape Winelands and the Overberg District Municipalities have the function of leading the Integrated Development Planning across the greater Western Cape Water Supply System. There are considerable number of local municipalities that fall within this area and that have water service provision functions as well as local land use planning. They do not have a mandate to issue environmental authorisations and work closely with the provincial Department of Environmental Affairs and Development Planning in this regard. Capacity constraints within the local municipalities do exist.	• WUAs have not been as extensively used in this water management area as they have in the Western Cape. This has also been exacerbated by the slow progress in transforming Irrigation Boards established under previous legislation. • The institutions responsible for water services in this system are largely very competent and resourced. Umgeni Water is the second largest water utility in South Africa, supplying over 453 million cubic metres of bulk potable water annually to six Water Services Authorities. Umgeni Water Board also performs an array of supportive roles towards improved water resource management. They have had a strong focus on water quality monitoring over the years that has provided a useful database. • uMgungundlovu and Harry Gwala District Municipalities, as well as eThekwini Metropolitan Municipality, have the function of leading the Integrated Development Planning across the Greater uMngeni system. There are considerable number of local municipalities that fall within this area and that have water service provision functions as well as local land use planning. Capacity constraints within the local municipalities are considerable and is exacerbated by inadequate income streams due to the high levels of poverty across the catchment. Municipalities cannot issue environmental authorisations and therefore work closely with the provincial environmental department.

	Berg-Breede	Greater uMngeni
NRM investments	• DEA's Natural Resource Management programme has significant budgets to control invasive alien plants in the Breede and Berg systems. In the last three years NRM has undertaken significant programmes, focused on the use of labour intensive approaches, to improve the control of invasive plants and by so doing improve the quality of ecological infrastructure. The Breede Gouritz CMA has initiated certain invasive alien plant removal projects in the middle Breede (through the local irrigation board) and Sonderend Rivers (through the Zonderend WUA). An amount of R500 000 per annum has been committed by the Breede Gouritz CMA to the latter for seven years, although the required funding is likely orders of magnitude more than this, this has reflected the recognition by the CMA of the value add this programme brings. These funds have leveraged additional investment from the WUA (R200 000 per year 3 years) and individual farmers. There are not sufficient funds for coordination, planning, innovation or scaling up the work to the required level. • The baseline of hectares cleared and maintained, through DEA's Natural Resource Management Programmes, in the project area in 2016 is 5 849 hectares. This has generated 11 181 person days of employment opportunities. • Provincial LandCare programme investing approximately R500 000 per annum of funds for clearing and a further R2 million per annum in rehabilitation projects in the Berg and Breede rivers, with no projects on the Sonderend River. In addition, LandCare has funded compilation of River Maintenance & Management Plans (RMMPs) to improve landowner compliance and guide programmatic investment. • WWF-SA has invested around R1,3 million per annum in the Sonderend from 2013-2016 and is actively searching for similar resources from corporates through their Water Balance programme. Much of these resources have been through the DEA NRM Land User Incentives programme in the past. However, WWF-SA are now supporting the WUA to apply for their own funds from NRM for alien clearing and rehabilitation. It is difficult to meet the LUI targets on person day costs as the invasive alien clearing is slow and difficult in riparian wetland conditions and active restoration expensive. It is unlikely that more than R2 million per annum will be available from government programmes for restoration in the Sonderend system, and the unpredictable nature of corporate funds for NGO programmes may mean that the work could stop any time.	• The DEA NRM Programmes are primarily funded via the Expanded Public Works Programme and have been supporting the clearing of IAPs and subsequent rehabilitation interventions in priority areas. • The baseline of hectares cleared and maintained, through DEA's Natural Resource Management Programmes, in the project area in 2016 is 28 676 hectares. This has generated 206 834 person days of employment opportunities. • There is significant demand between priority sub-quaternary catchments for key services in the uMngeni catchment and includes Midmar (40,000ha), Albert Falls (27,000ha), and Henley/PMB (16,000ha) Dam catchments and the areas in which the NRM Programmes are active. DEA NRM are therefore considered to be an important investor in ecological infrastructure in these catchments. To date efforts do appear to be disparate, noting that the needs are significant and resources are often very limited. DEA NRM are busy planning a suite of new interventions within the Greater uMngeni system, but in the face of very significant needs there is concern that focused impact will not be achieved. In this regard the Institute for Natural Resources (INR) are providing assistance to the NRM programme in finding more effective operational approaches and is aimed at improving the levels of coordination.

<table>
<tr><th></th><th>Berg-Breede</th><th>Greater uMngeni</th></tr>
<tr><td>Infrastructure investments</td><td>

The City of Cape Town is leading water resource infrastructure planning in the WCWSS with an annual capital outlay of around R1,5 billion. Two augmentation options have been identified that it may need to pursue through infrastructure investments by 2019 – the Raising of the Voelvlei dam, and building a diversion weir at the base of Michell's pass below Ceres. In both cases, there are opportunities to clear and rehabilitate the catchments (Klein Berg, and Upper Breede/ Witels rivers, respectively) feeding them. Additional augmentation will also be required to replace the water abstracted from these rivers upstream of the existing supply schemes such as Brandvlei dam. The province is planning to raise the Brandvlei dam to expand irrigation agriculture by 4500ha in the Breede valley, despite the river being over- allocated.
TCTA is engaged in a number of smaller projects in the Berg catchment. The bulk water supply to the Tulbagh region is being further enhanced through the construction of Tulbagh (pipeline, storage dam, water treat works); Woseley (reservoir, pump station, pipeline); Prince Alfred Hamlet (pipeline and booster pump station) – all due for completion in 2019.
Furthermore, a new bulk sewer is being constructed from the East bank of the Berg River to the Paarl WWTW. Lastly, extension work is being undertaken at the Stellenbosch WWTW to a 35 Mℓ/day competency and conversion of the existing works to a full biological nutrient removal process. These are due for completion during 2016.

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Spring Grove dam has been the latest addition to this suite of infrastructure. The implementing agent for the development of this dam was TCTA, on behalf of DWS. The total cost of development was R582 million. The next significant developments will be on the uMkhomazi River at Smithfield and further into the future, as necessary, the Impendle Dam. The Smithfield Dam is currently still in the planning phases and is undertaking Environmental Impact Assessments. Estimated costs to develop this dam are in the order of R2 018 million. Further investments include the Northern Aqueduct which will supply water to the greater eThekwini area. The expected costs will be in the order of R800 million, which will be funded by the DBSA, a European grant for R100 million as well as a loan from the African Development Bank for R700 million. In support of this R5 million will be expended on ecological infrastructure management and maintenance.

Existing dams on the Greater uMngeni system (Umgeni Water Board, 2016)
<table>
<tr><th>Impoundment</th><th>River</th><th>Capacity (mill m³)</th><th>Purpose</th></tr>
<tr><td>Spring Grove Dam</td><td>Mooi</td><td>139.5</td><td>Domestic</td></tr>
<tr><td>Craigie Burn Dam</td><td>Mnyamvubu</td><td>23.5</td><td>Irrigation</td></tr>
<tr><td>Mearns Weir</td><td>Mooi</td><td>5.1</td><td>Domestic</td></tr>
<tr><td>Midmar Dam</td><td>uMngeni</td><td>235.4</td><td>Domestic</td></tr>
<tr><td>Albert Falls Dam</td><td>uMngeni</td><td>289.1</td><td>Domestic</td></tr>
<tr><td>Nagle Dam</td><td>uMngeni</td><td>23.2</td><td>Domestic</td></tr>
<tr><td>Inanda Dam</td><td>uMngeni</td><td>241.7</td><td>Domestic</td></tr>
</table>
</td></tr>
<tr><td>Coordination initiatives</td><td>

The Berg River Improvement Program was launched in 2012, but recent progress on this initiative seems to have flagged without strong DWS support and resources. Although quite wide ranging, there is a particular focus on water quality issues. Despite it not being the core mandate of the provincial environment department, DEA&DP anchors some key investments to rehabilitate wetlands or create artificial wetlands to mitigate the microbial pollution. However, these are out for tender and final budgets do not seem to have been allocated.
A Berg River Clearing and Rehabilitation Forum exists, and one is planned for the Breede River, but the irrigation boards and WUAs cannot engage to the desired levels, largely due to the lack of dedicated staff.

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The establishment of the UEIP in November 2013 through the signing of a Memorandum of Understanding (MoU) has pulled together a network of stakeholders, including government, the private sector, academia and NGOs, with an interest in realising improvements in the management and maintenance of ecological infrastructure. The appointment of a UEIP coordinator by SANBI and the development of a UEIP 20 year strategy has assisted in providing capacity and highlighting priorities for this programme of work. The UEIP could play a key coordinating role between the complex array of institutions and mandates, but without more resources and potentially a more formalised institutional mandate there is a danger that the UEIP will not gain the traction that it could.

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	Berg-Breede	Greater uMngeni
Aligned initiatives focusing on ecological infrastructure	• The City of Cape Town, in partnership with The Nature Conservancy, announced plans to establish a Water Fund by end of 2017. The Fund would aim to safeguard water supplies and biodiversity while supporting local livelihoods, and is focused on the Atlantis aquifer, outside of the Berg river system, but within the WMA. Its primary source of funding is aimed at philanthropic sources. • The GEF 5 programme on mainstreaming biodiversity into land use regulation and management at the municipal scale and is providing support within the Berg River catchment by working with the Cape Winelands District Municipality. This project is designed to address challenges by (a) strengthening cooperation, coordination and capacity of municipal and other regulatory authorities that regulate land use decisions to incorporate criteria to avoid/prevent, minimize and/or offset impacts on biodiversity, and improve compliance monitoring and enforcement, and (b) introducing mechanisms in collaboration with private and communal land owners to better protect critical biodiversity areas and manage land, while demonstrating the potential of biodiversity to create jobs and contribute to economic growth.	• The SANBI Green Fund supported the UEIP and a study that targeted investing in ecological infrastructure to enhance water security in the uMngeni river catchment. This study provides a rich resource for understanding the challenges that exist in improving the status of ecological infrastructure. • The GEF 5 programme on mainstreaming biodiversity into land use regulation and management at the municipal scale and is providing support within the uMngeni catchment by working with the uMgungundlovu District Municipality. • The Adaptation Fund is funding an initiative to reduce climate vulnerability and increase the resilience and adaptive capacity in rural and peri-urban settlements and small-scale farmers in productive landscapes in the uMgungundlovu District Municipality. This programme was initiated in December 2015 and will be completed in December 2020, providing US$7.5 million of support. The specific sites include low-lying high-density settlements, the rural area of Ward 8 of Vulindlela, Msunduzi Local Municipality, the rural farming area of Ward 8 of Swayimane, uMshwathi Local Municipality and the rural area of Ward 5 of Nhlazuka, Richmond Local Municipality. • Currently, WWF is working alongside landowners, agri-business and finance role-players to explore innovative ways of investing in ecological infrastructure that unlocks sustainable value and delivers water benefits to nature and the environment. There is specific focus on the dairy industry in the upper uMngeni and Mooi Rivers. • The INR is assisting the DEA NRM programme by looking at ways to maximise benefits and improve the effectiveness of the NRM Programmes in the uMngeni River Catchment. This will also map ecosystem services in the uMngeni catchment, and using the outputs, identify and compare priority areas for further investment. The INR is also working with the Lloyds Register Foundation and a range of international academic institutions to look at water security through the lenses of urban water security, transboundary water security and water quality security. The uMngeni and Kafue River (Zambia) catchments are cased studies for this project. • The University of Kwa Zulu- Natal are undertaking a WRC study looking at catchment-scale water resource accounts in the uMngeni and Breede Rivers.

5. Stakeholder analysis

This section summarises in Table 3 the organisations and their roles in water resource and infrastructure planning, finance and development and outlines indicative project roles at national, provincial and local level.

Table 3. List of stakeholders and their roles in water resource and infrastructure planning, finance and development

Stakeholder	Branch/Unit	Function	Indicative project roles & responsibilities
Dept. of Water & Sanitation (DWS)	Various branches	National department responsible for water and sanitation. Overseas national water resource planning, classification and RQO processes, licensing processes; guides development of national information management (Chapter 14 of NWA), institutional reforms and the development of policy and strategy.	Supports improved planning instruments, the connectivity to the classification and RQI processes. Supports and guides improved authorisation processes, systemising of data and information. Provides interface on policy issues to Top Management. Support the development of operational policy guides such as the CMS. Data provider for production of water-related natural capital accounts. Potential user of natural capital accounts. Institutional oversight supports institutional clarifications, capacitation of CMAs and linkages to Catchment Management Forums.
Dept. of Environmental Affairs (DEA)	Biodiversity and Conservation, NRM	National department responsible for environmental affairs, including developing national environmental indicators and reporting on South Africa's commitments to the CBD. Other capital grant disbursing national sector departments	Support and guide on key policy issues. User of natural capital accounts. Focal point for SA's participation in the CBD and the Gaborone Declaration for Sustainability in Africa. Active partners in Component 2 of this project, they will assist in the planning of interventions to remove IAPs and rehabilitate riparian and wetland systems
Dept. of Agriculture, Forestry & Fisheries (DAFF)	Water Use and Irrigation Development; LandCare	Department of Agriculture, Fishing and Forestry, through their mandate in agricultural areas, and programmes such as Land Care. Oversight on the water use agricultural interface in terms of authorizing higher water fees for agricultural users. Other capital grant disbursing dept.	Support in terms of land practices linked to agriculture. DAFF's LandCare programme, including its WaterCare focus area, involved in work to develop a framework for improved operating protocols. Target audience for lessons on improved implementing arrangements for biodiversity and ecosystem maintenance and rehabilitation.
National Treasury		Ensuring the efficient allocation of scarce state resources	Key ally in promoting the user-pays principle. No direct project role, but key partner. User of natural capital accounts.
Statistics SA (Stats SA)		National Statistics Office of South Africa, responsible for producing official statistics.	Overall responsibility for producing natural capital accounts, working in partnership with other organs of state. Lead role in producing National Water Accounts.
Cooperative Governance & Traditional Affairs	COGTA	Approves many of the infrastructure business plans submitted by municipalities under broader grant windows (e.g. Municipal Infrastructure Grants). Other capital grant disbursing national sector departments	If successful, later years will entail engagement with these departments to improve the integration of ecological infrastructure into relevant capital grant mechanisms.
Dept. of Public Works (DPW)	Expanded Public Works Programme	Funds many labour intensive projects which address natural resource management.	Peripheral goal, to improve the targeting of natural resource management projects which receive funding under the EPWP umbrella.
Public or state owned entities	DBSA	Drives financial and non-financial investments in the social and economic infrastructure sectors. Prioritized water, energy, transport and ICT as its key focus areas.	Implementing agency for the GEF. Interest in integrating biodiversity criteria into finance instruments. User of natural capital accounts.

Stakeholder	Branch/Unit	Function	Indicative project roles & responsibilities
	Water Research Commission (WRC)	Public agency falling under DWS, responsible for research related to the management and use of water resources and water ecosystems.	Key role in coordinating component 3, and in co-financing development of catchment-level water resource and ecosystem accounts.
	Council for Scientific and Industrial Research (CSIR)	Public agency mandated to undertake research, including on natural resources and the environment	Provision of technical expertise related to development and interpretation of natural capital accounts.
	South African National Biodiversity Institute (SANBI)	Public agency falling under DEA. Mandate to monitor and report on the state of SA's biodiversity, and providing science-based policy advice related to the conservation and management of biodiversity.	Executing agency responsible for project management; convening project steering committee (PSC); coordinator of work under outcomes 1.1 and 1.2 and 3
	Trans-Caledon Tunnel Authority (TCTA)	Facilitates water security through the planning, financing and implementation of bulk raw water infrastructure, in most cost-effective manner for the benefit of water users	Key sector stakeholder and potential role-player in supporting integration of ecological infrastructure in planning and prefeasibility analysis of infrastructure projects, learning from existing and setting guidance for future offsets, and financial interventions.
Water Management Institution	CMAs and/or DWS Regional Offices (Proto-CMA)	Public agencies mandated with integrated water resource management at the WMA level. They currently have tariff-setting powers defined in the NWA, which have been under-utilised to date. Functions include supporting implementation of the NWRS; developing and implementing the CMS; institutional development and sector coordination; facilitating water use authorisations; monitoring the status of the resource; support the implementation of the pricing strategy; compliance monitoring and enforcement; stakeholder coordination.	Potentially key knowledge hub within the region. Key partners in both of the demonstration catchments (Component 2) and a target user/audience in Component 1 and 3. Breede Gouritz CMA and Berg Proto CMA (in the process of assuming functions) and Pongola to uMzimkulu CMA (gazetted in 2014) have key role in supporting Component 2. Facilitate a range of project activities within the water management area as well as provide the conduit for demonstration lessons into policy, strategy and guidelines at national level. As the central institution within the water management area they will play a key role in coordinating and liaising with a range of stakeholders. Become a focal point for coordination of planning and prioritisation of ecological infrastructure restoration. House a dedicated champion that performs an extension function to its constituencies.
	Catchment Management Forums	Platform for multiple stakeholders to engage on water related matters	Information sharing and capacity development
	WUAs	Oversee local infrastructure and water use. The Zonderend WUA and Berg Irrigation Board manage water allocation and use among its members	Operational aspects regarding ecological infrastructure. Host a Rehabilitation Coordinator, implement at least one project on riparian restoration and deliver extension and training to water users and rehabilitation contractors. Pilot water quality improvement through ecological infrastructure.
KwaZulu-Natal (KZN)	Ezemvelo KZN Wildlife	Provincial authority responsible for the management and conservation of biodiversity in KwaZulu-Natal	Provision of data for catchment-level ecosystem accounts.
	Provincial departments	KZN Department of Agriculture and Rural Development and Dept. of Economic Development, Tourism and Environmental Affairs.	Support the development of Catchment Management Strategies. Support to cooperative approaches to regulatory functions and compliance monitoring and enforcement.
Western Cape (WC)	CapeNature	Provincial authority responsible for the management and conservation of biodiversity in the Western Cape	Provision of data for catchment-level ecosystem accounts.

Stakeholder	Branch/Unit	Function	Indicative project roles & responsibilities
	Provincial departments	Western Cape Department of Environmental Affairs and Development Planning (DEAD&P) and Western Cape Department of Agriculture.	Support the development of Catchment Management Strategies. Support to cooperative approaches to regulatory functions and compliance monitoring and enforcement.
Municipalities		Lead for local economic development and land use management. Including Ethekwini Metropolitan Municipality, uMgungundlovu and Harry Gwala District Municipalities in KZN and Cape Town Metropolitan Municipality, West Coast, Winelands and Overberg District Municipalities in the Western Cape.	Responsible for planning, budgeting, service delivery, local economic development and spatial development planning, the role of these municipalities would be to support integrated planning aligned with the CMS. Partners in Component 2 in terms of support of interventions in the catchments. Support for compliance monitoring and enforcement in their areas of jurisdiction. Support operational aspects regarding ecological infrastructure.
	Water service authorities	Municipalities, responsible for water services development planning	Indirect role through engagement in demonstration catchments, and working to improve integration between CMSs and WDSPs (and therefore IDPs and Spatial Development Framework (SDFs)).
	Water service providers	Municipalities and regional water boards	Only as required depending of the nature of the proposed catchment interventions.
Academic	Applied research organisations	Several applied research organisations will be involved in this project. Some still to be identified by will include: Centre for Water Resources Research at University of KwaZulu-Natal (UKZN); INR.	Role in applied research (such as related to producing catchment-level water resource accounts), teaching and capacity building related to hydrology and water resources research.
NGOs and CSOs	NGOs/ Civil society / Community organisations	Advocate for specific ecological infrastructure, biodiversity and community issues, including representing the issues of vulnerable groups (gender, youth and persons with disabilities). Several NGOs operating nationally and locally are key partners in the project: WWF-SA, WESSA, Living Lands, EWT, DUCT, and CMRA. Other NGOs and CSOs will become involved through the knowledge management and social learning for change strategy.	Support on technical, social and economic issues (related to Component 1), practical input and supporting implementation in demonstration areas (Component 2) and aspects of knowledge management and social learning (Component 3). They play a particularly important role in bridging between private and public sector stakeholders and representing the interests of biodiversity and community issues.
Partnerships / coalitions	Multi-stakeholder, voluntary partnerships / coalitions	Several multi-stakeholder, voluntary partnerships / coalitions play an important convening and coordinating role in the water space, such as NBI, SWPN, and UEIP.	Support interventions with regard to Component 2 and 3. Provide targeted technical and operational capacity to bridge barriers and enhance project impact and sustainability, particularly at the catchment level and in bringing together private, public and civil society sectors to develop and implement catchment-wide solutions to water security.

Part II. Strategy

6. Project Rationale and Policy Conformity

6.1 Project alignment with the GEF Focal Area Strategy and Strategic Programme

The project is aligned with the GEF Biodiversity Focal Area Strategy which aims to maintain globally significant biodiversity and the ecosystem goods and services that it provides to society. To achieve this the Biodiversity Strategy has four objectives reflected in four focal areas. This project will contribute to Focal Area 4, to "Mainstream Biodiversity Conservation and Sustainable Use into Production Landscapes/Seascapes and Sectors", and within that, to Programme 10 which supports the "Integration of Biodiversity and Ecosystem Services into Development & Finance Planning". The outcome and indicator for Programme 10 are reflected in Table 4 below.

Table 4: Project contribution to focal area, outcomes and indicators of GEF 6 Biodiversity Strategy

GEF 6 Biodiversity Focal Area	Programme	Expected Outcomes	Indicators
BD 4: Mainstream Biodiversity Conservation and Sustainable Use into Production Landscapes/Seascapes and Sectors	Programme 10: Integration of Biodiversity and Ecosystem Services into Development & Finance Planning	Outcome 10.1 Biodiversity values and ecosystem service values integrated into accounting systems and internalized in development and finance policy and land-use planning and decision-making.	Indicator 10. 1 The degree to which biodiversity values and ecosystem service values are internalized in development, finance policy and land-use planning and decision making.

The project has chosen to focus "development and finance planning" on the water sector in light of South Africa's pressures to improve water service delivery in support of development and the focus on investments in infrastructure as a lever for development. The existence of SIP 18 to address the slow pace of water sector infrastructure development further underscores South Africa's recognition of the connection between service delivery in the water sector and development. This project further recognizes the opportunity for well-functioning biodiversity to contribute to improving water security through the delivery of water-related ecosystem services. The project thus seeks to improve the alignment between the planning, finance and development of water sector infrastructure and biodiversity in order to contribute to water security, the SDGs and deliver global environmental benefits.

The project responds to a need to address water service delivery in a context of rising water scarcity and increasing demands. The project aims to ensure infrastructure planners and funders address risks related to natural capital impacts and dependencies by creating an enabling environment and following up on this throughout the value chain of water infrastructure projects.

The project has interpreted "biodiversity values and ecosystem service values" broadly and beyond monetization. Drawing on the Natural Capital Protocol, values are recognized in terms of the relative importance, worth or usefulness to people in a particular context (for example water security). Valuation therefore refers to the process of estimating the relative importance, worth or usefulness of biodiversity and ecosystem services to people and can be qualitative, quantitative, monetary or a combination of these. "Accounting systems" are taken to include natural capital accounting in the context of national accounting systems, project level impact accounting as well as relevant tariff calculations, such as the water tariff. "Development and finance policy and land-use planning and decision-making" is interpreted to mean be the full range of institutional mechanisms that impact on the management of water and land. The "degree to which" biodiversity and ecosystem service values are internalized is taken to include policies influenced, tariff structures influenced, guides/tools to support mainstreaming developed and used and private finance influenced.

6.2 Project alignment with the DBSA Strategy

The project is directly aligned to the DBSA's strategic objectives and mandate of providing sustainable infrastructure project preparation, financing and implementation support within South Africa and regional economic integration. The DBSA has identified the water sector as a key social infrastructure sector for financing. The Bank is particularly concerned with pursuing an integrated approach to addressing the water security particularly with regard to the food, water, energy and biodiversity nexus. Financing sustainable bulk and reticulation solutions within the water sector, requires supporting sustainable (equitable, efficient, effective) resource management to improve water security (both quantity and quality). The key focus of this project, namely to develop an enabling environment for mainstreaming the value of ecosystem services into development policy, planning and financial incentives is thus directly aligned to the core mandate of the DBSA.

Ad hoc, inconsistent and poor natural capital management results in poor water quantity and quality, damaged infrastructure, shortened life span of infrastructure, inefficient use of resources, increased social inequality, environmental disasters, economic loss, social conflict and reputational risk of the financial institutions involved. The project provides a critical opportunity for the DBSA to identify and test how biodiversity and ecosystem values can be appropriately financed within the water infrastructure delivery cycle. Failure to respond to increasing pressure on natural resources will lead to increased incidences of poor project performance against anticipated project outcomes and increased incidences of project failures.

6.3 Rationale and summary of the GEF Alternative

Despite interventions since 1994 to improve capacity to manage biodiversity, South Africa is still experiencing high rates of biodiversity loss and there are ongoing pressures on biodiversity, particularly from demands on water resources. The root causes of these pressures on biodiversity are complex, relating to institutional, regulatory, planning, economic and social issues. There is currently a massive focus on development policy and finance in order to address the infrastructure backlog and thereby boost economic growth, and more specifically, to address the backlog in service delivery from water and sanitation infrastructure. However, the role of biodiversity in contributing to water security, and the impacts and dependencies of infrastructure on natural capital, are insufficiently recognised or internalised into water sector development and finance planning.

To address this, and the threats and root causes described in Section 2.3 above, the project proposes "to develop policy and capacity incentives for mainstreaming biodiversity and ecosystem values into national, regional and local development policy and finance in the water sector, demonstrated in two water catchments" (to result in what is referred to as the GEF alternative). The overarching goal that this project will contribute towards is that "Integrating biodiversity and ecosystem services into planning, finance and development in the water sector improves water security".

The GEF alternative will achieve the project objective and contribute towards the goal through interventions that:

- strengthen the enabling environment for integrating biodiversity and ecosystem services to improve water security including through:
    - developing natural capital accounts,
    - influencing applicable policy frameworks, regulatory instruments and institutions,
    - supporting the operationalization of mechanisms for financing ongoing rehabilitation and maintenance of biodiversity and ecosystem services, including supporting project-level impact accounting.
- test the application of policies and financial mechanisms to improve water security in the above demonstration catchments.

- improve the integration of biodiversity and ecosystem services into the water value chain through strengthening social learning, credible evidence, and knowledge management.

The project will thus work at a national enabling level as well as in two sets of catchments, the Berg-Breede system and the Greater uMngeni system of catchments, which fall across global biodiversity hotspots and national priority areas for biodiversity that are under threat from a range of pressures, including infrastructure development. The project will implement the GEF alternative to address the loss of biodiversity from the business as usual scenario and in doing so, will deliver global environmental benefits (section 15).

The project has interpreted "policy" as policies at all levels (including national, regional and local), "capacity" as institutions strengthened, individual capacity built, tools developed, etc. and "incentives" using a broad interpretation of incentives as interventions that encourage a shift or change towards the mainstreaming of biodiversity. "Mainstreaming" is understood in terms of the GEF definition of mainstreaming; biodiversity and ecosystems values as described above; "national, regional and local" includes all levels, including national, provincial, catchment, district and local. "Development policy and finance" is described above.

7. Project Goal, Objective, Outcomes, Outputs and Activities

The project's **goal** is that **"Integrating biodiversity and ecosystem services into planning, finance and development in the water sector improves water security"**.

The project's **objective** is **"To develop policy and capacity incentives for mainstreaming biodiversity and ecosystems values into national, regional and local development policy and finance and demonstrated in two water catchments"**.

To achieve the above objective, significant barriers (see Section 3.2) will have to be overcome to address the threats to biodiversity and their root causes. With this in mind the projects has been organised in three components which will operate interdependently to integrate biodiversity and ecosystem service values into national, regional and local development policy and finance in the water sector. The indicator in support of this objective is: "*Water-related ecosystems services maintained in over 200 000 hectares of riverine ecosystems by removal of invasive alien plants, and rehabilitation of riparian zonesand dryland and wetland rehabilitation*."

The three components are as follows:

- Component 1: **Enabling environment is strengthened** for improving water security through the integration of biodiversity and ecosystem services in the water value chain.
- Component 2: **Application of policies and financial mechanisms** in the water value chain **improves water security** in critical catchments.
- Component 3: **Social learning, credible evidence, and knowledge management improves** the integration of biodiversity and ecosystem services into the water value chain.

Figure 23 reflects the structure of the project in terms of the components and their outcomes. The components and project outcomes are fundamentally interdependent, mutually supportive and cross-cutting. The nested boxes and dotted arrows in Figure 23 illustrate the interdependence of the components. Interventions are needed in the enabling environment (component 1) in order to support interventions in the catchments that improve water security (component 2). Interventions tested in the catchments (component 2) will seek to influence policy (component 1) to ensure replication, scalability and sustainability. Interventions in support of social learning and strengthening capacity of targeted stakeholders (component 3) are required in order to enable interventions in both the enabling and catchment levels (components 1 and 2). Similarly, the

coordination and generation of evidence, supported by effective knowledge management (component 3) will ensure the necessary evidence and lessons from interventions in the catchments (component 2) in order to influence policies at the enabling level (component 1) and practices in catchments (component 2).

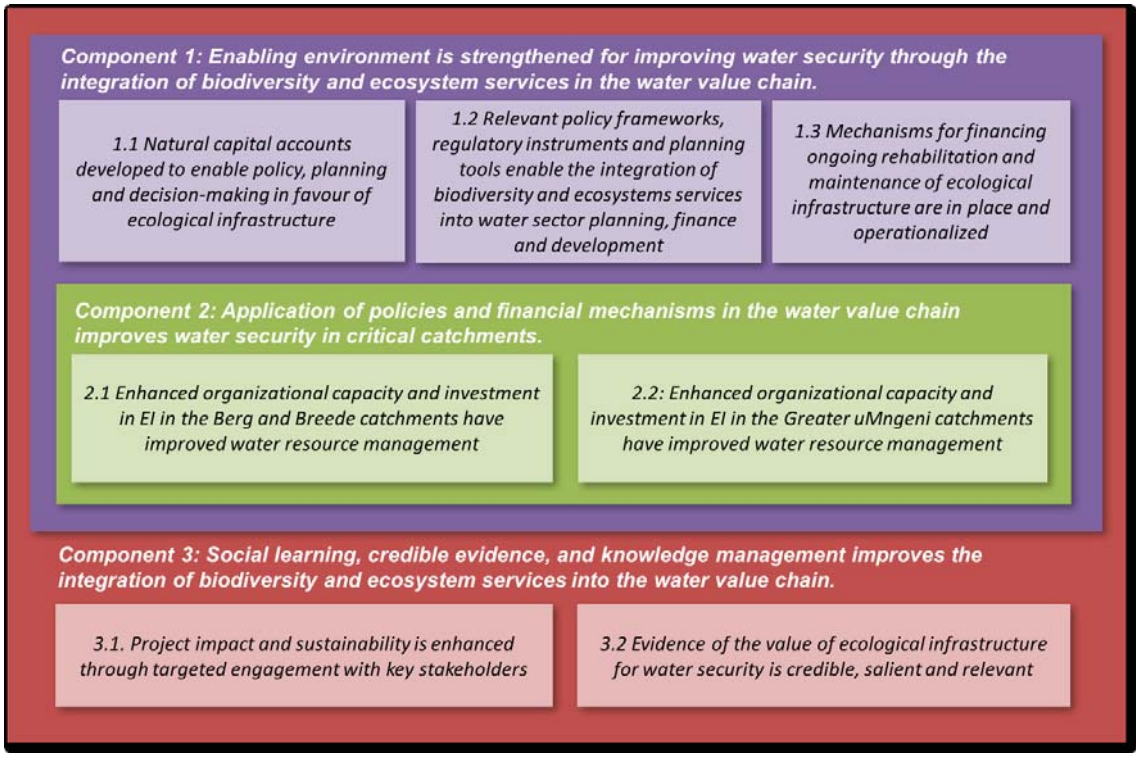

Figure 23 Structure of the project, components and their outcomes

The outcomes proposed in respect of the three components and the outputs necessary to achieve the outcomes are described below and captured in table format. This is followed by a description of the high-level activities necessary to support the achievement of each of the outputs and outcomes.

8.1 Component 1: Enabling environment is strengthened for improving water security through the integration of biodiversity and ecosystem services in the water value chain.

Component 1 of the project focuses on addressing key barriers that hinder the integration of biodiversity and ecosystem services into current approaches to improve water security. These barriers include the limited integration of biodiversity into national accounting systems, policies, institutions, as well as regulatory and management tools linked to water infrastructure planning, development and finance. The outcomes of this component focus on the statutory instruments (policy, law, regulation), the enabling tools (financial, compliance, monitoring) and the various planning frameworks to facilitate the mainstreaming of biodiversity and ecosystems into processes that enable water security. In doing so, the project will work closely with DWS, CMAs, DEA, DAFF, Stats SA, National Treasury and TCTA, as well as networks and institutions that finance or support the finance of infrastructure, including finance institutions such as the DBSA, TCTA, UNEPFI, the World Bank's WAVES[28] programme, and global and national sustainable finance initiatives. The

[28] Wealth Accounting and the Valuation of Ecosystem Services (WAVES) is a World Bank-led global partnership that aims to promote sustainable development by ensuring that natural resources are mainstreamed in development planning and national economic accounts.

project will support a positive impact towards socially, economic and ecologically sustainable development through mobilising resources into responsible infrastructure investment.

Outcome 1.1 Natural capital accounts developed to enable policy, planning and decision-making in favour of ecological infrastructure

This outcome deals with the production and application of natural capital accounts in support of their eventual integration into national accounting systems. The outcome has two outputs: Output 1.1.1 deals with producing natural capital accounts, at the national level and the catchment level, and testing their application with key users. Output 1.1.2 deals with putting in place the capacity, institutional arrangements and data foundations needed for ongoing regular production of accounts.

Outcomes	Outputs
1.1 Natural capital accounts developed to enable policy, planning and decision-making in favour of ecological infrastructure. *(Indicator 1.1: One set of national ecosystem accounts published by Stats SA. One set of catchment-level ecosystem accounts published within each demo catchment.)*	1.1.1 Natural capital accounts are developed at the national level and the catchment level, and tested for informing planning, management and monitoring of ecological infrastructure for water security. 1.1.2 Capacity, institutional arrangements and time series data to enable regular production of relevant NC accounts are established or strengthened.

Outcome 1.1 will be achieved through the following outputs and activities:

Output 1.1.1. Natural capital accounts are developed at the national level and the catchment level, and tested for informing planning, management and monitoring of ecological infrastructure for water security.

The accounts envisaged to be produced as part of Output 1.1.1 include national land and ecosystem accounts, catchment-level water resource accounts, and catchment level ecosystem accounts (for example, accounts for ecological infrastructure assets). This work will be coordinated by a NCA project lead in SANBI with support from a NCA project manager to be appointed within SANBI and the Environmental Accounting Unit at StatsSA who would undertake some of the work including building on their existing WRC funded project on national water accounts. Specialists consultants will help with particular aspects and UKZN will be closely involved in the work on catchment-level water resource accounts. A key challenge is to develop technical methods for linking land, ecosystem and water accounts at the catchment level, as well as to link the accounts with relevant socio-economic information. This involves working across traditional disciplinary boundaries. The application of the accounts will be piloted in the demonstration catchments, in partnership with CMAs/proto-CMAs and other stakeholders. Close alignment with the work undertaken in Outcome 1.3 on financing infrastructure will be ensured, including links with approaches emerging from various private sector initiatives on accounting for impacts and dependencies on natural capital at the project level. While drawing on the UN's SEEA methodology in the development of these accounts, this work will also include engagement with related global accounting initiatives and methodologies such as those being piloted in the World Bank's WAVES programme.

Output 1.1.2. Capacity, institutional arrangements and time series data to enable regular production of relevant NC accounts are established or strengthened.

The activities envisaged as part of Output 1.1.2 include building the capacity and expertise needed for natural capital accounting, recognising Stats SA's lead role as well as the potential supporting role of other key partners; and assessing gaps in the data foundations that are necessary for priority natural capital accounts and determining how these can best be filled. This work will be coordinated by the NCA lead and project manager in SANBI with support of specialist consultants were necessary and in close collaboration with StatsSA, DWS and other relevant national departments or agencies. This work will be guided by the Strategic Advisory Group for Ecosystem Accounting, which was

established as part of the ANCA project but with no resources or impetus for long-term functioning. The focus of the Strategic Advisory Group may be broadened from ecosystem accounting to natural capital accounting more broadly. In addition, the work of this Outcome will be supported through the establishment of a community of practice on natural capital accounting in South Africa, which will provide a forum for sharing lessons and experiences and providing momentum for further progress.

Outcome 1.2 Relevant policy frameworks, regulatory instruments and planning tools enable the integration of biodiversity and ecosystem services into water sector planning, finance and development

Outcome 1.2 will address the policy frameworks, regulatory instruments and planning tools for water resource management. The mainstreaming of biodiversity and ecosystem services into these overarching frameworks and instruments is critical in ensuring support for actions within catchments, and provides the basis for sustainability, scalability and replication in other catchments. Outcome 1.2 is therefore structured to address the policies that guide interventions and the regulations and planning tools that give effect to policy. Capacity considerations are central to this discussion.

Outcome 1.2 has two outputs reflected in the table below:

Outcomes	**Outputs**
1.2 Relevant policy frameworks, regulatory instruments and institutions enable the integration of biodiversity and ecosystems services into water sector planning, finance and development *(Indicator 1.2: 1 national policy reflects the importance of ecological infrastructure; Regulatory instruments support the integration of ecological infrastructure in 2 catchments)*	1.2.1. National water policies, strategies and regulatory instruments applicable to water, such as the National Water and Sanitation Strategy (3rd Edition NWRS) and the National Water Security Plan, reflect the importance of ecological infrastructure for water security 1.2.2. Planning applicable to water resource management and water resource development supported to integrate biodiversity and ecological infrastructure considerations for water security

Outcome 1.2 will be achieved through the following outputs and activities:

Output 1.2.1. National water policies, strategies and regulatory instruments applicable to water, such as the National Water and Sanitation Strategy (3rd Edition NWRS) and the National Water Security Plan, reflect the importance of ecological infrastructure for water security.

This output supports the DWS in the review of the current NWRS (2nd Edition) with specific focus on the mainstreaming of biodiversity and ecosystem services. In its current format, the NWRS includes a chapter on the protection of water resources where core concepts of biodiversity and ecosystem services have been introduced. This has been the first edition of the NWRS to introduce these concepts and their importance for water resource management. In the review of the second edition of the NWRS it will be important to assess the impact this has had on management of water resources which inform input into the development of the third edition of the NWRS, currently being considered as a National Water and Sanitation Strategy. Other relevant water sector policy instruments, such as the development a National Water Security Plan, are also important policy levers to influence as they will set the direction for how biodiversity is considered in the management of water resources. Where it makes sense to do so, engagement with other sector policies that offer opportunities to support water security through integration of biodiversity and ecosystem services (e.g. agriculture) will be pursued.

Noting that offsets are often required as part of mitigating the impacts of infrastructure development, support will strengthen the further development and application of offsets policy frameworks (especially those focusing on biodiversity and wetlands) in relation to water infrastructure to streamline implementation and maximize benefits to water security. This will result in the development of guidance for offsets triggered by future developments.

RQOs, including the Ecological Reserve,[29] are the water sector's primary instrument for protecting water resources and have implications for the management of water, land and biodiversity. The project support the continued development and implementation of RQOs particularly at a CMA level.

While there are considerable challenges in creating aligned and integrated authorisation processes across departments and resource management sectors, there is recognition of the importance of developing an integrated system. This will be supported through providing appropriate support to efforts to streamline and integrate regulatory systems across government, as well as through activities that seek to strengthen the practice of setting water use license conditions (particularly for developments with significant water impacts) through requirements for implementation, the minimum information required to process and issue water use licenses, conditions for developments with significant water impacts, especially for mitigation and proactive ecological infrastructure management that benefits water security.

The project will contribute to this through building the capacity of DWS CME officers (at national and catchment level, as well as other sector departments and agencies) regarding the protection and maintenance of biodiversity with a focus on improved water security. Opportunities for DWS to strengthen its approach to the regulation of unlawful activities, such as supporting the development of administrative penalties, will be explored as part of the development of the third edition of the NWRS.

Output 1.2.2. Planning applicable to water resource management and water resource development supported to integrate biodiversity and ecological infrastructure considerations for water security.

Currently, the focus in water resource management is to consider biodiversity and ecosystem services to support important aquatic ecosystems. Biodiversity and ecosystem services are currently not adequately considered during the pre-feasibility and feasibility analyses for dams and other water sector infrastructure developments. Drawing on experiences where this has been attempted, this output will develop recommendations for DWS Planning and Options Analysis, such as for Terms of Reference for hydrological, yield, sedimentation, biodiversity and other input studies that are conducted in the pre-feasibility and feasibility stages of infrastructure development. In doing so, this output looks to strengthen the role that biodiversity and ecosystems play in supporting water delivery by introducing biodiversity considerations into the planning and options analysis that is undertaken for future water sector infrastructure developments. This could include guidance in terms of reflecting these considerations in the core water supply system reconciliation strategies.

There is currently only limited connectivity between natural resource management programmes that manage, maintain and rehabilitate ecological infrastructure and the development of the plans and strategies for water resource management and water resource development. The project aims

[29] The NWA ensures that water for basic human needs and the environment is 'reserved' or set aside before water is allocated for other uses. The concept of the Ecological Reserve is entrenched in the NWA and given effect in the process of determining the RQOs which includes setting the Reserve (the Reserve is a component of the RQO) for each water resource.

to strengthen these relationships through mechanisms to improve the prioritisation of rehabilitation projects towards water and biodiversity outcomes. In doing, the programme will work with the DEA NRM programme and other related Expanded Public Works Programmes such as DAFF's LandCare programme including its WaterCare focus area to develop a framework for improved operating protocols.

Catchment Management Strategies (CMS) are pivotal instruments for the management of water resources at catchment or Water Management Area scale. The timing of the project presents an opportunity to support and guide the development of CMSs with the focus of managing and maintaining biodiversity and ecosystem services in support of water security. This output will engage with relevant institutions to develop approaches and methods for incorporating these aspects into Catchment Management Strategies. This will include revisiting guidelines that pertain to CMS development, examining the current practise of CMS development and identifying and addressing opportunities to strengthen how biodiversity and ecosystem services are integrated into CMSs. To date only two Catchment Management Strategies have been developed, so it is expected that this piece of work will offer recommendations to potentially influence a further seven strategies.

Outcome 1.3 Mechanisms for financing restoration and ongoing rehabilitation and maintenance of ecological infrastructure are in place and operationalized

This outcome entails the presence of operational and effective mechanisms to finance restoration and ongoing rehabilitation and maintenance of water-related ecological infrastructure. In addition to supporting the implementation of the Water Pricing Strategy (output 1.3.1), the project will engage with and build on the work and tools of a range of networks and finance institutions in the global and local community to develop a tool/method that maps the risks and dependencies of water infrastructure on natural capital (ecological infrastructure components). The intention is to embed these considerations in the models and tools used by finance institutions such as those used to assess credit and investment risk, scenario modelling, frameworks and indicators used for corporate reporting (e.g. sustainability) (output 1.3.2). Linkages between accounting for natural capital impacts and dependencies at the project level, and the work in Outcome 1.1 on natural capital accounting at the catchment scale, will be explored to enable synergies between the accounting approaches at these two difference scales wherever possible. Relationships that have been established and will be built upon in this work include with UNEPFI, the IFC, the Sustainability Banking Network, Natural Capital Finance Alliance, the World Bank and through the project's executing agency, the DBSA.

These outputs are further discussed below.

Outcomes	**Outputs**
1.3 Mechanisms for financing restoration and ongoing rehabilitation and maintenance of ecological infrastructure are tested and operationalized *(Indicator 1.3: Completion of foundational work in catchments to enable operationalization of ecological infrastructure components of the Water Pricing Strategy. Tool/method implemented to strengthen the assessment and management of environmental risk within investment decision-making.)*	1.3.1. The management of water-related ecological infrastructure is progressively being incorporated into the cost of catchment management in line with the Water Pricing Strategy and other new and emerging policies and strategies. 1.3.2. Method/tool is developed for the finance sector to strengthen the assessment and management of environmental risk within investment decision-making linked to water infrastructure finance.

Outcome 1.3 will be achieved through the following outputs and activities:

Output 1.3.1. The management of water-related ecological infrastructure is progressively being incorporated into the cost of catchment management in line with the Water Pricing Strategy and other new and emerging policies and strategies

The NWA recognised that the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users. It also recognised the need for the integrated management of all aspects of water resources and, where appropriate, the delegation of management functions to a regional or catchment level. The policy environment already provides a supportive context for the funding of ecological infrastructure in support of water resource management, and the 2015 revision of the Water Pricing Strategy, pending approval in 2016, further enables this.

However, implementation of the Act in terms of establishment of CMAs with full management responsibilities, and full application of the user-pays principles for funding all aspects of water resource management has not yet occurred. The focus of this output is on working with DWS and the demonstration catchments to progressively and collaboratively implement the water pricing strategy to the benefit of ecological infrastructure management activities in specific catchments, and improved water security in general.

The proposed activities entail working with the demonstration catchments to establish the work required to integrate and manage water-related ecological infrastructure in their catchments in support of ensuring sustainable water use by all users. Once these ecological infrastructure-related management activities have been identified, their costs will be reconciled with the current Water Resource Management Charge in those catchments. This can then form the basis for discussion around measures to close the funding gap, should one be identified. Possibilities include increasing the relevant charges within the raw water tariff, use of other related government funds such as the EPWP funding window which is already used for many natural resource management activities, or working with relevant landowners to provide incentives to manage ecological infrastructure on their land to the benefit of the water resource. While the particular activities are not yet certain, the desired outcome is the application of the user-pays principle to the rehabilitation and maintenance of water-related ecological infrastructure, a goal supported by National Treasury, in order to provide a sustainable revenue source for the ongoing management of ecological infrastructure to the benefit of improved water security in specific catchments. This could also include piloting the implementation of the Waste Discharge Charge System and working with DWS to revise appendix A of the Water Pricing Strategy as necessary to incorporate ecological infrastructure “assets” & costs into the price setting process.

Output 1.3.2 Method/tool is developed for the finance sector to strengthen the assessment and management of environmental risk within investment decision-making linked to water infrastructure finance.

The transition to a decarbonized, resilient and inclusive economy requires that natural capital (ecological infrastructure particularly) impacts and dependencies are understood, valued, equitably apportioned, measured, reported on and lessons for scaling up are shared. The convergence of national level innovation with the goals and ambitions of international frameworks such as the SDGs, the Sendai Framework and the Paris Agreement creates pathways for promoting green finance in the broadest sense. Similarly, the finance sector realises a pure risk based approach will not lead to mobilizing resources to achieving the SDGs. It has to seek opportunities for positive environmental and social outcomes and open new markets to scale up private sector capital investments in the green economy. This is seen as an important opportunity to contribute towards addressing poverty and improving efficiencies and equity between competing uses. In support of this, principles, strategies, methods, tools and best practice case studies will be drawn on and shared through global

networks such as from UNEPFI, WAVES, the Natural Capital Financial Alliance and global and national Sustainable Banking initiatives.

In South Africa, there is interest from both the public sector responsible for the development of water infrastructure (such as the DBSA and TCTA), and the private investment sector, in the development of tools and methods to help ensure that investments in water infrastructure are socially, environmentally and financially responsible, and contribute appropriately to improved water security. Investment in built water infrastructure is implicitly dependent on the services delivered into the water value chain by ecological infrastructure. However, current financing protocols are focused on negative impacts of investment and construction as opposed to upstream dependencies.

This output seeks to enable an explicit assessment of the dependence of new built infrastructure projects on ecological infrastructure, in order to permit the internalization of some of the necessary costs for active restoration and maintenance of that ecological infrastructure into project costs. It represents a fundamental shift from impact mitigation to co-investment and recognizes ecological and built infrastructure as interdependent elements of the water value chain. This would build on existing tools and initiatives underway to better address environmental externalities of projects financed by finance institutions. The financial sector would benefit from the calculation of the "true" cost of water, which should be incorporated into their financial models to ensure that should regulatory conditions change, their business models still hold. Linking back to the previous output under 1.3.1, even if CMAs are not able to increase the water tariff as necessary, the availability of this information to the private sector will be useful in the development of more robust business models where water is a key input.

High level activities include engaging with and building on the tools and experience of global networks such as UNEPFI, WAVES, the Natural Capital Financial Alliance and global and national Sustainable Banking initiatives. The project will work directly with South African finance institutions, particularly the DBSA, to develop a tool/method to enable finance institutions to incorporate ecological infrastructure into project approval processes for financing water infrastructure, and in so doing to encourage the incorporation of upstream and adjacent ecological infrastructure in the planning and prefeasibility stages of water infrastructure development. The existing tools used in project approval processes that this project might seek to influence include those used to assess credit and investment risk, scenario modelling, frameworks and indicators used for corporate reporting (e.g. sustainability), and others. This will include exploring the need for guidance around natural capital valuation as a means to promote sustainability in water sector development, including through mechanisms such as cross subsidisation, and in terms of the principles of polluter pays, precautionary, subsidiarity and intergenerational, inter-geographical and social equity and how to apply these across the water sector value chain. Linkages between this work and the work in Outcome 1.1 on natural capital accounting at the catchment scale, will be explored to enable synergies between the accounting approaches at these two difference scales wherever possible.

Similarly, the project will work with interested private sector infrastructure funders (which may include Old Mutual, Investment Solutions, RMB, Pension Funds, etc.) to improve understanding of the potential for water related ecological infrastructure to reduce financial risk, both at the project and systemic level linked to water security issues in South Africa. Finally, there is an opportunity to work with DWS to ensure that ecological infrastructure is incorporated in business plans submitted for grant funding of water infrastructure such as through the Regional Bulk Infrastructure Grant and the Water Services Infrastructure Grant.

8.2 Component 2: Application of policies and financial mechanisms in the water value chain improves water security in critical catchments

Continued degradation and loss of critical biodiversity areas and ecosystem services within the Berg and Breede and Greater uMngeni catchments will have dire implications for the ability of the CMA to sustainably provide water of a quantity, quality and assurance of supply required by users. Component 2 focuses on the application of approaches that integrate biodiversity and ecosystem services into water resource management in support of water security in the Berg-Breede (outcome 2.1) and the Greater uMngeni (outcome 2.2) catchments. The project will address key institutional, operational, regulatory and financial challenges that exist in mainstreaming biodiversity and ecosystem services considerations into water resource management and water resource development in both systems. These outcomes will also require engagement with land and natural resource use planning, regulation and compliance processes and policy frameworks within the provincial and local spheres of government to ensure alignment of planning frameworks and processes for water outcomes.

To do this, this component looks at:

- Strengthening CMAs including through support to the development of CMSs,
- Enabling a more coordinated and targeted approach, across an array of actors, in terms of maintaining and rehabilitating ecological infrastructure,
- Exploring the use of various funding mechanisms to support this work; and
- Influencing investments in ecological infrastructure to support built infrastructure, drawing on lessons learned from infrastructure development.

The success and sustainability of the catchment-based work undertaken in component 2 depends on leadership and championship by the CMAs under whose jurisdiction these catchments fall, and working closely with national DWS and DEA NRM as well as provincial departments, municipalities and other relevant organisations. The use of existing local platforms such as the UEIP and Catchment Management Forums will capitalise on existing relationships and networks in building the engagement required for more integrated approaches.

Outcome 2.1 Enhanced organizational capacity and investment in ecological infrastructure in the Berg and Breede catchments have improved water resource management

The Berg River has both quality and quantity problems, the former of which may be mitigated by restoring riparian ecosystem integrity. Clearing the remaining riparian infestations should also substantially improve water availability. The Breede has mainly a quantity problem, and the most effective way to address this is the removal of the massive infestations of invasive alien plants on the Sonderend.

Outcomes	**Outputs**
2.1 Enhanced organizational capacity and investment in ecological infrastructure in the Berg and Breede catchments have improved water resource management *(Indicator 2.1: Number of hectares of catchment better managed through CMS implementation* *Number of wetlands rehabilitated* *Number of hectares of land rehabilitated)*	2.1.1. Institutional capacity within in the Breede and Riviersonderend catchments to identify, plan, budget for, assess benefits of and manage ecological infrastructure investments has been strengthened 2.1.2 Full costs of rehabilitation and maintenance of water-related ecological infrastructure and associated CME are determined in order to support the mainstreaming of ecological infrastructure into the financing of water resource management and development

Outcome 2.1 will be achieved through the following outputs and activities:

Output 2.1.1. Institutional capacity within in the Breede and Riviersonderend catchments to identify, plan, budget for, assess benefits of and manage ecological infrastructure investments has been strengthened

The Breede Gouritz CMA is the key institution to oversee planning and resourcing of ecological rehabilitation in the Breede basin. The CMA is already investing its own funds and coordinating with WUAs. A major tributary of the Breede, the Sonderend River is becoming heavily infested with invading trees and is likely to be the quickest and most effective place to demonstrate the benefits of improving ecological infrastructure for water outcomes.

Support to the Breede Gouritz CMA will be provided through the appointment and deployment of an Ecological Infrastructure Coordinator to the CMA for the duration of the project, to work to with the CMA and other stakeholders to:

- Act as the focal point to coordinate project activities in the Berg-Breede catchments;
- Manage the development of an ecological infrastructure plan and implementation strategy for the CMA (focusing on priority sub-catchments) as part of the detailed CMS development process;
- Undertake a Baseline assessment for quantity and quality Indicators at strategic points in catchments to provide Baseline data above and below any rehabilitation interventions coordinated through the project;
- Engage with IDP and SDF processes of affected District and Local Municipalities to ensure alignment with the CMS in general, and the ecological infrastructure plan in particular;
- Oversee implementation of CMA funded or aligned ecological restoration projects;
- Convene of a CMA "learning network", supported by resources in component 3, on rehabilitation and maintenance of ecological infrastructure that feeds into the Catchment Management Forums to build broader capacity across the region and encourage land users to change behaviours;
- Coordinate costing studies and support their uptake in CMA tariff setting processes under output 2.1.3;
- Investigate, in support of Outcome 1.1, how Natural Capital Accounts can support the CMS development;
- Support relevant stakeholders to investigate appropriate and innovative monitoring mechanisms for assessing ecological infrastructure performance, flow benefits, water quality improvement against RQOs and act on findings of investigation.

Support will also be provided via a full-time staff member appointed to support the Sonderend WUA and Berg River Irrigation Board. This Ecological Infrastructure Coordinator will work closely with his/her counterpart in the Berg Proto CMA, as well as other stakeholders to coordinate the rehabilitation of key ecological infrastructure. Importantly, this will include the monitoring of the results and water-related impacts of interventions. This reporting will be collated and made available to a range of actors and stakeholders.

In conjunction with the DEA NRM programmes, the Ecological Infrastructure Coordinator will support the development and implementation of a plan for targeted ecological infrastructure interventions (including tree removal, flood control berm removal, post clearing restoration, biomass use and training of contractors in key skills gaps, primarily in Sonderend). Opportunities to develop bankable projects for off-project investment (e.g. through innovative private sector finance) to mitigate pollution and determine key conditions of success for implementation through the Waste Discharge Charge System, municipal or provincial grant funding, or other innovative financial instruments, will also be explored. Opportunities to engage with and where possible support social learning opportunities, in conjunction with existing learning networks (e.g. of provincial departments and local NGOs) will be pursued.

Output 2.1.2 Full costs of rehabilitation and maintenance of water-related ecological infrastructure and associated CME are determined in order to support the mainstreaming of ecological infrastructure into the financing of water resource management and development

This output will determine the full costs of rehabilitating and maintaining water-related ecological infrastructure and associated CME in order to contribute to a more complete understanding of what is required to ensure that the resource is managed and developed sustainably. This will include assisting stakeholders to:

- Determine the full cost of water-related ecological infrastructure rehabilitation and maintenance, including invasive alien plant control and subsequent ecosystem rehabilitation, appropriate water weed control, and Waste Discharge Mitigation charges in the Berg catchment.
- Determine the full cost of associated license, inspection and enforcement capacity.

Outcome 2.2 Enhanced organizational capacity and investment in ecological infrastructure in the Greater uMngeni catchment have improved water resource management

Outcomes	**Outputs**
2.2 Enhanced organizational capacity and investment in ecological infrastructure in the Greater uMngeni catchments have improved water resource management *(Indicator 2.2: Number of hectares of catchment better managed* *Number of wetlands rehabilitated* *Number of hectares of land rehabilitated)*	2.2.1 Institutional capacity within in the Greater uMngeni catchment to identify, plan, budget for, assess benefits of and manage ecological infrastructure investments has been strengthened 2.2.2. Full costs of rehabilitation and maintenance of water-related ecological infrastructure and associated CME are determined in order to support the mainstreaming of ecological infrastructure into the financing of water resource management and development 2.2.3. Planning, prefeasibility, and licensing for infrastructure development has addressed the management and mainstreaming of ecological infrastructure, using examples such as the uMkhomazi Smithfield Dam, Spring Grove, Kamberg and Hlatikulu

Outcome 2.2 will be achieved through the following outputs and activities:

Output 2.2.1. Institutional capacity within in the Greater uMngeni catchment to identify, plan, budget for, assess benefits of and manage ecological infrastructure investments has been strengthened

Capacity in the Greater uMngeni catchment will be strengthened through appointing a full time Greater uMngeni Coordinator with responsibility for:

- Coordinating the implementation of GEF 6 activities and partnerships in the Greater uMngeni demo;
- Support the continued functioning of the UEIP including; and
- Coordinate research to monitor ecological infrastructure rehabilitation and restoration activities and provide evidence for improvements in water security.
- Support and coordinate efforts of multiple actors to control invasive alien plants, rehabilitate riparian and wetland ecosystems and related ecological infrastructure activities
- Implement the priority outcomes from previous studies such as the UEIP Green Fund Report on Ecological Infrastructure
- Leverage the projects undertaken under the Aqueduct programme

Support to the Pongola-uMzimkulu CMA (within which the Greater uMngeni catchment falls) will be provided through the appointment of an Ecological Infrastructure Coordinator to the CMA for the duration of the project, in order to work with the various key stakeholders to:

- Manage the development of an ecological infrastructure plan and implementation strategy for the CMA (focusing on priority tertiary catchments) as part of the detailed CMS development process.
- Do Baseline assessment for quantity and quality Indicators at strategic points in catchments
- Engage with IDP and SDF processes of affected District and Local Municipalities to ensure alignment with the CMS in general, and the ecological infrastructure plan in particular
- Incorporate NCA into the CMS development process
- Support the Classification and RQOs

Noting the value that the UEIP has added, this project provides an opportunity to explore institutional options for the UEIP to become more formalised.

Output 2.2.2 Full costs of rehabilitation and maintenance of water-related ecological infrastructure and associated CME are determined in order to support the mainstreaming of ecological infrastructure into the financing of water resource management and development

Noting that the Waste Discharge Charge System can be used for certain water quality issues and not for others and requires sufficient data in order to calculate and apportion loads, the project will:

- Assist key stakeholders to undertake studies to confirm the eligibility of catchments for implementing the Waste Discharge charge system and investigate alternative financial instruments for improving water quality
- Assist key stakeholders to develop detailed costing from the CMA, including CMS implementation, CME, and waste discharge levies to better calculate the costs of ecological infrastructure protection, rehabilitation and maintenance and compliance management in the Water Resource Management Charge
- Assist key stakeholders to investigate the full costs of water for different user groups in the catchment and explore opportunities within the water value chain that ensure more equitable allocation of full costs for water amongst different users.

Output 2.2.3. Planning, prefeasibility, and licensing for infrastructure development has addressed the management and mainstreaming of ecological infrastructure, using examples such as the uMkhomazi Smithfield Dam, Spring Grove, Kamberg and Hlatikulu

Based upon the experience at Spring Grove Dam, and the development process being undertaken for the development of a dam at Smithfield on the uMkhomazi, working closely with key stakeholders including DWS, the CMAs, conservation agencies, NGOs, universities, municipalities, TCTA and others, this output will:

- Identify, cost, develop an investment plan and coordinate ecological infrastructure management and maintenance opportunities within the dam catchments to secure and enhance the delivery of water-related ecosystem services (including water quantity and quality aspects), covering areas not already covered in the SANBI/Green Fund Investment Plan for the uMngeni River catchment;
- Assist key stakeholders to review offset examples to develop guidance, that may be used in EIAs, EMPs, licenses, pricing structures, tariffs and safeguards of financial institutions, on:
    - optimising outcomes for biodiversity and ecological infrastructure especially hydrological performance of the catchment;
    - paying for the offset;
    - reducing ecological infrastructure-related risks associated with infrastructure ; developments for infrastructure implementing agencies such as the DBSA and TCTA;
    - assisting key stakeholders to investigate options for where best to locate capital and maintenance costs for ecological infrastructure (e.g. raw water tariff, bulk tariff or municipal tariff – or all)

- Use experience developed during the regulatory approval processes (Water Use Licences and Environmental Authorisations) for Spring Grove Dam to make recommendations on how these processes can be strengthened and streamlined in future water infrastructure developments.

8.3 Component 3: Social learning, credible evidence, and knowledge management improves the integration of biodiversity and ecosystem services into the water value chain.

Component 3 seeks to support a change in the way targeted public and private sector stakeholders and decision-makers engage with, think about and therefore integrate biodiversity and ecosystem services into water sector development planning and finance. Component 3 will draw from the knowledge[30] generated and lessons learnt through the other components of work in the GEF 6 project, and seeks to support the effectiveness of project interventions through social learning.

Knowledge management is core to this component and is understood as a "process by which organizations generate value from their intellectual and knowledge-based assets and expert communities of practice in an effort to address new challenges and develop solutions and best practices" (Bierbaum *et al*. 2014). A strong emphasis is placed on social learning as a process through which society becomes aware of the discontinuities it is facing, and learns to engage with them, often through a community of practice, to make more informed choices including about lifestyles. This component therefore focuses on how social change comes about and ensures that effective knowledge management and social learning processes are put in place that ultimately transform understanding amongst key stakeholders so that the choices they make are based on sound knowledge of the value of biodiversity and ecosystem services for water security. Emphasizing learning also means designing, implementing, monitoring and evaluating the project in ways that strengthen the knowledge base, the co-generation and sharing of knowledge, and the likelihood of knowledge being taken up and applied within their own context.

Knowledge management and social learning are important to encouraging new and innovative thinking, cultivating partnerships and collaborations, unlocking funding, and nurturing communities of practice through which novel approaches to natural resource management for strengthened water security outcomes can be implemented. They are thus important to stimulating innovation and transformational change that can enhance project impact and the likelihood of sustainability (increased catalytic effects, replication and upscaling). This component of work will seek to support and strengthen the work of existing organisations, such as the water sector's research body, the WRC, the NBI, the CMRA and the WWF-SA. The component is an essential part of the sustainability of the project, working to deepen capacity in existing organisations and networks active in the sector leaving them able to continue addressing the value of natural capital in their decision making around resource conflicts, trade-offs and scaling up opportunities for gains in the ecological, social and infrastructure investment nexus.

There are two outcomes that interventions in this component seek to support:

- Project impact and sustainability is enhanced through targeted engagement with key stakeholders (outcome 3.1), and
- Evidence of the value of ecological infrastructure for water security is credible, salient and relevant (outcome 3.2).

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[30] **Knowledge** is the appropriate collection of information of different types with the intent of being useful. Knowledge of a particular topic may enable answering questions of 'how' something takes place, but the use of knowledge to create 'why' questions, or generate new knowledge requires cognitive and analytical ability, it requires **understanding**, which is enhanced through social learning interventions.

Outcome 3.1. Project impact and sustainability is enhanced through targeted engagement with key stakeholders

This outcome will be achieved through strategic coordination of knowledge management and social learning interventions by partners and through enhancing technical and operational capacity with targeted stakeholders to enhance project impact and sustainability.

Outcomes	Outputs
3.1 Project impact and sustainability is enhanced through targeted engagement with key stakeholders. *(Indicator 3.1: Improvement in key decision-maker survey/tracking tool (to be developed)[31])*	3.1.1. Coordinated knowledge management and social learning for change enhances project impact and sustainability

Outcome 3.1 will be achieved through the following output and activities:

Output 3.1.1. Coordinated knowledge management and social learning for change enhances project impact and sustainability

Achieving water security presents complex societal challenges that requires creative, collaborative, complementary and coordinated approaches to address. Knowledge management and social learning for change will be coordinated through a strategy developed with stakeholders and partners. It will set out the strategic interventions and implementation plan to enable robust knowledge management and social learning necessary for the change the project seeks, and to enhance the replicability and post-project sustainability of systemic project interventions.

Targeted stakeholders should cut across the breadth of stakeholders in the water value chain. Through the development of the strategy the relationships between stakeholders (including existing platforms for engagement with each other) will be mapped, and their interests in, incentives for and constraints to integrating ecological infrastructure into water sector planning, finance and development characterised. This will provide a basis for developing the strategy. The strategy will be designed with relevant stakeholders (co-designed) to (a) begin the process of learning and working together, (b) ensure alignment with existing knowledge management and social learning initiatives, (c) better identify interventions that will be credible, salient and relevant, and (d) gain consensus and commitment to tracking effectiveness and impact[32] of interventions.

The strategy may also highlight specific pieces of work required to improve understanding and uptake of knowledge that supports improved integration of biodiversity and ecosystem services into water sector planning, finance and development. For instance, additional work may be required to understand how risk is managed by certain role-players and translate or interpret knowledge on ecological infrastructure in a way that makes sense to them and enables uptake, integration and innovation (knowledge brokering).

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[31] Developed to track aspects such as: awareness of the value of ecological infrastructure for water security, integration into decision-making, change in choices that show this, use of evidence showing the value of biodiversity and ecosystem services for water security.

[32] Effectiveness relates to the project interventions and to the level by which the activities of the project produce the desired effect e.g. capacity in CMA's was strengthened.
Impact refers to the extent to which long-term and sustained changes occur in the target area/stakeholder group etc. Impact relates to the overall project goal and objective, i.e. has strengthening of CMA capacity improved the integration of ecological infrastructure into CMS's and resulted in improved water security?

A Coordinator will be appointed through the project to enable the development and implementation of the strategy. They will work closely with partners and component coordinators, particularly those involved in overseeing the implementation of the strategy, to support all aspects of knowledge management and social learning across the programme. This will include: convening and supporting a range of knowledge exchange mechanisms (such as learning events, dialogues, knowledge sharing platforms/learning alliances); supporting the development and production of knowledge products; and supporting skills development. This will be planned for through aligning with existing knowledge management systems, developing the strategy with partners and ensuring clear responsibilities for maintenance and resourcing beyond the project.

Three activities will help to bridge existing capacity barriers through providing support, assistance, facilitation, and guidance where necessary and by working with identified recipients/stakeholders. Key stakeholders are those critical to implementation of the project (across the components of work) and include CMAs, private, public and civil society sectors with shared risk, and local institutions that manage ecological infrastructure restoration and maintenance. Targeted support for technical and operational capacity at the catchment in this way level is considered critical for supporting social learning and improving capacity for managing and financing ecological infrastructure solutions to water security. The project will also build on existing initiatives where targeted support and convening has laid useful foundations for this project to strengthen. These include the NBI's Green Economy work, building on DWS's Project Kingfisher programme which provided institutional support to the CMAs including through the CMRA and on WWF's work in deepening capacity for rehabilitation and maintenance of ecological infrastructure through local implementers. For example, an important activity to enable the implementation of rehabilitation and maintenance of ecological infrastructure is testing the capacity available at a local level to complete active rehabilitation work and ensuring the roles and responsibilities of local implementing institutions (e.g. WUAs) are agreed by all the participants.

Outcome 3.2. Evidence of the value of ecological infrastructure for water security is credible, salient and relevant

This outcome will be achieved through the co-generation of evidence for the value of ecological infrastructure to water security. This will include a focus on assessing the impact of pilot project interventions. The evidence base will be overseen by partners with scientific credibility in the water sector. The outcome will also be supported by monitoring and evaluation of information that is salient to project objectives and partners interests.

Outcomes	**Outputs**
3.2 Evidence of the value of ecological infrastructure for water security is credible, salient and relevant *(Indicator: Number of evidence-based knowledge products developed and shared with target audience)*	3.2.1. Co-generated evidence base and impact assessment of pilot project interventions is generated, packaged appropriately and shared 3.2.2. Monitoring and evaluation information enhances project implementation, learning and evidence

Outcome 3.2 will be achieved through the following outputs and activities:

Output 3.2.1. Co-generated evidence base and impact assessment of pilot project interventions is generated, packaged appropriately and shared

This output will deliver a co-generated evidence base and assessment of project impact that quantifies the water-related benefits of the ecological infrastructure interventions. This output is a prerequisite for being able to activate some of the financial mechanisms discussed under components 1 and 2. It will also enhance learning (for project stakeholders and beyond) and will provide a basis for compelling evidence for the value of ecological infrastructure to water security.

The credibility of this evidence base will be ensured through the design and support of targeted and coordinated research linked to project interventions in collaboration with research institutions, project implementers and other stakeholders. The work will focus on generating and/or drawing together empirical evidence (leveraging evidence from past and present projects) to demonstrate the value of ecological infrastructure for water security and to assess the impact of project interventions at demonstration sites. It will also include different sources of knowledge, such as citizen science[33]. It is about operationalising and showing what works, determining causality, and establishing the extent of longer-term effects produced by interventions. These effects can be economic, sociocultural, institutional, or environmental.

To leverage the outcomes and lessons learned from this work, the output includes translating findings into knowledge products that are credible, salient and relevant to target audiences (identified in the knowledge management and social learning for change strategy). The products of this output will include peer-reviewed research products that will contribute to a credible evidence base as well as products (such as policy briefs or in depth case studies) that are accessible to targeted audiences.

Output 3.2.2. Monitoring and evaluation information enhances project implementation, learning and evidence

This output is about gathering monitoring and evaluation information that tracks project progress, contributes to assessing impact, and strengthens institutional capacity and decision-making processes within the project team and with partners. This output will be supported by a knowledge exchange between GEF 6 project design team and project implementers around the project inception, and the production of a project position paper on the Theory of Change. This will ensure project implementation aligns with intent and provides a basis around which mutual understanding between partners and stakeholders can be founded and evaluation of progress can be tested. It is thus important in influencing the monitoring and evaluation information that must be gathered. The information gathered will be informed by best practice, lessons from monitoring and evaluating other GEF projects in South Africa, and information needs of partners and stakeholders. The information will also help to meet data needs identified in the knowledge management and social learning for change strategy and provide information necessary for internal and external evaluation. A collaborative process of identifying and developing indicators and gathering information will enhance learning and capacity building, particularly around gaps and inadequacies of available monitoring information and good indicators that can be used across different organisations.

8. Cost-effectiveness

Pressures on biodiversity in South Africa continue to increase and are set to rise further. Without urgent action, globally important biodiversity is at risk. In addition, failing to act now will result in greater difficulties and substantially higher costs in securing biodiversity goals.

One approach to conserving biodiversity is through state expansion of the protected area needed to meet biodiversity targets. In a country such as South Africa, with enormous development pressures and demands on scarce resources, coupled with high alpha, beta and gamma diversity, the

[33] "Findings indicate that citizen science promotes empowerment and social learning amongst participants, in addition to fostering multi-stakeholder collaboration (on water quality issues), encouraging the establishment of new environmental connections, and enabling a shift in existing government-citizen power relations." (Kolbe 2014)

consolidation of sufficient biodiversity into protected areas, including the ongoing management costs, is not a viable strategy, not least of all for financial reasons. The costing of the National Biodiversity Strategy and Action Plan (NBSAP), recently done through the Biodiversity Finance Needs Assessment for the South African Biodiversity Finance Initiative (BIOFIN), has calculated that the total overall cost for costed activities across all NBSAP Strategic Objectives amounts to R86.8 billion (net present value of R51.3 billion) over 10 years (2015/16 to 2024/25). The major cost drivers are associated with expanding the protected area estate and conservation area networks and the restoration and maintenance of ecological infrastructure. This study found that mainstreaming biodiversity concerns into the plans, policies and practices of other sectors (such as water infrastructure) remains one of the more cost effective approaches to contributing to biodiversity targets.

Given the magnitude of these costs in a financially constrained fiscal environment, the need to identify and develop innovative mechanisms to increase investments in biodiversity remains significant, as does the need to improve the outcomes and return from existing investments. The project approach that has been selected recognises these challenges and builds alternatives.

At the core of this programme, is the drive to find innovative ways to mainstream the financing of biodiversity and ecosystem services towards ensuring water security. The project will work with public and private financial mechanisms to link catchment rehabilitation and maintenance to ongoing revenue streams outside of donor investments and public sector works programmes, e.g. ensuring that budget for catchment management is secured through the water tariff and that the financing of infrastructure development includes budget for associated impact and dependencies on ecological infrastructure. Whilst state funding of investments in ecological infrastructure is important, new, innovative and sustainable ways of financing the maintenance and rehabilitation of ecological infrastructure will be explored. For example, the project will ensure that the costs associated with the impacts and dependences of built infrastructure on associated natural capital are built into project appraisal processes, budgets, risk assessments and correctly allocated in project financing. The mainstreaming of biodiversity and ecosystem services into the various planning instruments will also ensure that future interventions will be included into budgeting cycles.

In addition to unlocking new mechanisms to increase biodiversity finance, the project will contribute towards improving the return on investment in built infrastructure that is supported by well-functioning ecological infrastructure. Improving water security through investments in ecological infrastructure further contributes to cost effectiveness by offsetting of delaying the need for further investment in infrastructure.

Through working closely with DEA's NRM programmes, the project will seek to strengthen the outcomes of these activities towards improved delivery of water services, thus contributing towards improved efficiencies of the existing investments in these programmes. The project will also work to increasing finance available for NRM programmes of work, through operationalising the ecological infrastructure components of the Water Pricing Strategy.

The project will complement and build upon the extensive baseline activities already underway in the sector. Wherever possible, the project will use the competencies and technical skills within the existing public, private sector and civil society institutions to implement project activities. Project resources, as far as possible, will also be deployed to strengthen and expand existing initiatives to avoid duplication of effort. Increased co-financing commitments will continue to be targeted by the project during the project implementation.

9. Project Consistency with National Priorities

The project is the result of extensive consultations at the national and catchment level that have taken place over the past 18 months with key stakeholders to define the priorities for programming the GEF 6 Biodiversity Focal Area allocation. As a result, this project is country-driven, consistent with and supportive of national development strategies and plans that relate to green growth and sustainable development, with a focus the SDGs.

The project is specifically aligned with a number of national policies and plans, including:

- **National Development Plan**: The current plan for South Africa's development path is described in the NDP developed by the National Planning Commission established by the Presidency in 2009. The Diagnostic Report supporting the NDP identifies poorly located, inadequate and under-maintained infrastructure as one of nine major challenges facing South Africa. Addressing these failings in South Africa's infrastructure base is therefore seen as an enabling milestone in achieving the development goals of eliminating income poverty and reducing inequality by 2030. The NDP goes on to identify a number of infrastructure priorities that are further developed in the National Infrastructure Plan (see next bullet). Chapter 5 of the NDP 2030 recognises the importance of biodiversity and ecosystems, laying policy foundations for further investment in South Africa's biodiversity assets and ecological infrastructure. In support of this, the NDP requires the development of a set of indicators for natural resources, being led by DEA, and accompanied by publication of annual reports on the health of identified resources to inform policy. These national environmental indicators will feed into the Presidency's annual report on national development indicators. **Natural capital accounts can play a key role in providing such national indicators.**
- **National Infrastructure Plan** (2012) details eighteen Strategic Integrated Projects (SIPs), located across the country with a focus on lagging regions, to fast track development and growth. An investment from the public purse of R850 billion over period 2012 – 2015 was earmarked for these infrastructure investments. **This project is aligned with SIP 18, a nation-wide project to fast track delivery of water and sanitation infrastructure.** SIP 18 comprises a 10-year plan to address the estimated backlog of access of 1.4 m households to adequate water and 2.1 m households to basic sanitation. SIP 18 has been designed to ensure a sustainable supply of water to meet social needs and support economic growth as well as a comprehensive sanitation service that enhances community wellbeing, reduces health care costs and improves productivity. This project has been designed in consultation with the SIP 18 coordinator to support the objectives and development impacts of SIP 18. The uMngeni river catchment was identified as the first national priority for a **proposed 19th SIP on Ecological Infrastructure**. SIP 19 would be the most significant illustration of appreciation for the complementary contribution ecological infrastructure can make with built infrastructure to address water security and would involve significant levels of collaboration. Although still pending approval, **this project is fundamentally aligned with SIP 19 objectives.**
- Outcome 6 of the **Medium Term Strategic Framework (MTSF)**[34] seeks "An efficient, competitive and responsive economic infrastructure network", with sub-outcome 4 focused

[34] The MTSF guides government's programme of work in a particular electoral period. The current MTSF period is 2014-2019. It provides a prioritised framework for focusing government efforts on strategic priorities for moving South Africa to an environmentally sustainable, climate change resilient, low-carbon economy. The 12 Outcomes in the Presidential Delivery Agreement articulate in more detail the strategic priorities of the MTSF and are accompanied by measurable outputs, key activities and Outcome Delivery Performance Agreements between the President and Ministers. The MTSF in turn provides guidance for achieving the NDP 2030 priorities.

on ensuring the maintenance and supply availability of bulk water resources infrastructure. **This project directly supports these outcomes by implementing interventions to mainstream ecological infrastructure into South Africa's water infrastructure network.** The MTSF also calls for the implementation of the revised National Water Resources Strategy (NWRS2), and specifically, the need to define institutional arrangements for water resource management, including the development of a national water resource infrastructure agency and the fast-tracked **establishment of CMAs which this project is supporting**.

- The project will support the implementation of a number of aspects of the **NWA (Act 108 of 1998)**, including providing input into the Catchment Management Strategies of the three CMAs with which it is working, namely the Breede Gouritz, the Berg Proto and the Pongola to uMzimkulu Proto CMAs. The project will deepen understanding of how ecological infrastructure may assist with giving effect to the RQOs and the Reserve, the implementation of the Waste Discharge Charge System, and will support the improvement of water use authorisations to incorporate ecological infrastructure.
- **National Water Resource Strategy (NWRS)**: The primary national policy priority in water resource management is the NWRS2, a short term **Water Security Plan** and National Water & Sanitation Strategy (NWRS3 to be developed in the project lifetime). The NWRS2 has a specific chapter 5 on Water Resource Protection which speaks to many of the challenges and opportunities addressed by this GEF project. However, institutional instability, an unclear mandate, and a focus on urgent large infrastructure projects has detracted from implementation of Chapter 5. **The project is fundamentally aligned with the NWRS and has a key role to play in supporting the development of the National Water Security Plan.**
- **National Water Pricing Strategy**: The Pricing Strategy for Water Use Charges (enabled by the NWA) provides the framework for pricing the use of water from South Africa's water resources. This includes the use of untreated water from a water resource, water supplied from government waterworks and the discharge of water into a water resource or onto land. The third revision of the strategy was gazetted for public comment in November 2015 and has yet to be finalised. Both the current, and to a greater extent the draft revised strategy make provision for water consumers, who benefit from the ecosystem services provided by water-related ecological infrastructure, to contribute financially to its maintenance and rehabilitation. However, barriers to implementation remain. **This project will seek to contribute to lifting some of the barriers to implementation of the Pricing Strategy working closely with DWS and the CMAs.**
- The project supports a number of the strategic objectives in the **DWS's Corporate Strategic Plan**, including programmes of work towards the delivery of sustainable water and sanitation services, the protection of water across the value chain and increasing the skills pool and building competencies within the sector.
- **South Africa's Statistics Act (Act 6 of 1999)** is in the process of being revised. **The project will enable stakeholders involved in natural capital accounting to participate in the revision of the Act**, to strengthen environmental aspects and to ensure that the revised Act provides an enabling platform for natural capital accounting. In addition to the revision of the Statistics Act, Stats SA is engaged in an internal process of making links between the National Statistical System and natural capital accounting. The project will support this process by strengthening experience with natural capital accounting.
- The project supports a number of strategic objectives in **South Africa's recently revised National Biodiversity Strategy and Action Plan** including Strategic Objective 2: *Investments in ecological infrastructure enhance resilience and ensure benefits to society*; Strategic Objective 3. *Biodiversity considerations are mainstreamed into policies, strategies and practices of a range of sectors*, and Strategic Objective 4: *People are mobilised to adopt practices that sustain the long-term benefits of biodiversity*. Further detail on direct links is available in the NBSAP.

- **National Climate Change Response White Paper:** In integrating biodiversity and ecosystem services into the water value chain to improve water security, **the project is contributing to climate change adaptation policy imperatives** under the National Climate Change Response White Paper, the national Strategic Framework and Overarching Implementation Plan for Ecosystem-based Adaptation and other climate change policy frameworks.

10. GEF Conformity and Country Eligibility

South Africa has signed and ratified all key international conventions pertaining to biodiversity conservation, including the Convention on Biological Diversity, the Ramsar Convention, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), World Heritage Convention, as well as the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention to Combat Desertification, and ratified the Biosafety Protocol. Most recently, South Africa has become the 12th country globally to ratify the international Nagoya Protocol to protect the country's biological diversity and associated traditional knowledge. As the financial mechanism for some of these conventions, the GEF presents South Africa with a vehicle for advancing global environmental objectives within the context of national development policies, programs and priorities outlined in the previous section.

South Africa published its first NBSAP in 2005 and this was updated in 2015/16. Along with the National Biodiversity Assessment (2011), these documents serve as the basis for the National Biodiversity Framework (NBF) which is updated every five years, as required by the National Environmental Management Biodiversity Act (Act 10 of 2004). The NBF identifies 33 priority actions to guide the work of the biodiversity sector to 2013. This is currently being updated following the revised NBSAP (2015/16).

The project is fully consistent and aligned with South Africa's response to its commitments under these and other international, including:

- Through its efforts to manage and maintain ecological infrastructure, **the project will support South Africa's contribution as a signatory to the SDGs (SDG 2030)**. Cummings *et al* (in prep) highlight the links between well-functioning ecological infrastructure and the SDGs as follows. Functioning ecological infrastructure provides services that can contribute to poverty alleviation (SDG 1), food security (SDG 2), health and wellbeing (SDG 3), gender equality (SDG 5) and reducing inequality (SDG 10). The act of restoring ecological infrastructure to a functional state is a job creation activity, which can support economic growth, full and productive employment, as well as gender equality (SDG 5) and reducing inequality (SDG 8). The availability of clean water (SDG 6) is supported by healthy catchments and wetlands. Built infrastructure and human settlements (SDG 9 and SDG 11) are made more resilient when planned in conjunction with ecological infrastructure considerations, as well as the impacts of natural disasters, exacerbated by climate change (SDG 13), when protected by ecological infrastructure. Ecological infrastructure also contributes to climate change mitigation. The protection and sustainable use of biodiversity, marine and terrestrial (SDG 14 and SDG 15), is synonymous with the protection and sustainable use of ecological infrastructure. Efforts to improve social learning and influence behaviour change through education for sustainable development, often associated with ecological infrastructure interventions, contribute to ensuring sustainable production and consumption (SDG 12), and efforts to promote peaceful and inclusive societies, such as responsive and participatory decision-making at all levels. **Natural capital accounting will support South Africa's reporting on the SDGs. The project will also seek to ensure that the private sector, and private finance, support efforts to contribute to the SDGs through support to ecological infrastructure.**

- **As a project that will deliver a range of global environmental benefits**, particularly the project contribution of ecosystem services maintained across 200 000 ha, **the project will make a substantial contribution to implementation of the Strategic Plan of the Convention on Biological Diversity and the Aichi Targets.** Land in biodiversity priority areas will be better managed and rehabilitated, resulting in improved delivery of ecosystem services and the natural capital accounting component will support South Africa's reporting obligations to the CBD on the Aichi Targets.
- The project will also support South Africa's contribution to the **Intergovernmental Platform on Biodiversity and Ecosystem Services** through strengthening capacity and knowledge foundations of the science-policy interface (objective 1), will contribute to key thematic and methodological issues (objective 3) and to strengthening communications (objective 4) to the extent that these overlap with the project.
- The project will also contribute to the adaptation, and particularly ecosystem-based adaptation, commitments of the **Paris Agreement under the UNFCCC**.
- South Africa is a signatory to the **Gaborone Declaration for Sustainability in Africa**, which commits signatories to take action towards sustainability in three main areas, one of which is incorporating the value of natural capital in public and private policies and decision-making. South Africa is a participant in the **African Ministerial Conference on the Environment** (ACMEN), the 15th session of which in 2015 adopted a series of decisions on natural capital accounting. The GEF investment will align with South Africa's GDSA and ACMEN commitments.
- As part of the **global ANCA project led by the United Nations Statistical Division**, in which South Africa was a pilot country, a draft national plan for advancing environmental-economic accounting was developed in 2015. It identifies the priorities[35] for environmental-economic accounting in South Africa which align well with the proposed natural capital accounts to be developed in this project, and would help to take forward the implementation of aspects of this national plan.

11. Sustainability and Replicability

Institutional sustainability:
The project will support the development and implementation of policy, plans and management tools to ensure that ecological infrastructure is effectively integrated into the implementation of water resources management and water resources development. The structuring of the programme in terms of national policy and regulatory support provides the basis for ongoing implementation of the programmes development outcomes. By influencing policy and strategy, new approaches will become part of the day to day business of the DWS. The department is undergoing restructuring to more effectively implement the NWRS. Therefore, by mainstreaming biodiversity and ecosystem service into the NWRS will influence how these aspects are funded and implemented.

The project will seek to embed the capacity and tools for the management of ecological infrastructure into institutions responsible for water resources management and water resources development. The development of Catchment Management Strategies is s key to placing biodiversity and ecosystem services at the heart of water security. The supporting policy and guidance from the

[35] National Land Accounts (especially national land cover, land use and ownership), Ecosystem Extent and Condition Accounts (ideally across realms i.e. terrestrial, freshwater, coastal and marine), Water Accounts (including detailed supply, use and quality), Ecosystem Service Accounts (especially those relating to food security and water security), Priority SEEA Central Framework accounts

DWS will be important to ensure that this is indeed mainstreamed. The cooperation of the policy and strategy line function, together with that of institutional oversight will work towards a shift in practice at the CMA level. Similarly, the interaction of the programme with key national departments and agencies, as well as catchment-level organisations will influence the way these parties interact. These shifts in practice and relationships continue beyond the lifespan of the project.

The project will explicitly address building capacity at the catchment level, with the private sector and will address capacity needed and putting in place institutional arrangements for ongoing production of priority natural capital accounts.

Environmental sustainability:
The interventions of this project, supported by the co-generation of an evidence base and assessment of project impact, are designed to demonstrate (in a quantifiable way) the water-related benefits of the ecological infrastructure interventions. Making this case, and in a way that encourages social learning for change in the process, will enhance opportunities for replication and continuation of efforts beyond the project timelines. The interventions should enhance the sustainability of water use through better integrating ecological infrastructure and improve resilience to shocks.

Aligning with the DEA NRM Programmes, and influencing the prioritisation of areas for work of this ongoing government programme, provides the opportunity for sustainability and enhanced effectiveness in terms of water and biodiversity outcomes.

Financial sustainability:
At the core of this programme, is the drive to find innovative ways to mainstream the financing of biodiversity and ecosystem services towards ensuring water security. The project will work with public and private financial mechanisms to link catchment rehabilitation and maintenance to ongoing revenue streams outside of donor investments and public sector works programmes, e.g. ensuring that budget for catchment management is secured through the water tariff and that the financing of infrastructure development includes budget for associated impact and dependencies on ecological infrastructure.

Whilst state funding of investments in ecological infrastructure is critically important, new, innovative and sustainable ways of financing the maintenance and rehabilitation of ecological infrastructure will be explored. A diverse mix of funding sources may better mitigate risk, stabilise the availability of funding and facilitate higher levels of investment in ecological infrastructure in support of the delivery of these services to people.

The financial sustainability of these efforts will be secured through coordinated efforts of different agencies and institutions. The mainstreaming of biodiversity and ecosystem services into the various planning instruments will ensure that future interventions will be included into budgeting cycles and will receive funding.

Social sustainability:
Despite the changes that have occurred in the democratisation of South Africa, there is still widespread poverty and inequality. Government's response to rising unemployment and wide spread poverty is to focus on job creation and economic growth. By integrating ecological infrastructure in water sector development, finance and planning in ways that support labour intensive ecosystem management, this project contributes to job creation and economic development.

Ecosystem management further enhances or restores ecosystem functioning that underpins the delivery of services and makes ecosystems more resilient to shocks and disturbances. This contributes to avoiding ecosystem degradation, which increases water problems that often hit the poor hardest, exacerbating poverty, increasing risks associated with natural disaster hazards such as floods or droughts, and contributing to inequalities and disparities across groups (which can fuel social conflicts) (IIED 2007). Avoiding environmental degradation and improving ecological functioning thus supports social sustainability in both the Berg-Breede and Greater uMngeni systems, where the livelihoods of rural communities and urban communities, private and public sectors are dependent on water, primary production and healthy ecosystems.

The project places considerable emphasis on social learning, seeing it as a process through which society becomes aware of the discontinuities it is facing, and learns to engage with them, often through a community of practice, to make more informed choices including about lifestyles. This component therefore focuses on how social change comes about and ensures that effective knowledge management and social learning processes are put in place that ultimately transform understanding amongst key stakeholders so that the choices they make are based on sound knowledge of the value of biodiversity and ecosystem services for water security. Knowledge management and social learning are important to encouraging new and innovative thinking, cultivating partnerships and collaborations, unlocking funding, and nurturing communities of practice through which novel approaches to natural resource management for strengthened water security outcomes can be implemented. They are thus important to stimulating innovation and transformational change that can enhance project impact and the likelihood of sustainability (increased catalytic effects, replication and upscaling).

Replicability: The components of the programme design are constructed to embed approaches at a national level within policy and strategy as well as by demonstrating meaningful impact in catchments working within institutions that can replicate and take these interventions to scale. Key elements for replicability include:

- Piloting interventions in two demonstration areas (comprised of 3 CMAs) while also working with national institutions to take this experience to scale in other areas (9 CMAs in total). Strengthening CMAs will provide key learning for other CMAs and will assist the phased and progressive operationalisation of these institutions.
- Piloting the development of tools and working with sector/industry representative bodies, e.g. NBI, WISA, SWPN, CMRA, WAVES, UNEPFI, IFC, the Sustainability Banking Network, Natural Capital Finance Alliance, and other sustainable finance initiatives etc. with the potential to ensure the replication or roll out of tools to a broader audience.
- Enabling greater investment in the management and maintenance of ecological infrastructure by the natural resource management sector, including DEA's NRM programmes, through infrastructure-linked finance and water pricing-linked revenue, enabling those programmes of work to be implemented at scale.
- Integrating of biodiversity and ecosystem services in the NWRS ensures that the water sector sees this approach as central to policy, planning and regulation.
- The development of natural capital accounts with a view to their eventual integration into the national statistical service will further strengthen planning regimes.
- Knowledge management and social learning for change will promote uptake in other catchments, sharing of learning with other networks and fora.

Part III. Implementation Arrangements

12. Implementation Arrangements

This project will be implemented over a period of 5 years, from mid[36] 2017 until mid-2022. The GEF's **Implementing Agency** for this project in South Africa is the DBSA. The **national focal point** for the GEF is the DEA and the project's **Executing Agency** is the SANBI. As the Executing Agency, SANBI has overall responsibility for project implementation over the five-year period, and is therefore accountable for both project and financial management.

SANBI was established in terms of section 10 (1) of the National Environmental Management: Biodiversity Act, Act 10 of 2004. It is a public entity registered as a schedule 3A entity in terms of the Public Finance Management Act, Act 1 of 1999, and reports through its Board to the Minister of Environmental Affairs via the DEA. SANBI leads and coordinates research, and monitors and reports on the state of biodiversity in South Africa. The Institute provides knowledge and information, gives planning and policy advice and pilots best-practice management models in partnership with stakeholders. SANBI also engages in ecosystem restoration and rehabilitation, and leads the human capital development strategy of the biodiversity sector.

As the Executing Agency SANBI will sign the grant agreement with DBSA and will be accountable to DBSA for the disbursement of funds and the achievement of the project objective and outcomes according to the approved work plan. In particular, the Executing Agency will be responsible for the following functions: (i) coordinating activities to ensure the delivery of agreed outcomes; (ii) certifying expenditures in line with approved budgets and work-plans; (iii) facilitating, monitoring and reporting on the procurement of inputs and delivery of outputs; (iv) coordinating interventions financed by GEF/DBSA with other parallel interventions; (v) approval of Terms of Reference for consultants and tender documents for sub-contracted inputs; and (vi) reporting to DBSA on project delivery and impact.

Project implementation will be managed in close collaboration with **Sub-Executing Agencies** (see Figure 24) who have been identified as such through the project design process and include, but are not limited to:

- National organs of state including the DWS, Stats SA, and the WRC.
- At the regional level, catchment management agencies (CMAs) or the regional offices of DWS currently acting as Proto CMAs (including the Pongola-uMzimkhulu CMA, the Breede Gouritz CMA, and the Berg Proto CMA),
- At the local level, WUAs, including the Berg Irrigation Board and the Sonderend WUA, and
- Private sector representative bodies, NGOs, academic and other organisations with particular expertise and networks aligned with the project's objective and outcomes, including the NBI, the CMRA, WWF-SA and the UKZN.

[36] Depending on when funding is approved

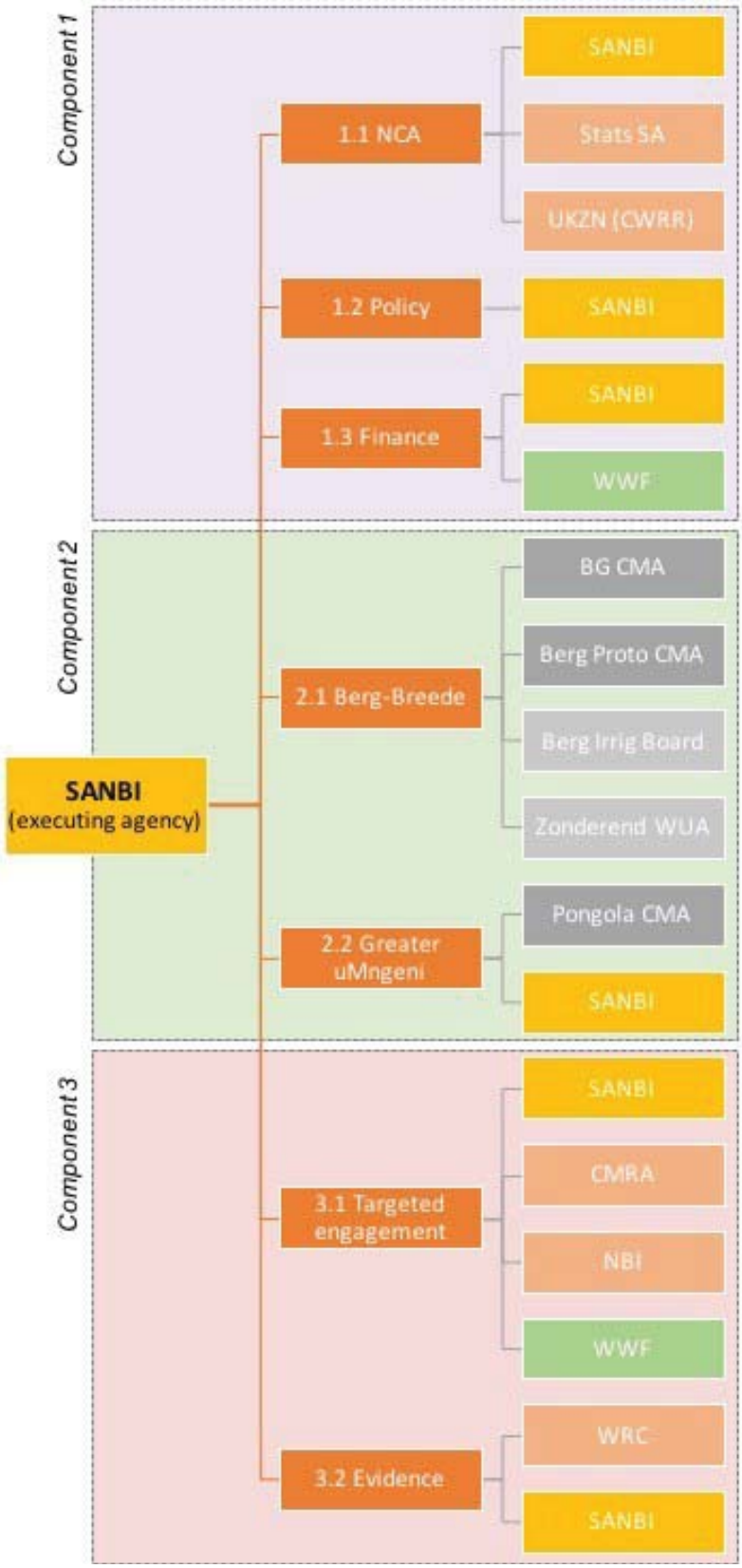

Figure 24 Sub-executing agencies

Critical to project implementation is **engagement and alignment** with **relevant organisations, networks and** fora (see Figure 25), including, but not limited to:

- Water sector organisations and networks, including WISA, the SWPN, water boards, including Umgeni Water
- Finance institutions and representative bodies such as the IFC, the Sustainability Banking Network, Natural Capital Finance Alliance, UNEP Finance Initiative, the World Bank and the DBSA,
- Agencies responsible for the development of water sector infrastructure, such as the Trans Caledon Tunnel Authority (TCTA) and the DBSA,
- Programmes, departments and authorities responsible for land management activities, including provincial conservation authorities, national and provincial natural resource management programmes, including DEA's Natural Resource Management Programmes (e.g. Working for Water and Working for Wetlands) and DAFF's LandCare Programme.
- Municipalities, including the relevant district, local and metropolitan municipalities such as eThekwini and the City of Cape Town in the project area,
- Catchment level partnerships, such as the UEIP, the Berg River Partnership, and others.

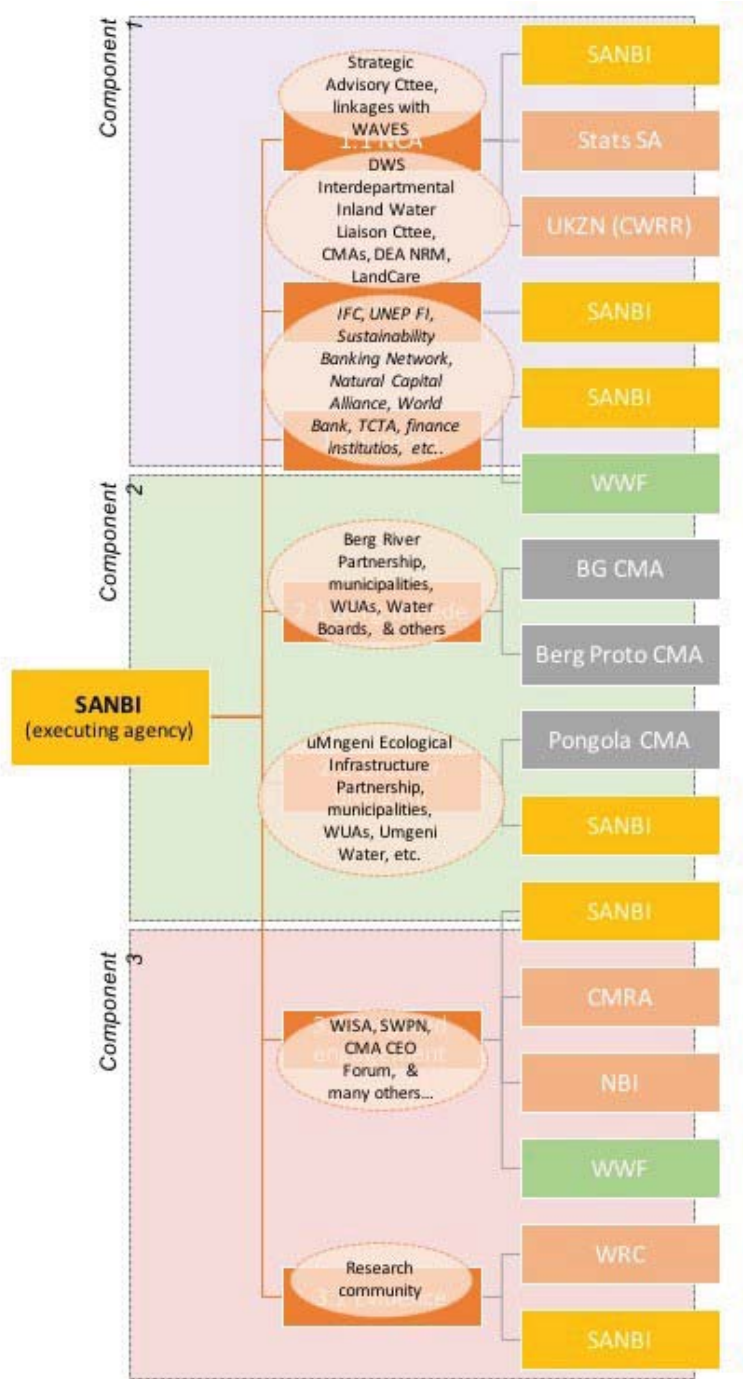

Figure 25 Engagement and alignment with relevant organisations, networks and fora

To facilitate oversight and direction regarding project implementation, SANBI will take responsibility for establishing and maintaining a **Project Steering Committee (PSC)** which will be comprised of representatives of all the project partners on the basis of a Terms of Reference which will be negotiated at project launch. The DBSA will also serve on this PSC. The PSC will meet twice yearly and will direct and steer the project, including approving the annual work plan and budget. An **Implementing Agency Oversight Committee** consisting of representatives from the DBSA and SANBI will be established. This committee will meet alongside the PSC twice yearly/as needed and will approve project progress reports and plans. These arrangements are reflected in Figure 26.

SANBI will establish a **Project Executing Team** responsible for delivery of the project as reflected in Figure 26. The Project Executing Team will consist of a:

- A Project Leader will be responsible for providing high level strategic and technical direction across the project as well as providing direction to the Project Management Unit (PMU) on project implementation and management.
- A Natural Capital Accounting Project Manager responsible for coordinating activities in outcome 1.1, an NCA specialist with spatial and ecological expertise, and a GIS technician.
- A Water Sector Senior Policy Advisor will be appointed in SANBI and responsible for technical leadership and water sector policy engagement as well coordination of activities in outcomes 1.2 and 1.3.
- A Knowledge Management Coordinator will be appointed by SANBI to provide leadership to and coordinator coordinate the activities in outcomes 3.1 and 3.2.
- A PMU which provides the necessary administrative and operational support for the day to day running of the project and procurement. The PMU will consist of a Project Coordinator, a Project Administrator, a Financial Manager and a Finance Officer. The Project Coordinator will support the project's reporting functions. The Finance Officer will be responsible for providing procurement support and financial administration support while the Finance Manager will provide direction and oversight to ensure compliance with the financial management requirements of the DBSA and SANBI. (The Finance Manager, part of the Finance Officer's salary and the Project Administrator will not be paid using project resources but through SANBI co-finance.)
- In collaboration with sub-executing agencies at the regional and local level, Ecological Infrastructure Coordinators will be appointed in each of the demonstration catchments (Berg-Breede and Greater uMngeni) with responsibilities for coordinating project activities within the catchments, managing the development of an ecological infrastructure plan and implementation strategy for the CMA as part of the detailed CMS development process.

These implementation arrangements are shown in Figure X:

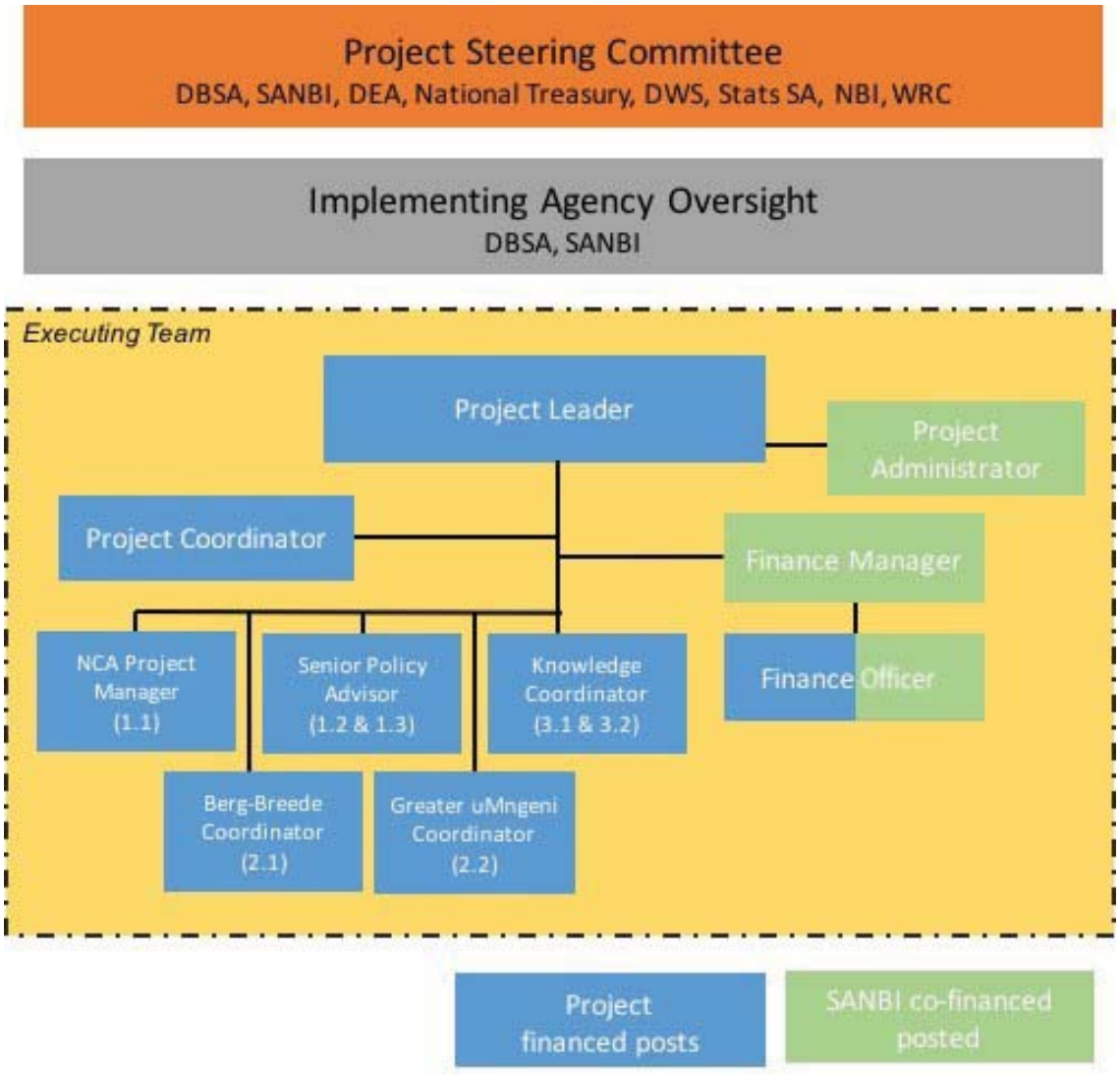

Figure 26 Project Management Arrangements

The Terms of Reference for key staff are included in Annexure E. They will be contracted to serve the project for a period of between 4 and 5 years. The Project Leader, the Finance Manager, Finance Officer, Project Coordinator and Project Administer will be employed for 66 (sixty-six) months to allow for project closure. Terms of Reference are provided only for these core staff in the PMU and not for the other technical component leads, secondments to project partners or short term consultants. This is because it is essential that the Project Leader takes responsibility for the recruitment of other staff and procurement of consulting services in close collaboration with the PSC and/or the relevant agency representatives at the time that such staff or services are to be procured. This is to ensure that recruitment and procurements dynamics that prevail at the time are taken into account and reflected into the Terms of Reference.

SANBI will delegate the responsibility of project oversight to a relevant official in their executive committee who will be responsible for providing day-to-day supervision of the Project Leader, while also serving as the Chair for the PSC.

SANBI will provide suitable office space for the Project Executing Team and SANBI-based staff on full-time service contracts, as well as the necessary office furniture and support services. The project

partners, to whom staff on full-time service contracts are seconded, will likewise take responsibility for designating an official to provide day-to-day supervision of these staff, for providing office space, and where appropriate the coordination of the procurement of office equipment from the grant.

All Project Executing Team staff on full-time contracts at the national level will be answerable to the Project Leader, while staff seconded on full-time contracts at the agency level will be directly answerable to the designated agency official, but with a reporting line to the Project Leader to ensure consolidated reporting back to the PSC and the DBSA.

Regular feedback and communication on progress with project implementation will be maintained internally through the PSC and Project Executing Team reporting structures across the project. Where relevant with project outcomes, the project will also report into existing external structures, such as the UEIP and SWPN and others mentioned above. Where no structures exist, new technical working groups will be established as required. These technical Working Groups to be established to ensure coordination and alignment between project activities and related initiatives at a national or catchment level.

13. Project Management

Project oversight
Oversight of project activities will be the responsibility of the PSC. Day-to-day operational oversight will be provided by the DBSA, through the DBSA-GEF focal point based at the DBSA's Johannesburg Office. The DBSA will also provide strategic oversight and technical guidance to the project through designated in-house expertise based in the team of Sector Specialists.

The project is in alignment with the DBSA Environmental and Social Safeguards Standards and all applicable national legislation. All monitoring and evaluation frameworks and implementation plans will apply the measures required by the safeguards. In particular the safeguards applying to community consultation, biodiversity, dam safety and gender will be prioritised.

Gender Equity will be covered according to the action plan provided in Annexure B.

Project management at the central level
The project will be managed by the Project Leader based in SANBI, supported by the Project Executing Team staff.

Project management at the catchment level
Implementation at the catchment level will be the direct responsibility of the relevant agencies involved in particular interventions. The number of agencies involved will differ from catchment to catchment with some being more complex than others. These details are provided in the Section on "Implementation Arrangements" above.

Project accounting and procurement processes
SANBI will serve as the executing agency responsible for undertaking the fiduciary responsibilities of the project. Some of the partners may operate different accounting systems, but they shall maintain sound financial records in accordance with applied accounting standards acceptable to SANBI. A separate project account in South African Rands will be opened.

SANBI must comply with South African public finance legislation (Public Finance Management Act, Act 1 of 1999) and procurement procedures and will adhere to the relevant requirements under this Act.

Part IV. Monitoring, Reporting and Reviewing Framework

14. Monitoring and Reporting

The project will be monitored through the following monitoring and evaluation activities. The monitoring and evaluation budget is provided in the table below. The monitoring and evaluation framework is set out in the Section 2 – Strategic Results Framework, Part I. Strategic Results Framework.

Protect start: A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, the DBSA and other stakeholders as required. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan. The **Inception Workshop** should address a number of key issues including:

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of DBSA vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the strategic results framework and the relevant GEF Tracking Tool, finalize the first annual work plan. Review the project indicators, targets and their means of verification, and recheck assumptions and risks. Agree on process for finalising systematic results-based monitoring and evaluation, which align with existing monitoring efforts of partners. This monitoring and evaluation information is an output in Component 3, a stand-alone component on Knowledge Management and monitoring and evaluation. Provide a detailed overview of reporting, monitoring and evaluation requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule PSC meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first PSC meeting should be held within the first 12 months following the inception workshop.

An Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly:

- Progress made shall be monitored in the DBSA's monitoring systems including Environmental and Social Safeguard Requirements.
- Based on the initial risk analysis submitted, the risk log shall be regularly updated by the DBSA.
- Risks become critical when the impact and probability are high. Note that for GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, etc. are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).

Annually: Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
- Project outputs delivered per project outcome (annual).
- Environmental and Social Safeguard Requirements.

- Lesson learned/good practice.
- AWP and other expenditure reports
- Risk and adaptive management

Periodic Monitoring through site visits: DBSA staff will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the PSC may also join these visits. A Field Visit Report will be prepared by the DBSA and will be circulated no less than one month after the visit to the project team and PSC members.

Mid-term of project cycle: The project will undergo an independent Mid-Term Review at the mid-point of project implementation (expected to be in late 2019). The Mid-Term Review will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term review will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term review will be prepared by the DBSA based on guidance from the GEF. The relevant GEF Tracking Tool will also will also be completed during the midterm evaluation cycle.

End of Project: An independent Terminal Evaluation will take place three months prior to the final PSC meeting and will be undertaken in accordance with GEF guidance. The terminal evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term review, if any such correction took place). The terminal evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the DBSA based on guidance from the GEF. The relevant GEF Tracking Tool will also be completed during the terminal evaluation cycle. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response.

Learning and knowledge sharing: The project Component 3 underpins and guides the knowledge management and social learning activities, which are seen as fundamental to project implementation success, replicability and sustainability. As such, a knowledge management and social learning strategy and implementation plan will, in participation with partners, will be developed in the first year of the project. Guided by the strategy, the project will:

- Disseminate results within and beyond the project intervention zone through existing information sharing networks and forums
- Focus on facilitating horizontal learning between different catchments and institutions as well as vertical learning between different spheres of government.
- Identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned.
- Identify, analyse, and share lessons learned that might be beneficial in the design and implementation of similar future projects.
- Facilitate two-way flow of information between this project and other projects of a similar focus.

The knowledge management and social learning for change strategy (developed in Component 3) will be overseen by a Reference Group to adaptively manage and optimise implementation.

Table 5. Project monitoring and evaluation workplan and budget

Type of monitoring and evaluation activity	Responsible parties	Budget US$ excluding project team staff time	Time frame
Inception Workshop and Report	Project Leader, project team, project partners, DBSA	Indicative cost: R50 000	Within first two months of project start up with full team on board
Develop and implement a monitoring and evaluation system that supports project impact assessment, including Measurement of Means of Verification of project results.	Project Leader Knowledge Coordinator	Indicative cost: R350 000	Within first 6 months of project start
Measurement of Means of Verification of project results.	Project Leader will oversee specific studies and institutions, and delegate responsibilities to relevant team members	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required
Measurement of Means of Verification for Project Progress on output and implementation	Oversight by Project Leader	To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	Project Leader DBSA	None	Annually
Periodic status/ progress reports	Project Leader and team	None	Quarterly
Mid-term Review	Project Leader DBSA External Consultants (i.e. evaluation team)	Indicative cost: R400 000	At the mid-point of project implementation
Terminal Evaluation	Project Leader DBSA External Consultants (i.e. evaluation team)	Indicative cost: R500 000	At least three months before the end of project implementation
Audit	DBSA Project Leader Project Executing Team	Indicative cost per year: annual R50 000, total R250 000	Yearly
Visits to field sites	DBSA (as appropriate) Government representatives	For GEF supported projects, paid from IA fees and operational budget	As required
TOTAL indicative COST excluding staff & DBSA costs		R1 550 000 or US$120 000 (+/- 2% of total GEF budget)	

Section 2 – Strategic Results Framework

Part I. Strategic Results Framework

Objective/ outcome	Outcome Indicator	Baseline	Mid-term target	End of project target	Source of Information	Risks & assumptions
1.1 Natural capital accounts developed to enable policy, planning and decision-making in favour of ecological infrastructure	One set of national ecosystem accounts published by Stats SA. One set of catchment-level ecosystem accounts published within each demo catchment.	Pilot land and ecosystem accounts for one province and national river ecosystem accounts produced as part of ANCA project, but no resources for further production of accounts.	Draft set of national ecosystem asset accounts completed. Draft set of catchment-level ecosystem accounts underway within each demo catchment.	Final set of national ecosystem asset accounts completed. Final set of catchment-level ecosystem accounts completed within each demo catchment.	National ecosystem accounts publication. Catchment-level ecosystem accounts publication (x2).	Relevant data available in time series to produce accounts – both national and catchment-level.
1.2 Relevant policy frameworks, regulatory instruments and planning tools enable the integration of biodiversity and ecosystems services into water sector planning, finance and development	1 national policy reflects the importance of ecological infrastructure. Regulatory instruments support the integration of ecological infrastructure	NWRS 2nd edition introduced ecological infrastructure	Inputs provided to policy development & regulatory tool processes	1 national policy influenced. Regulatory instruments reflect ecological infrastructure.	Policy documents Regulations	NWRS process takes place and is concluded by the end of the period. Stability in the legal and regulatory environment.
1.3 Mechanisms for rehabilitation and ongoing maintenance of ecological infrastructure are in place and operationalized	Completion of foundational work in catchments to enable operationalization of ecological infrastructure components of the Water Pricing Strategy. Tool/method implemented to strengthen the assessment and management of environmental risk within investment decision-making.	Pricing strategy (2007) is in place, allows for funding of a narrow range of ecological infrastructure activities, and implemented in a fragmented way. 2015 Pricing Strategy in the process of being approved by DWS. Value of services and upstream dependencies on ecological infrastructure is not systematically and consistently factored into corporate and project	Funding is allocated within CMA budget for rehabilitation and ongoing maintenance of ecological infrastructure. Key private institutions identified who are able to shift from impact mitigation to ecological infrastructure investment through the use of the tool.	Financial flows for rehabilitation and ongoing maintenance of ecological infrastructure from water pricing operationalized in demo catchments. At least one South African finance institution implements the tool to strengthen the assessment and management of environmental risk within investment decision-making.	CMAs Finance institution	2015 Water Pricing Strategy is approved and gazetted. Ability to retain funds raised through tariff realized at CMA/relevant institution level. CMAs willing to integrate management of ecological infrastructure into basis of costing. Finance institutions will be willing and able to develop, share, refine and

Objective/ outcome	Outcome Indicator	Baseline	Mid-term target	End of project target	Source of Information	Risks & assumptions
		financial assessments and credit risk models.				implement methods/tools.
2.1 Enhanced organizational capacity and investment in ecological infrastructure in the Berg and Breede catchments have improved water resource management	Number of hectares of catchment better managed through CMS implementation Number of wetlands rehabilitated Number of hectares of land rehabilitated	CMS does not adequately address EI 87 wetlands rehabilitated 5 849 baseline hectares rehabilitated	At least 1 CMS developed 102 wetlands rehabilitated (15 additional wetlands) 7 420 hectares rehabilitated (1 571 additional hectares)	2 CMSs developed resulting in improved management over 2 584 030 ha 112 wetlands rehabilitated (10 additional wetlands) 9 777 hectares rehabilitated (2357 additional hectares)	CMAs DEA NRM	EPWP funds continue to flow to DEA NRM
2.2 Enhanced organizational capacity and investment in ecological infrastructure in the Greater uMngeni catchment have improved water resource management	Number of hectares of catchment better managed Number of wetlands rehabilitated Number of hectares of land rehabilitated	CMS does not adequately address EI 5 wetlands rehabilitated 28 676 hectares rehabilitated	1 CMS developed 11 wetlands rehabilitated (6 additional wetlands) 48 355 hectares rehabilitated (19 679 additional hectares)	1 CMS developed resulting in improved management over 1 992 121 ha 15 wetlands rehabilitated (9 additional wetlands) 77 873 hectares rehabilitated (49 197 additional hectares)	CMAs DEA NRM	EPWP funds continue to flow to DEA NRM
3.1. Project impact and sustainability is enhanced through targeted engagement with key stakeholders	Improvement in key decision-maker survey/tracking tool	Baseline to be determined on project implementation	To be determined	To be determined	Tracking tool/survey	Decision-makers (leaders and managers) make themselves available. There is adequate continuity in leadership.
3.2 Evidence of the value of ecological infrastructure for water security is credible, salient and relevant	Number of evidence-based knowledge products shared with target audience	None	Under way	2 evidence based knowledge products	Knowledge products	Able to influence research calls of the sector research commission. Sufficient funding to undertake credible research.

Part II. Table of outcomes, outputs and indicative activities

Outcome, Outputs and result Indicator	Activity no.	Indicative high level activities
Component 1: Enabling environment is strengthened for improving water security through the integration of biodiversity and ecosystem services in the water value chain.		
Outcome 1.1 Natural capital accounts developed to enable policy, planning and decision-making in favour of ecological infrastructure		
1.1.1 Natural capital accounts are developed at the national level and the catchment level, and tested for informing planning, management and monitoring of ecological infrastructure for water security *Indicator: Workshops have been held to explore application of accounts with key users.* *Baseline: Some involvement of stakeholders in production of pilot ecosystem accounts as part of ANCA project, but no systematic testing of accounts with users* *Midterm: Workshops held with key users based on draft accounts* *End target: Lessons on application of accounts synthesised.*	1.1.1.2	Develop national ecosystem accounts, building on existing pilot accounts
	1.1.1.3	Develop detailed catchment-level water accounts for demonstration catchments, building on existing WRC-funded water accounting projects
	1.1.1.4	Develop map of ecological infrastructure in demonstration catchments
	1.1.1.5	Develop selected ecological infrastructure asset accounts for demonstration catchments
	1.1.1.6	Explore use of accounts in catchment-level planning and management, in supporting project-level investment decisions, and in monitoring effectiveness of investment including investments in ecological infrastructure (e.g. with CMAs, finance institutions, DWS)
	1.1.1.2	Develop national ecosystem accounts, building on existing pilot accounts
1.1.2 Capacity, institutional arrangements and time series data to enable regular production of relevant NC accounts are established or strengthened *Indicator: Strategic Advisory Committee for Ecosystem Accounting meets regularly. Community of practice for ecosystem accounting has been established and meets regularly.* *Baseline: Strategic Advisory Committee for Ecosystem Accounting established for ANCA project, but with no impetus or resources for long-term functioning. No community of practice for ecosystem accounting exists.* *Midterm: Strategic Advisory Committee for Ecosystem Accounting has met twice. Community of practice has been convened at least once.* *End target: Strategic Advisory Committee for Ecosystem Accounting has met four times. Community of practice has been convened at least twice.*	1.1.2.1	Build skills to develop and interpret accounts within SANBI, Stats SA and other partner organisations
	1.1.2.2	Develop clear understanding of the data foundations necessary for the priority NC accounts, and the current gaps and shortfalls in data for these accounts (i.e. what data is needed)
	1.1.2.3	Clarify mandates, roles and responsibilities for ensuring that time series data for accounts is collected and available (i.e. how to get the data)
	1.1.2.4	Explore institutional arrangements for long-term production of accounts with key partners
1.2 Relevant policy frameworks, regulatory instruments and planning tools enable the integration of biodiversity and ecosystem services into water sector planning, finance and development		
1.2.1. National water policies, strategies and regulatory instruments applicable to water, such as the National Water and Sanitation Strategy (3rd Edition NWRS) and the National Water Security Plan, reflect the importance of ecological infrastructure for water security *Indicator: Implementation plan for one applicable policy has ecological infrastructure targets* *Baseline: Implementation plan for chapter 5 of NWRS includes ecological infrastructure* *Midterm: Evidence of participation in policy process* *End target: Implementation plan for the National Water and Sanitation Strategy has ecological infrastructure targets*	1.2.1.1	Provide structured inputs regarding ecological infrastructure objectives into review of NWRS2, crafting of NWRS3, Water Security Plan and National Water and Sanitation Strategy and implementation plan
	1.2.1.2	Strengthen relevant offsets policy framework and tools for infrastructure to streamline implementation and maximize benefits to water security, including possible development of a guideline
	1.2.1.3	Support continued development and implementation of RQOs, particularly at CMA level
	1.2.1.4	Support improved practice of setting water use license conditions (particularly for developments with significant water impacts), including requirements for implementability, the minimum information required in order to process and issue a water use licenses, strengthen and align the conditions for developments with significant water impacts, especially for mitigation and proactive ecological infrastructure management that benefits water security.
	1.2.1.5	Support capacity development of DWS CME officers regarding the protection and maintenance of ecological infrastructure
	1.2.1.6	Support the development of Administrative Penalties for DWS to include in the NWRS 3 and Water Policy Reform process

Outcome, Outputs and result Indicator	Activity no.	Indicative high level activities
1.2.2. Planning applicable to water resource management and water resource development supported to integrate biodiversity and ecological infrastructure considerations for water security *Indicator: Water-related ecological infrastructure elements recognized in relevant plans* *Baseline: Water resource development options analysis currently does not include ecological infrastructure* *Midterm: NRM land user incentive framework strengthened for water outcomes* *End target: Water resource development planning and options analysis incorporates ecological infrastructure (evidence in options analysis processes undertaken for particular water infrastructure projects)*	1.2.2.1	Improve capacity for integrating ecological infrastructure considerations in the planning and options analysis of future water sector infrastructure developments
	1.2.2.2	Work with NRM and other ecological infrastructure related EPWP programmes to improve project prioritisation, such as through the use CMSs
	1.2.2.3	Revisit existing guidelines that pertain to CMS development (e.g. wetlands etc.), examine current practice of CMS development and identify and address opportunities to strengthen how ecological infrastructure is integrated into CMS development
1.3 Mechanisms for rehabilitation and ongoing maintenance of ecological infrastructure are in place and operationalized		
1.3.1. The management of water-related ecological infrastructure is progressively being incorporated into the cost of catchment management in line with the Water Pricing Strategy and other new and emerging policies and strategies *Indicator Full costs of management of ecological infrastructure determined at catchment level* *Baseline: Draft Water Pricing Strategy provides for recovery of costs linked to ecological infrastructure* *Midterm: Calculation of full costs underway* *End target: Statement of full costs. Mechanisms identified for flow of funds to ecological infrastructure rehabilitation and maintenance. Review of financial flows from water price. Engagement with institutions responsible for implementing identified mechanisms on statement of full costs and potential implementation.*	1.3.1.1	Work with DWS to ensure relevant institutions are able to collect and retain/direct charges that have been adequately calculated and clearly prioritized
	1.3.1.2	Work with CMAs to reconcile value of downstream water services and costs of ecological infrastructure rehabilitation and maintenance within water pricing structures and water resource plans (CMS's) which include ecological infrastructure
	1.3.1.3	Supporting processes to pilot the implementation of the Waste Discharge Charge System
	1.3.1.4	Work with DWS to revise appendix A of the Water Pricing Strategy as necessary to incorporate ecological infrastructure "assets" & costs in price setting process
1.3.2. Method/tool is developed for the finance sector to strengthen the assessment and management of environmental risk within investment decision-making linked to water infrastructure finance. *Indicator: Tool/method developed for the finance sector to strengthen the assessment and management of environmental risk within investment decision-making linked to water infrastructure finance.* *Baseline: Ecological infrastructure considered from an impact point of view in existing tools used by finance institutions.* *Midterm: Key elements for natural capital/ ecological infrastructure risk inclusion in the tool agreed with finance institutions (e.g. downstream 'benefit sheds', priority Water Source Areas, etc.). Systematic tool/method designed for integrating natural capital (particularly ecological infrastructure) considerations into finance institutions' operations, products or services.* *End target: Tool/method to strengthen the assessment and management of environmental risk within investment decision-making linked to water infrastructure finance developed, tested and peer reviewed (peer review could include WAVES, the Natural Capital Protocol or alternative similar global good practice initiative)*	1.3.2.1	Develop a decision-support tool to ensure finance institutions incorporate ecological infrastructure into their decision making and project approval processes for financing water infrastructure, and that ecological infrastructure considerations are incorporated in the planning and prefeasibility stages of water infrastructure development, building on and ensuring alignment with international initiatives (such as UNEPFI Sustainable Finance initiatives, the Natural Capital Declaration, the Natural Capital Finance Alliance and the World Bank WAVES programme) which are involved in developing tools for improved natural capital valuation in finance institutions' decision making at organisation and project level.
	1.3.2.2	Work with interested private sector infrastructure funders to improve understanding of the potential for water related ecological infrastructure to reduce financial risk, both at the project and systemic level linked to water security issues in South Africa (such as with Old Mutual, Investment Solutions, RMB, Pension Funds).
	1.3.2..3	Work with DWS to ensure that ecological infrastructure is incorporated in business plans submitted for grant funding of water infrastructure (Regional Bulk Infrastructure Grant, Water Services Infrastructure Grant)
Component 2: Application of policies and financial mechanisms in the water value chain improves water security in critical catchments.		
2.1 Enhanced organizational capacity and investment in ecological infrastructure in the Berg and Breede catchments have improved water resource management		
2.1.1. Institutional capacity within in the Breede and Riviersonderend catchments to identify, plan, budget for, assess benefits of and manage ecological infrastructure investments has been strengthened	2.1.1.1	Provide a Breede Gouritz CMA Ecological Infrastructure (EI) coordinator to assist key stakeholders to coordinate activities in the demonstration [as the Berg-Breede Coordinator], including:
	2.1.1.2	• Act as the focal point to coordinate project activities in the Berg-Breede catchments; • Manage the development of an ecological infrastructure plan and implementation strategy for the CMA (focusing on priority sub-catchments) as part of the detailed CMS development process;

Outcome, Outputs and result Indicator	Activity no.	Indicative high level activities
Indicator: Dedicated focal point for ecological infrastructure in the catchments. Ecological infrastructure management plan developed as part of the CMS. *Baseline: No dedicated focal point for ecological infrastructure at catchment level in Berg or Breede Gouritz. No ecological infrastructure management plan in CMS.* *Midterm: Dedicated focal point in place. Ecological infrastructure management plan under development.* *End target: Institutional arrangements for beyond project ecological infrastructure coordination agreed. Ecological infrastructure management plan being implemented as part of the CMS.*		• Undertake a Baseline assessment for quantity and quality Indicators at strategic points in catchments to provide Baseline data above and below any rehabilitation interventions coordinated through the project; • Engage with IDP and SDF processes of affected District and Local Municipalities to ensure alignment with the CMS in general, and the ecological infrastructure plan in particular; • Oversee implementation of CMA funded or aligned ecological restoration projects; • Convene of a CMA "learning network", supported by resources in component 3, on rehabilitation and maintenance of ecological infrastructure that feeds into the Catchment Management Forums to build broader capacity across the region and encourage land users to change behaviours; • Coordinate costing studies and support their uptake in CMA tariff setting processes under output 2.1.3; • Investigate, in support of Outcome 1.1, how Natural Capital Accounts can support the CMS development; • Support relevant stakeholders to investigate appropriate and innovative monitoring mechanisms for assessing ecological infrastructure performance, flow benefits, water quality improvement against RQOs and act on findings of investigation.
	2.1.1.3	Support relevant stakeholders to investigate River Maintenance and Management Plans (or Environmental Resource Protection Plans) ability to streamline enforcement of a range of natural resource management regulations, and aid in Compliance Monitoring and act on findings of investigation
	2.1.1.4	Support development of mobile interface for CME implementation tools and to record real time functioning of ecological infrastructure
	2.1.1.5	Provide one (1) full time staff member appointed for the Sonderend WUA and Berg River Irrigation Board focused on coordination of ecological infrastructure restoration measures (Incl. monitoring of outcomes of interventions)
	2.1.1.6	Support planning and coordination of ecological infrastructure interventions (including tree removal, flood control berm removal, post clearing restoration, biomass use and training of contractors in key skills gaps, primarily in Sonderend)
2.1.2 Full costs of rehabilitation and maintenance of water-related ecological infrastructure and associated CME are determined in order to support the mainstreaming of ecological infrastructure into the financing of water resource management and development *Indicator: Full costs associated with the 103rehabilitation and maintenance of water-related ecological infrastructure have been calculated.* *Baseline: No quantification of costs for rehabilitation and maintenance of water-related ecological infrastructure at catchment scale* *Midterm: Studies to determine the full costs associated with the rehabilitation and maintenance of water-related ecological infrastructure are underway* *End target: Institutional arrangements for beyond project ecological infrastructure coordination agreed. Ecological infrastructure management plan being implemented as part of the CMS*.	2.1.2.1	Assist key stakeholders to determine the full costs associated with the rehabilitation and maintenance of water-related ecological infrastructure including full cost of IAP control and subsequent rehabilitation, ecosystem rehabilitation, appropriate water weed control, Waste Discharge Mitigation charges in the Berg catchment and explore ecological infrastructure related rehabilitation as well as costs of associated license, inspection and enforcement capacity
2.2 Enhanced organizational capacity and investment in ecological infrastructure in the Greater uMngeni catchment have improved water resource management		
2.2.1 Institutional capacity within in the Greater uMngeni catchment to identify, plan, budget for, assess benefits of and manage ecological infrastructure investments has been strengthened *Indicator: Dedicated focal point for ecological infrastructure in the catchments. Ecological infrastructure management plan developed as part of the CMS.*	2.2.1.1	Appoint a full time Greater uMngeni Coordinator with responsibility for the following activities: • Coordinate the implementation of GEF 6 activities and partnerships in the Greater uMngeni demonstration; Support the continued functioning of the UEIP including • Coordinate research to monitor ecological infrastructure rehabilitation and restoration activities and provide evidence for improvements in water security

Outcome, Outputs and result Indicator	Activity no.	Indicative high level activities
Baseline: No dedicated focal point for ecological infrastructure at catchment level in Greater uMngeni. No ecological infrastructure management plan in CMS. *Midterm: Dedicated focal point in place. Ecological infrastructure management plan under development.* *End target: Institutional arrangements for beyond project ecological infrastructure coordination agreed. Ecological infrastructure management plan being implemented as part of the CMS.*	2.2.1.2	Support and coordinate efforts of multiple actors to control invasive alien plants, rehabilitate riparian and wetland ecosystems and related ecological infrastructure activities • Implementing the priority outcomes from previous studies such as the UEIP Green Fund Report on Ecological Infrastructure • Leverage the projects undertaken under the Aqueduct programme
	2.2.1.3	Provide a Pongola-uMzimkulu CMA Ecological Infrastructure (EI) coordinator to coordinate activities in the demonstration with responsibilities for the following activities:
	2.2.1.4	• Manage the development of an ecological infrastructure plan and implementation strategy for the CMA (focusing on priority tertiary catchments) as part of the detailed CMS development process. • Do Baseline assessment for quantity and quality Indicators at strategic points in catchments • Engage with IDP and SDF processes of affected District and Local Municipalities to ensure alignment with the CMS in general, and the ecological infrastructure plan in particular • Incorporate NCA into the CMS development process • Support the Classification and RQOs
2.2.2 Full costs of rehabilitation and maintenance of water-related ecological infrastructure and associated CME are determined in order to support the mainstreaming of ecological infrastructure into the financing of water resource management and development *Indicator: Studies undertaken to confirm the eligibility of catchments for implementing the WDCS* *Baseline Waste discharge charge system yet to be implemented in South Africa* *Midterm: Studies to confirm the eligibility of catchments for implementing the WDCS are underway* *End target: Studies to confirm the eligibility of catchments for implementing the WDCS are completed*	2.2.2.1	Assist key stakeholders to undertake studies to confirm the eligibility of catchments for implementing the Waste Discharge charge system and investigate alternative financial instruments for improving water quality
	2.2.2.2	Assist key stakeholders to develop detailed costing from the CMA, including CMS implementation, CME, and waste discharge levies to better calculate the costs of ecological infrastructure protection, rehabilitation and maintenance and compliance management in the Water Resource Management Charge
	2.2.2.3	Assist key stakeholders to investigate the full costs of water for different user groups in the catchment and explore opportunities within the water value chain that ensure more equitable allocation of full costs for water amongst different users.
2.2.3. Planning, prefeasibility, and licensing for infrastructure development has addressed the management and mainstreaming of EI, using examples such as the uMkhomazi Smithfield Dam, Spring Grove, Kamberg and Hlatikulu *Indicator: Ecological infrastructure investment plan developed, such as for the Smithfield Dam* *Baseline: No investment plan exists* *Midterm: One investment plan under development* *End target: One investment plan under implementation*	2.2.3.1	Identity, cost, develop an investment plan and coordinate ecological infrastructure management and maintenance opportunities within the dam catchments to improve hydrological performance
	2.2.3.2	Assist key stakeholders to review offset examples to develop guidance, that may be used in EIAs, EMPs, licenses, pricing structures, tariffs and safeguards of financial institutions, on: • optimising outcomes for biodiversity and ecological infrastructure especially hydrological performance of the catchment; • paying for the offset; • reducing ecological infrastructure-related risks associated with infrastructure; • developments for infrastructure implementing agencies such as the DBSA and TCTA; • assisting key stakeholders to investigate options for where best to locate capital and maintenance costs for ecological infrastructure (e.g. raw water tariff, bulk tariff or municipal tariff – or all)
	2.2.3.3	Use experience developed during the regulatory approval processes (Water Use Licences and Environmental Authorisations) for Spring Grove Dam to make recommendations on how these processes can be strengthened and streamlined in future water infrastructure developments.
Component 3: Social learning, credible evidence, and knowledge management improves the integration of biodiversity and ecosystem services into the water value chain.		
3.1. Project impact and sustainability is enhanced through targeted engagement with key stakeholders		
3.1.1. Coordinated knowledge management and social learning for change enhances project impact and sustainability	3.1.1.2	Develop and coordinate the implementation and maintenance of a knowledge management and social learning for change strategy with key partners. Include in this the development of a key decision maker survey/tracking tool, including its Baseline and the

Outcome, Outputs and result Indicator	Activity no.	Indicative high level activities
Indicator: Strategy for knowledge management and social learning for change is developed *Baseline: No strategy* *Midterm: Strategy exists, and is being implemented.* *End target: Updated strategy implemented, and post project road map developed*		midterm & end of term targets as part of the Indicator for this outcome.
	3.1.1.3	Convene and participate in strategically identified platforms, learning alliances, learning events and dialogues with key stakeholders and partners that address barriers or nurture opportunities identified by the strategy
	3.1.1.4	Work with partners and component coordinators to interpret and translate technical outputs from the project activities, capture lessons through implementation, and co-produce knowledge products that effectively communicate knowledge and promote choices supportive of ecological infrastructure for water security.
	3.1.1.5	Identify and support relevant knowledge management systems that support access and use of knowledge, advisory services and collaboration
	3.1.1.6	Support learning and skills development that increases technical capacity to use information and tools that enable integration of biodiversity and ecosystem services into planning, finance and development (e.g. use of accounts, integrating information into learning materials of key stakeholders).
	3.1.1.7	Strengthen institutional capacity and operational governance in Catchment Management Agencies (CMA) for ecological infrastructure and convene the CMA Chief Executive Officer (CEO) forum
	3.1.1.8	Work with the private, public and civil society sectors to develop and implement catchment-wide solutions to water security
	3.1.1.9	Co-develop blue print for contracting arrangements with local institutions to manage ecological infrastructure rehabilitation and maintenance rehabilitation and maintenance implementation with DWS and CMA and assess skills-readiness to implement ecological infrastructure rehabilitation and maintenance in local areas where testing will take place.
	3.1.1.2	Develop and coordinate the implementation and maintenance of a knowledge management and social learning for change strategy with key partners. Include in this the development of a key decision maker survey/tracking tool, including its Baseline and the Midterm & end of term targets as part of the Indicator for this outcome.
	3.1.1.3	Convene and participate in strategically identified platforms, learning alliances, learning events and dialogues with key stakeholders and partners that address barriers or nurture opportunities identified by the strategy
3.2 Evidence of the value of ecological infrastructure for water security is credible, salient and relevant		
3.2.1. Co-generated evidence base and impact assessment of pilot project interventions is generated, packaged appropriately and shared *Indicator: Two cases are produced* *Baseline: 0* *Midterm: 2 under development* *End target: 2 completed*	3.2.1.1	Inform call for proposals for research and generation of evidence of the impact of project interventions (based on what the evidence/knowledge needs are guided by the knowledge management and social learning for change strategy).
	3.2.1.2	Support (through participating in steering committee and ensure linkages between demonstration interventions and research projects) research and generation of evidence of the impact of project interventions
	3.2.1.3	Translate findings of research on the impact of project interventions into knowledge products that demonstrate the value of ecological infrastructure for water security and are credible, salient and relevant to target audiences (identified in the knowledge management and social learning for change strategy).
3.2.2. Monitoring and evaluation information enhances project implementation, learning and evidence *Indicator: M&E system. 8 learning products/events.* *Baseline: No M&E system. 0 learning products/events.* *Midterm: M&E system implemented. 3 learning products/events.* *End target: M&E system implemented. 8 learning products/events.*	3.2.2.1	Develop and implement a monitoring and evaluation system that supports project impact assessment
	3.2.2.2	Conduct a knowledge exchange between GEF 6 project design team and project implementers around the project inception, and produce a project position paper on the Theory of Change around which mutual understanding between partners and stakeholders can be founded
	3.2.2.3	Conduct initial internal (yr2), Midterm (yr3) and terminal evaluations (yr5)

Part III. Incremental Reasoning and Cost Analysis

15. Global and national benefits

South Africa is one of the world's most biodiverse countries making it a very effective place to secure global benefits for conservation. Comprising 1% of the world's land surface it contains a disproportionate 10% of the documented fish, bird and plant species and 6% of the reptile and mammal species. GEF investment has significantly improved South Africa's capacity to manage and conserve its biodiversity through several mainstreaming projects, however there are ongoing pressures on biodiversity, including from demands on water resources. The 2011 National Biodiversity Assessment indicated that wetland, riverine, and estuarine ecosystems are the most threatened environments.

Pressure on these ecosystems, as well as the terrestrial ecosystems in their catchments, threaten the country's ability to meet global and national biodiversity conservation targets and undermine the ability of these ecosystems to provide crucial ecosystem services of benefit to millions of people downstream. Naturally functioning ecosystems that deliver valuable services to people are referred to in South Africa as ecological infrastructure. In certain areas especially, such as strategic water sources areas for instance, they are critical to the delivery of water-related services, such as water provisioning and purification, water flow regulation and disaster risk regulation amongst others, and are of increasingly recognised importance to water security. The rich endowments of biodiversity assets and ecological infrastructure therefore provide opportunity to support the country's development path, especially as the knowledge base on the value of ecosystems and how to manage them effectively expands. In order to unlock investment in South Africa's ecosystems, to realise multiple social, economic and environmental (biodiversity) benefits, this project will focus in two catchment systems, the Berg-Breede and the Greater uMngeni.

Extending into all three of South Africa's global biodiversity hotspots, and six of South Africa's strategic water source areas, the project demonstration areas hold a high density of nationally and provincially identified biodiversity priority areas. These areas are prioritised because of they are Critical Biodiversity Areas, Ecological Support Areas, FEPAs and other biodiversity priority areas identified through systematic biodiversity plans at the national, provincial and metro scale. The demonstration area catchments also support the water supply systems for two of the larger cities in South Africa, with GDPs in the order of R400 billion per annum, and home to over 16 million people. The uMngeni Water Supply System and the Western Cape Water Supply System are both at their limits and future water conservation and demand management measures are being initiated by municipalities. Contributions that investments in ecological infrastructure can make to water security (availability, quality, risk reduction etc.) will significantly benefit economic growth and requirements for improved levels of service.

Integrating biodiversity and ecosystem services into the planning, finance and development in the water sector is necessary to improve water security and avoid further loss of biodiversity and ecosystem services (see Table 6). Doing so contributes to GEF 6 Biodiversity Focal Area programme 10, Integration of biodiversity and ecosystem services into development and finance planning, and contributes to social development and transformation that is ecologically sustainable as outlined in the NDP (National Planning Commission, 2012). Through demonstration, capacity building and the process of changing the way key stakeholders make decisions about how we plan for water security and manage water, the project promotes higher levels of appreciation of the diverse values of biodiversity and ecosystem services to economic development and human well-being as well as an awareness of steps to take to conserve and use biodiversity more sustainably. This has a long-term benefit for biodiversity and ecosystem services that support water security.

Table 6. Baseline Alternative and Benefits of the GEF Project

Cost/Benefit	Baseline (B)	Alternative (A)	Increment (A-B)
Global Benefits	Biodiversity in global biodiversity hotspots in a megadiverse country are threatened by a range of pressures that emanate from poor water resource and catchment management. Pressures, such as pollution, over-abstraction, and IAS, threaten ecosystems, human well-being and economic activities, which is further exacerbated by loss of important ecosystem services. The incorporation of biodiversity and ecosystem services and the benefits accrued are not adequately reflected in broader policy, legal, regulatory frameworks and management instruments and is constrained by limited understanding, governance challenges, insufficient capacity, lack of alignment in policies, and inadequate regulatory frameworks. It is in part hampered due to a lack of awareness of the value to water security of biodiversity and associated water-related services provided by ecosystems.	The project will deliver global environmental benefits through a bundle of interventions that: • Ensure biodiversity and ecosystem services are being mainstreamed into water resource management and development to ensure water security • Strengthen capacity to understand biodiversity and ecosystem services so that staff can incorporate this understanding into the support, guidance, coordination and management of processes and activities (planning, implementing, overseeing, regulating) that ensure water security. • Support learning, innovation and transformational change through social learning and collective action.	The GEF increment will: • Ensure improved management, regulation and compliance monitoring of globally important biodiversity in South Africa. • Avoid further loss of biodiversity and ecosystem services in global biodiversity hotspots through (a) restoration and maintenance of ecosystems (direct footprint) and (b) through improved management, regulation and compliance monitoring of globally important biodiversity in South Africa and improved planning, finance and development decision-making in the water sector enabled by tools developed, e.g. natural capital accounts and catchment-level water resource accounts and ecosystem accounts to inform Catchment Management Strategies and their implementation (indirect footprint). This in turn will enhance the national contribution to the achievement of the SDGs (SDG 2030) and the Aichi Strategic Goals. Specifically Aichi Targets, namely: • Target 1: increased awareness of the values of biodiversity and the steps they can take to conserve and use it sustainably. • Target 2 on integrating of biodiversity values into development planning. • Target 3 on the development of positive incentives for the conservation and sustainable use of biodiversity; • Target 7 on the sustainable management of forestry and agriculture areas;

Cost/Benefit	Baseline (B)	Alternative (A)	Increment (A-B)
			• Target 8 on the reduction of pollution to levels that are not detrimental to ecosystem functioning; • Target 9 on the control, eradication and management of invasive alien species; • Target 14 on ecosystems that provide essential services; • Target 19 on the sharing and transfer of science and knowledge; and • Target 20 on the mobilization of financial resources
National and local benefits	Without the interventions of this programme South Africa is likely to continue along a path of increasing degradation of EI, loss of freshwater biodiversity, and water scarcity, with key catchments being closed to further development. Currently: • Water resource planning, at national levels, in CMS and in IDPs does not effectively consider the role of biodiversity and ecosystem services in water security • There is limited coordination between regulatory authorities responsible for water, land management, environment and natural resource use authorisations. • The opportunities for effective water conservation and water demand management are not effectively explored or implemented • There is limited compliance monitoring and enforcement	At the national and local level, the following benefits will arise through the planned project activities: Component 1: Enabling environment is strengthened for improving water security through the integration of biodiversity and ecosystem services in the water value chain, will result in: • National and catchment-level ecosystem accounts are developed. • National policy and regulatory instruments integrate ecological infrastructure. • Foundational work in catchments to enable operationalization of ecological infrastructure components of the Water Pricing Strategy. • Tool/method implemented to transform the way finance institutions assess and manage environmental risks and make investment decisions. Component 2: Application of policies and financial mechanisms in the water value chain improves water security in critical catchments, will result in: • Capacity in CMAs is enhanced and enables improved intergovernmental and cross-sectoral planning and management.	The GEF increment will: • Improve land and water use regulation across 4.58 million ha through the development of Catchment Management Strategies that mainstreams biodiversity and ecosystem services in the Berg-Breede River system and Greater Umgeni River system. Supports achievement of Aichi Targets 2 • Coordinate the implementation of natural resource management activities, including invasive alien plant removal, riparian rehabilitation, and dryland and wetland rehabilitation in 87 650 ha in order to maintain delivery of water-related ecosystem services over 200 000 ha. Supports achievement of Aichi Targets7, 9 and 14. • Improve understanding of the links between water resources, ecosystems, ecological infrastructure, and a range of social and economic factors. • Increased funding available for ecological infrastructure management, and improved targeting of funds, resulting in both rehabilitated

Cost/Benefit	Baseline (B)	Alternative (A)	Increment (A-B)
	resulting in degraded natural resources and unlawful water use. • Biodiversity and ecosystem services are not sufficiently or timeously considered in infrastructure pre-feasibility and feasibility analyses • Return on investments in infrastructure are not realised. • Appreciation of the value of biodiversity and consideration in choices made is a constraint. Capacity for effective coordination that supports social processes for learning and collaboration is a constraint. Collective action and collaboration support more integrated, innovative and holistic ways of addressing root causes of inter-connected social and environmental problems.	• EI is successfully integrated into CMS and specific ecological infrastructure actions are prioritise and implemented resulting in better management of freshwater ecosystems and catchments. Component 3: Social learning, credible evidence, and knowledge management improves the integration of biodiversity and ecosystem services into the water value chain, will result in: • Improved decision-making in key stakeholders • Evidence-based knowledge products that inform, transform and enhance project impact and sustainability. In this way, water resource management will be strengthened through enhance capacity and collective action to sustainable manage and use water resources. This will result in multiple benefits for different stakeholders (e.g. improving human well-being, health, security, livelihoods and social equity at the same time as improving environmental benefits and supporting climate resilience). Additionally, strengthened capacity, knowledge management and social learning will support the innovation and transformational change in water resource management in South Africa necessary to improve water security and conserve important biodiversity areas.	natural environments and increased water security. • Contribute to global, regional and local communities of practice and knowledge e.g. by demonstrating that ecosystem accounting, which is still considered an experimental component of natural capital accounting globally, can contribute in practical ways to the sound management of biodiversity and ecosystem services, thereby helping to remove barriers to investment in ecosystem accounting in other countries. The increment will enhance the national and local contribution to: • the NDP, • the NWRS, NWA • DWS Strategic Outcome orientated goal 1 of improving, increasing the skills pool and building competencies within the sector. • South Africa's NBSAP • South Africa's Water Security Plan (including through 'knowledge capital, seen as a key component of the Plan)

Section 3 – Total Budget and Work Plan

***Budget and work plan is under development and subject to change

Component	Outcome	Executing agency	Donor	Budget category	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$	Year 5 US$	Total US$	Budget note
Component 1: Enabling environment is strengthened for improving water security through the integration of biodiversity and ecosystem services in the water value chain.	1.1 Natural capital accounts developed to enable policy, planning and decision-making in favour of ecological infrastructure	SANBI	GEF	staff	28 538	79 865	100 028	105 114	92 700	406 245	
				consultants	33 838	117 342	203 777	129 821	-	484 778	
				travel	5 708	15 508	26 414	14 785	7 400	69 814	
				operating	2 202	4 738	6 808	5 246	3 500	22 494	
				equip	-	4 308	-	-	-	4 308	
				misc	-	-	-	-	-	-	
				sub-total	**70 286**	**221 760**	**337 026**	**254 965**	**103 600**	**987 638**	
	1.2 Relevant policy frameworks, regulatory instruments and institutions enable the integration of biodiversity and ecosystems services into water sector planning, finance and development	SANBI	GEF	staff	52 848	148 904	156 881	164 858	172 835	696 327	
				consultants	34 246	126 646	81 692	14 308	-	256 892	
				travel	7 927	21 921	23 095	24 270	19 444	96 657	
				operating	10 600	13 785	9 985	10 492	8 000	52 862	
				equip	4 974	2 154	3 268	2 385	-	12 780	
				misc	-	-	-	-	-	-	
				sub-total	**110 595**	**313 410**	**274 921**	**216 313**	**200 279**	**1 115 518**	
	1.3 Mechanisms for rehabilitation and ongoing maintenance of ecological infrastructure are in place and operationalized	SANBI	GEF	staff	-	-	-	-	-	-	
				consultants	57 077	106 831	117 092	121 138	-	402 138	
				travel	1 957	4 135	4 357	5 723	-	16 172	
				operating	-	-	-	-	-	-	
				equip	-	-	-	-	-	-	
				misc	-	-	-	-	-	-	
				sub-total	**59 034**	**110 966**	**121 449**	**126 862**	**-**	**418 311**	
Component 2: Application of policies and financial	2.1 Enhanced organizational capacity and investment in ecological infrastructure in the Berg and Breede	SANBI	GEF	staff	8 328	98 402	103 673	108 945	114 216	433 565	
				consultants	9 785	138 708	137 062	80 123	-	365 677	
				travel	1 249	13 778	14 698	14 110	11 592	55 427	

Component	Outcome	Executing agency	Donor	Budget category	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$	Year 5 US$	Total US$	Budget note
mechanisms in the water value chain improves water security in critical catchments.	catchments have improved water resource management			operating	1 631	21 883	55 732	58 566	6 200	144 012	
				equip	1 468	36 185	3 994	1 908	-	43 554	
				misc	3 914	-	-	-	-	3 914	
				sub-total	**26 374**	**308 955**	**315 159**	**263 651**	**132 009**	**1 046 148**	
	2.2 Enhanced organizational capacity and investment in ecological infrastructure in the Greater uMngeni catchment have improved water resource management	SANBI	GEF	staff	8 328	87 643	111 251	116 908	122 564	446 694	
				consultants	66 862	255 705	260 326	178 178	4 800	765 871	
				travel	1 249	23 140	25 038	26 312	18 385	94 124	
				operating	4 892	92 788	158 574	131 345	7 000	394 598	
				equip	1 468	6 892	7 262	7 631	-	23 252	
				misc	7 828	-	-	-	-	7 828	
				sub-total	**90 627**	**466 168**	**562 451**	**460 373**	**152 749**	**1 732 367**	
Component 3: Social learning, credible evidence, and knowledge management improves the integration of biodiversity and ecosystem services into the water value chain.	3.1. Project impact and sustainability is enhanced through targeted engagement with key stakeholders	SANBI	GEF	staff	8 328	52 797	55 625	58 454	61 282	236 486	
				consultants	16 308	215 385	136 154	90 615	25 000	483 462	
				travel	1 249	15 243	13 790	14 491	15 192	59 965	
				operating	-	73 532	69 098	71 443	76 125	290 198	
				equip	1 468	-	1 634	-	-	3 102	
				misc	-	25 846	27 231	57 231	60 000	170 308	
				sub-total	**27 353**	**382 803**	**303 532**	**292 234**	**237 600**	**1 243 521**	
	3.2 Evidence of the value of ecological infrastructure for water security is credible, salient and relevant	SANBI	GEF	staff	-	-	-	-	-	-	
				consultants	88 877	47 385	63 538	38 154	47 500	285 454	
				travel	4 077	1 292	4 538	-	5 000	14 908	
				operating	-	-	-	-	-	-	
				equip	-	-	-	-	-	-	
				misc	-	-	-	-	-	-	
				sub-total	**92 954**	**48 677**	**68 077**	**38 154**	**52 500**	**300 362**	
4.1 Project Management Unit	4.1 Project Management Unit	SANBI	GEF	staff	29 233	61 776	65 086	68 395	71 704	296 194	
				consultants	-	-	-	-	-	-	
				travel	3 237	6 841	7 207	7 574	7 940	32 799	
				operating	4 077	4 308	4 538	4 769	5 000	22 692	

Component	Outcome	Executing agency	Donor	Budget category	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$	Year 5 US$	Total US$	Budget note
				equip	1 631	-	2 269	2 385	-	6 285	
				misc	-	-	-	-	-	-	
				sub-total	**38 178**	**72 925**	**79 100**	**83 123**	**84 645**	**357 970**	
	Project total				515 400	1 925 663	2 061 715	1 735 674	963 381	7 201 835	

Notes to the budget

General:

- Exchange rate of R13 to 1 US$ has been applied
- A 6% annual increment has been factored into all expenses in the budget

1. Includes the following staff
    a. In SANBI NCA project manager (for 54 months), GIS technician/officer (for 45 months)
    b. In CWRR, UKZN Water resource accounting specialist
2. Includes the following consulting expertise:
    a. NCA specialist with spatial and ecological expertise
    b. Biodiversity planner, consultant to develop guidelines linked to ecological infrastructure maps, consultant on institutional arrangements related to data, and possible PhD students
3. Travel, operating and other miscellaneous expenses in support of outcome 1.1
4. Includes the following staff in SANBI
    a. Technical Project Leader (anticipated at Level 13) for 54 months
    b. Senior Policy Advisor/Sector Specialist (anticipated at Level 13) for 52 months able to deliver on most of the technical activities of outcome 1.2 with limited consulting support
5. Includes consulting services in support of:
    a. Strengthen the offsets policy framework
    b. Support to continued development of RQOs at CMA level
    c. Support to improved practice of setting water use license conditions
    d. Support to improved capacity for integrating ecological infrastructure considerations in the planning and operations analysis of future water sector infrastructure developments
    e. Work with NRM and other ecological infrastructure related EPWP programmes to improve project prioritisation, such as through the use CMSs
6. Travel, operating, equipment and miscellaneous expenses in support of outcome 1.2, including for the PSC meetings
7. Includes the following consulting expertise to:
    a. Work with CMAs to reconcile value of downstream water services and costs of ecological infrastructure rehabilitation and maintenance within water pricing structures and water resource plans (CMS's) which include EI; Supporting processes to pilot the implementation of the Waste Discharge Charge System; Work with

DWS to revise appendix A of the Water Pricing Strategy as necessary to incorporate ecological infrastructure "assets" & costs in price setting process (implementing partner: WWF-SA)

b. Develop a decision-support tool to ensure DFIs incorporate ecological infrastructure into their decision making and project approval processes for financing water infrastructure; Work with interested private sector infrastructure funders to improve understanding of the potential for water related ecological infrastructure to reduce financial risk, both at the project and systemic level linked to water security issues in South Africa. (Old Mutual, Investment Solutions, RMB, Pension Funds) (implementing partner: WWF-SA)
c. Work with DWS to ensure that ecological infrastructure is incorporated in business plans submitted for grant funding of water infrastructure (Regional Bulk Infrastructure Grant, Water Services Infrastructure Grant)

8. Travel, operating, equipment and miscellaneous expenses in support of outcome 1.3
9. Includes the following staff in the catchment:
    a. In the Breede Gouritz, a full time Ecological Infrastructure (EI) Coordinator for 50 months to assist key stakeholders to coordinate activities in the demo [as the Berg-Breede Coordinator]
    b. Resources, possibly in the form of 1 full time staff member for 48 months in the Sonderend WUA and Berg River Irrigation Board, for the coordination of ecological infrastructure restoration
10. Includes consulting services in support of:
    a. Development of an ecological infrastructure plan and implementation strategy for the CMA as part of the CMS development process;
    b. Undertake a baseline assessment for quantity and quality indicators at strategic points in catchments to provide baseline data above and below any rehabilitation interventions coordinated through the project;
    c. investigate River Maintenance and Management Plans (or Environmental Resource Protection Plans) ability to streamline enforcement of a range of natural resource management regulations,
    d. Support development of mobile interface for CME implementation tools and to record real time functioning of ecological infrastructure (LandCare WC)
    e. Support planning and coordination of ecological infrastructure interventions (including tree removal, flood control berm removal, post clearing restoration, biomass use and training of contractors in key skills gaps, primarily in Sonderend)
    f. Assist key stakeholders to determine the full costs associated with the rehabilitation and maintenance of water-related ecological infrastructure including full cost of IAP control and subsequent rehabilitation, ecosystem rehabilitation, appropriate water weed control, Waste Discharge Mitigation charges in the Berg catchment and explore ecological infrastructure related rehabilitation as well as costs of associated license, inspection and enforcement capacity
11. Travel, operating, equipment and miscellaneous expenses in support of outcome 2.1
12. Includes the following staff in the catchment:
    a. A full time Greater uMngeni Coordinator for 45 months to in SANBI on behalf of the UEIP, to coordinate the implementation of GEF 6 activities and partnerships in the Greater uMngeni demo, to support the continued functioning of the UEIP and to Coordinate research to monitor ecological infrastructure rehabilitation and restoration activities and provide evidence for improvements in water security
    b. In the Pongola-uMzimkulu CMA, full time Ecological Infrastructure (EI) coordinator for 50 months to coordinate activities in the demo
13. Includes consulting services in support of:
    a. Implementing the priority outcomes from previous studies such as the UEIP Green Fund Report on Ecological Infrastructure; Leverage the projects undertaken under the Aqueduct programme
    b. Development of an ecological infrastructure plan and implementation strategy for the CMA as part of the CMS development process.
    c. Undertake a baseline assessment for quantity and quality indicators at strategic points in catchments
    d. Studies to confirm the eligibility of catchments for implementing the Waste Discharge charge system and investigate alternative financial instruments for improving water quality

e. Development of detailed costing from the CMA, including CMS implementation, CME, and waste discharge levies to better calculate the costs of ecological infrastructure protection, rehabilitation and maintenance and compliance management in the Water Resource Management Charge
f. investigate the full costs of water for different user groups in the catchment and explore opportunities within the water value chain that ensure more equitable allocation of full costs for water amongst different users.
g. Identity, cost, develop an investment plan and coordinate ecological infrastructure management and maintenance opportunities within the dam catchments to improve hydrological performance
h. Review offset examples to develop guidance, that may be used in EIAs, EMPs, licenses, pricing structures, tariffs and safeguards of financial institutions, on optimising outcomes for biodiversity and ecological infrastructure especially hydrological performance of the catchment; paying for the offset, de-risking infrastructure for TCTA and other implementing agencies; how to ensure funds are ring-fenced for ecological infrastructure management and maintenance in the appropriate institution (i.e. uMngeni Water or eThekwini municipality)
i. Investigate options for where best to locate capital and maintenance costs for ecological infrastructure (e.g. raw water tariff, bulk tariff or municipal tariff – or all)

14. Travel, operating, equipment and miscellaneous expenses in support of outcome 2.2
15. Includes the following staff in the WRC:
    a. A full time Knowledge Management and Social Learning Coordinator (50 months)
16. Consulting services in support of:
    a. The development knowledge management and social learning for change strategy with key partners and the development of a key decision maker survey/tracking tool, including its baseline and the midterm & end of term targets as part of the indicator for this outcome.
    b. Identify and support relevant knowledge management systems that support access and use of knowledge, advisory services and collaboration
    c. Strengthen institutional capacity and operational governance in Catchment Management Agencies (CMA) for ecological infrastructure and convene the CMA CEO forum (implementing partner: CMRA)
    d. Work with the private, public and civil society sectors to develop and implement catchment-wide solutions to water security (implementing partner: NBI)
    e. Co-develop blue print for contracting arrangements with local institutions to manage ecological infrastructure rehabilitation and maintenance implementation with DWS and CMA and assess skills-readiness to implement ecological infrastructure rehabilitation and maintenance in local areas where testing will take place (implementing partner: WWF-SA)
17. Travel, operating, equipment and miscellaneous expenses in support of outcome 3.1, including
    a. Operating expenses to convene and participate in strategically identified platforms, learning alliances, learning events and dialogues with key stakeholders and partners that address barriers or nurture opportunities identified by the strategy
    b. Miscellaneous expenses to interpret technical outputs from the project activities, capture lessons and co-produce knowledge products
18. Consulting services in support of:
    a. Calls for proposals for research and generation of evidence of the impact of project interventions (implementing partner: WRC)
    b. Translate findings of research on the impact of project interventions into knowledge products (implementing partner: WRC)
    c. Develop and implement a monitoring and evaluation system that supports project impact assessment
    d. A knowledge exchange between GEF 6 project design team and project implementers around the project inception, and a project position paper on the Theory of Change
    e. Initial internal (yr2), midterm (yr3) and terminal evaluations (yr5)
19. Travel, operating, equipment and miscellaneous expenses in support of outcome 3.2
20. Includes the following staff in SANBI
    a. A fulltime project coordinator for 54 months
    b. A halftime finance officer for 54 months

21. Travel, operating, equipment and miscellaneous expenses in support of project management

References

Bierbaum, R., Stocking, M., Bouwman, H., Cowie, A., Diaz, S., Granit, J., Patwardhan, A., Sims, R., Duron, G., Gorsevski, V., Hammond, T., Neretin, L., and C. Wellington-Moore. (2014). 'Delivering Global Environmental Benefits for Sustainable Development. Report of the Scientific and Technical Advisory Panel (STAP) to the 5th GEF Assembly, México 2014'. Global Environment Facility, Washington, DC.

BO CMA (Berg-Overberg Catchment Management Agency). (2010). Berg Overberg Catchment Management Strategy. Available at http://bgcma.co.za/wp-content/uploads/2016/08/Catchment-Management-Strategy-1.pdf

Bobbins, K. and C. Culwick. (2015) Green growth transitions through a green infrastructure approach at the local government level: Case study for the Gauteng City-Region. Journal of Public Administration 50, 32-49.

CAPE (2011). Cape Action for the People and the Environment. The Cape Floristic Region. www.capeaction.org.za/index.php/what-is-cape/the-cape-floristic-region (December 2012).

Clark, D.J. (Editor) (2015). Development and Assessment of an Integrated Water Resources Accounting Methodology for South Africa. Water Research Commission, Pretoria, South Africa. WRC Report No. 2205/1/15, 259pp.

Colvin. C., Cartwright, A., McKenzie. M., Dent. M., Maherry, A., and T. Mhlongo. 2015. Enhancing ecological infrastructure in the uMngeni catchment through private sector action and engagement. Green Fund Research Report.

Cumming, T, Forster, J, Shackleton, R, Dini, J, Ntshotsho, P, Kahn, A, Gumulua, M, Kubiszewski, I, (in prep), Investing in Ecological Infrastructure supporting the SDGs and South Africa's Development Agenda.

DEA (Department of Environmental Affairs). (2013). Long-Term Adaptation Scenarios Flagship Research Programme (LTAS) for South Africa. Pretoria, South Africa.

DEA (Department of Environmental Affairs). (2014a). SIP 19: Ecological Infrastructure for Water Security: An overview of a proposed Strategic Integrated Project (SIP) aimed at improving South Africa's water resources and other environmental goods and services through the conservation, protection, restoration, rehabilitation and/or maintenance of key ecological infrastructure. Minister's Approved Draft for Submission to the Presidential Infrastructure Coordinating Commission. Revision 6.1, Friday 31 October 2014

DEA (Department of Environmental Affairs). (2014b). South Africa's fifth national report to the Convention on Biological Diversity. RSA, Pretoria: Department of Environmental Affairs.

Dini, J., G. Jewitt, C. Hughes *et al*. (2015). Benefits of investing in ecological infrastructure to enhance water security in the uMngeni river catchment. Policy brief 8, December 2015. DEA, SANBI and Green Fund

Dini, J.A. (2008). Evaluation of interdepartmental environmental programmes in relation to cooperative government. November 2008. A research report submitted to the Faculty of Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management (in the field of Public and Development Management).

Driver A., Sink, K.J., Nel, J.N., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. and K. Maze. (2012). National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria.

DWA (Department of Water Affairs). (2004). Breede Water Management Area: Internal Strategic Perspective

DWA (Department of Water Affairs). (2009). Western Cape Water Supply System Reconciliation Strategy: Status Quo Report

DWA (Department of Water Affairs). (2012). Institutional Reform and Re-Alignment: A strategic framework for institutional realignment and reform. Available at https://www.dwa.gov.za/io/Docs/IRR%20strategic%20framework%20v0%203%20%20Printout.pdf

DWA (Department of Water Affairs). (2013a). National Water Resources Strategy. Second Edition. Water for an Equitable and Sustainable Future.

DWA (Department of Water Affairs). (2013b). Revision of the Pricing Strategy for Water Use Charges and Development of a Funding Model for Water Infrastructure Development and Use and a Model for the Establishment of an Economic Regulator: Sources and Options for Water Resources Infrastructure Financing

DWA (Department of Water Affairs). (2013c). National Water Resources Strategy. Second Edition. Appendix B: Understanding Water Resources.

DWA (Department of Water Affairs). (2015). The uMkhomazi Water Project Phase 1. Module 1: Technical Feasibility Study: Raw Water. Main Report.

DWS (Department of Water and Sanitation). (2015). Business Case for the Establishment and Development of the Berg Olifants Catchment Management Agency.

DWS (Department of Water and Sanitation). (2016). Water Resource Management Functions as in the Current Pricing Strategy. Annexure A. (internal document) Department of Water Affairs and Forestry. 2004. National Water Resource Strategy: Our Blueprint for Survival. First Edition.

GEF. (2013). Mainstreaming Gender at the GEF. Global Environment Facility, Washington

Grenfell, M.C., W.N. Ellery, S.E. Garden, J. Dini and A.G. van der Valk. (2007). The language of intervention: A review of concepts and terminology in wetland ecosystem repair. Water SA Vol. 33 No. 1 January 2007

Grey, D. and C. W. Sadoff. (2007). 'Sink or swim? Water security for growth and development', Water Policy: 9, 545-571

GSA (Government of South Africa). (2012). National Development Plan 2030. www.gov.za. Retrieved 29 March 2016. http://www.poa.gov.za/news/Documents/NPC%20National%20Development%20Plan%20Vision%202030%20-lo-res.pdf

IIED. (2007). Water ecosystem services and poverty reduction under climate change. Issues Paper for discussion in developing a DFID research programme. Draft: March 2007. Available at http://pubs.iied.org/pdfs/G00398.pdf

Jewitt, G., Zunckel, K., Dini, J., Hughes, C., de Winnaar, G., Mander, M., Hay, D., Pringle, C., McCosh, J., and I. Bredin. (eds.). (2015). Investing in ecological infrastructure to enhance water security in the uMngeni River catchment, Green Economy Research Report No. 1, Green Fund, Development Bank of Southern Africa, Midrand.

Jewitt, G., Zunckel, K., Dini, J., Hughes, C., de Winnaar, G., Mander, M., Hay, D., Pringle, C., McCosh, J., and Bredin, I. (eds.). (2015). Investing in ecological infrastructure to enhance water security in the uMngeni River catchment, Green Economy Research Report No. 1, Green Fund, Development Bank of Southern Africa, Midrand.

Kehler, J. (2001). Women and Poverty: The South African Experience. Journal of International Women's Studies, 3(1), 41-53. Available at: http://vc.bridgew.edu/jiws/vol3/iss1/3

Kolbe, A. (2014). Citizen Science & Water Quality in the uMngeni Catchment Area, KwaZulu-Natal, South Africa. Master of Environmental Studies thesis, School of Environmental Studies, Queen's University, Kingston, Ontario, Canada (September, 2014). Available at https://qspace.library.queensu.ca/handle/1974/12479

Magadlela, D. and N. Mdzeke. (2004). Social benefits in the Working for Water programme as a public works initiative. South African Journal of Science 100, 94-96. Jan/Feb 2004.

Mjoli, N., R. Nenzhelele and E. Njiro. (2009). Assessment of Gender Equity in Water User Associations. Report to the Water Research Commission. WRC Report No. Kv 219/09. April 2009

National Planning Commission. (2012). Our future -make it work. National Development Plan 2030

NCC (Natural Capital Coalition). (undated). the path towards the NATURAL CAPITAL PROTOCOL a primer for business. Available from naturalcapitalcoalition.org

Nel, J.L., Driver, A., Strydom, W.F., Maherry, A., Petersen, C.P., Hill, L., Roux, S., Nienaber, S., Van Deventer, H., Swartz, E. and L.B. Smith-Adao. (2011) Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. WRC Report No. TT 500/11, WRC, Pretoria.

PSC. (2006). Gender Mainstreaming initiactive in the Public Service. Published in the Republic of South Africa by the Public Service Commission (PSC)

Rarieya, J. F. A. (2016). Women leaders in the workplace: The intangible barrier. Article for the Human and Social Development research programme, HSRC. Accessed on 18 November 2016 at http://www.hsrc.ac.za/en/review/hsrc-review-july-2013/women-leaders-in-the-workplace-the-intangible-barrier

Runciman, C. (2013). A Protest Event Analysis of Community Protests 2004-2013. Presentation to the Water Research Commission. September 2013.

SANBI. (2016). Lexicon of Biodiversity Planning in South Africa. Beta Version, June 2016. South African National Biodiversity Institute, Pretoria. 72 pp.

Schaffler, A., Christopher, N., Bobbins, K. *et al*. (2013). State of Green Infrastructure in the Gauteng City-Region. July 2013. Published by the Gauteng City-Region Observatory (GCRO), a partnership of the University of Johannesburg, the University of the Witwatersrand, Johannesburg, and the Gauteng Provincial Government. ISBN 978-0-620-57619-2

Turpie, J.K. (2012). Maximising the Value of South Africa's Coast. Research Brief, Environment for Development Programme, University of Gothenberg.

Umgeni Water. (2016). Umgeni Water Infrastructure Masterplan 2016. 2016/17 – 2046/2047. Volume 1.

UNDP. (2015). UNDP annotated Project Document for nationally executed GEF/LDCF/SCCF-financed projects. 5 October 2015

UNEPFI. (2016). Accessible at http://www.unepfi.org/grt/2016/

UNPF South Africa. (2016). Gender equality: the situation. United Nations Population Fund (UNPF) website page accessed 18 November 2016, http://southafrica.unfpa.org/topics/gender-equality-3#sthash.prBIm1fF.dpuf

Water Wheel. (2013). Poor and angry – Research grapples with reasons behind social protests. The Water Wheel November/December: 14-16. Accessible at http://reference.sabinet.co.za/webx/access/electronic_journals/waterb/waterb_v12_n6_a6.pdf

Whittaker, R.H. (1972). Evolution and Measurement of Species Diversity. Taxon. Vol. 21, No. 2/3 (May, 1972), pp. 213-251. Published by: International Association for Plant Taxonomy (IAPT). DOI: 10.2307/1218190. Available at: http://www.jstor.org/stable/1218190

WWF. (2013). An Introduction to South Africa's Water Source Areas. WWF-SA

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Annexures

A. Relevant legal context, institutional framework and budget forecasts for biodiversity and water in South Africa

A.1 Relevant legal context for biodiversity and water in South Africa

Table 7. Policy and legislation relevant to infrastructure, ecological infrastructure and water security (after Jewitt et al. 2015)

Legislation	Strategic Intent and Key Points
Constitution of the Republic of South Africa	The Constitution is the foundation of all law in South Africa. All laws must be consistent with the Constitution. Section 24 provides for the right to an environment that is not harmful to health or wellbeing. Obligation imposed on the State to protect the environment for the benefit of present and future generations, to: • Prevent pollution and ecological degradation; • Promote conservation • Secure ecologically sustainable development
National Water Act (Act 36 of 1998 - NWA)	Places the country's water resources in the hands of National Government as custodian and trustee to manage resources in the public interest. The NWA allows for: • Water management strategies at a national and catchment level • Protection of water resources (including reserve determination and pollution precautions) • Use of water resources (including the issue of licenses and authorisations) • The establishment of institutions/structures such as WUAs, catchment management agencies (CMAs) and advisory committees • Monitoring of water resources and availability of information related to water resources As an instrument of the NWA, the NWRS aims to ensure that water is used and managed to support equitable and sustainable social and economic transformation and development. In so doing the NWRS recognizes in Chapter five the importance of ecological infrastructure. The NWRS approach is underpinned by the Water for Growth and Development Framework that was developed in 2009. Key financial aspects of the NWRS are given effect via the Pricing Strategy which sets out the financial framework against which charges are set for water use and for the development of infrastructure.
Water Services Act (Act 108 of 1997)	Provide for the right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being. The Water Services Act allows for: • the setting of national standards and norms and standards for tariffs in respect of water services • the preparation and adoption of water services development plans by water services authorities • a regulatory framework for water services institutions and water services intermediaries • the establishment and disestablishment of water boards and water services committees and their duties and powers • the monitoring of water services and intervention by the Minister or by the relevant Province • financial assistance to water services institutions • the gathering of information in a national information system and the distribution of that information • the accountability of water services providers • the promotion of effective water resource management and conservation This is supported by the Strategic Framework for Water Services (DWAF, 2003) that put forward a vision for the water services sector in South Africa for the next ten years, and set out the framework to enable the achievement of the sector vision.
National Environmental Management Act (Act 107 of 1998 - NEMA)	Framework legislation that gives effect to Section 24 of the Constitution "for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment". NEMA gives powers to the national Minister of Environmental Affairs to identify activities which require environmental authorisation from the competent authority. Also empowers the minster to identify geographical areas in which specified activities may not commence without environmental authorization. Allows for regulations to monitor compliance with environmental authorisations.
National Environmenta	Provides for the management and conservation of South Africa's biodiversity; sustainable use of biological resources; equitable sharing of benefits from indigenous biological resources.

Legislation	Strategic Intent and Key Points
l Management Biodiversity Act (Act 10 of 2004)	Requires the Minister to identify and implement plans for the protection of Critically Endangered, Endangered and Vulnerable Ecosystems as well as endangered species. The Minister must prepare and adopt a National Biodiversity Framework, to identify priority areas for conservation; develop integrated, coordinated and uniform approaches to biodiversity management in protected areas.
National Environmenta l Management Act Protected Areas Act (Act 57 of 2003)	Provides for the protection and conservation of ecological viable areas representative of South Africa's biological diversity and its natural land- and seascapes, for their establishment and management.
Conservation of Agricultural Resource Act (Act 43 of 1983 - CARA)	CARA governs agricultural resources and their conservation. Prescribes compulsory control measures for: • Maintenance of the production potential of agricultural land • Combating and prevention of soil erosion • Prevention of the weakening or destruction of water sources • Protection of vegetation; and • Combating of weeds and invader plants.
Infrastructure Development Act (Act 23 of 2014)	Provides for the facilitation and co-ordination of public infrastructure development This Act has the objective to: • identify and implement strategic integrated projects which are of significant economic or social importance and thereby giving effect to the national infrastructure plan • enable the alignment and dedication of capabilities and resources for the effective implementation and operation of strategic integrated projects across the state in order to ensure coherence and the expeditious completion of infrastructure build and maintenance programmes • provide for processes and periods of time applicable to the implementation of strategic integrated projects • a statutory instrument by which any approval, authorisation, licence, permission or exemption required in terms of other legislation can be facilitated and expedited; • provide practices and procedures which seek to ensure that infrastructure development is not undertaken merely in a transactional manner
Spatial Land Use Management Act (Act 16 of 2013)	Provides for a national spatial planning framework that enables the development of spatial equity, ensuring spatial sustainability and efficiency in land use. The objectives of SPLUMA are provided in Section 3 of the Act as: • provide for a uniform, effective and comprehensive system of spatial planning and land use management for the Republic; • ensure that the system of spatial planning and land use management promotes social and economic inclusion; • provide for development principles and norms and standards; • provide for the sustainable and efficient use of land; • provide for cooperative government and intergovernmental relations amongst the national, provincial and local spheres of government; and • redress the imbalances of the past and to ensure that there is equity in the application of spatial development planning and land use management systems.
Municipal Systems Act (Act 32 of 2000)	Sets out the functions and duties of Municipalities with regards to planning and land use management. Through the Act and subsequent regulations provide detailed guidance for the development of Integrated Development Plans, noting the importance of cooperative government in the development of these plans. Integrates the activities of all spheres of government for the overall social and economic upliftment of communities in harmony with their local natural environment.

A.2 Institutional Framework for the Water Sector

The institutional framework for the water sector is depicted in Figure 27 and Table 8 summarises the roles and responsibilities of each.

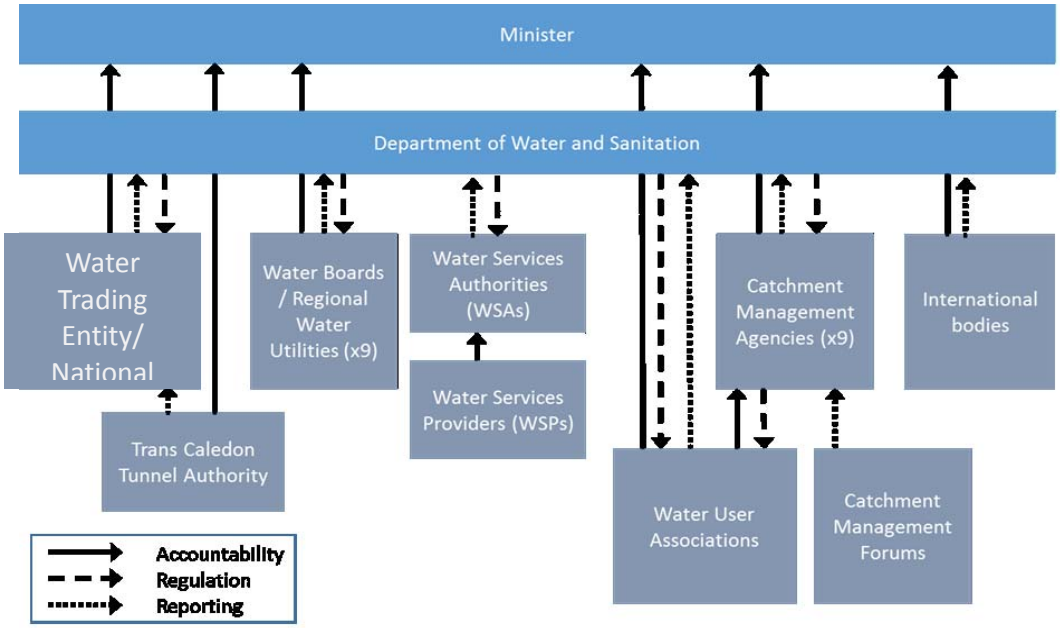

Figure 27 Water sector institutional framework (adapted from DWA, 2013b)

Table 8. Institutions with roles and responsibilities for water resource development (from DWA (2013a & b)

Institution	Role and responsibility
Department of Water and Sanitation	Custodian of the water resources of the country and is thus responsible for the allocation and health of the country's water resources and infrastructure; and has a regulatory and oversight role with regard to water resources, services and sanitation. Responsible for the NWRS.
National Water Resources Infrastructure Branch	Currently a ring fenced branch of DWS, other institutional options/models are being considered. Functions include design, project management, funding, construction and commissioning of water resources infrastructure; asset management of national water resources infrastructure; facilitation of public and private partnerships and contractual agreements for the utilization of infrastructure; maintenance, operation rehabilitation and refurbishment of water resources infrastructure; construction of new water resources infrastructure to meet social water needs and to facilitate economic growth and development.
Trans Caledon Tunnel Authority (TCTA)	State-owned entity that raises finance for major water resource projects and then manages the design and construction of the infrastructure. TCTA's mandate derives from explicit directives from the Minister of Water and Sanitation and is generally to develop infrastructure that has a high degree of economic utilisation, the expectation being that TCTA will be able to recover the full cost of the infrastructure without having to resort to government grants or transfers.
Water Boards / Regional Water Utilities (RWU)	State-owned entities with the primary responsibility being the provision of bulk potable water services to local authorities that depend on a common source of raw water. Their services may also extend to the treatment of waste water. Currently, Water Boards play a limited role in water resource infrastructure development. The establishment of 9 RWUs will amalgamate Water Boards into more sustainable entities that have an improved footprint. The RWUs will be responsible for the financing, development, management, operation and maintenance of regional bulk water infrastructure.
Water Services Authorities (WSA)	In terms of Section 12 of the Municipal Systems Act (Act 32 of 2000), WSAs are municipalities that have the responsibility for planning and ensuring access to and regulating provision of water supply and sanitation within their area of jurisdiction. WSAs may provide water services themselves or contract external Water Services Providers (WSP).

Institution	Role and responsibility
Water Service Providers (WSP)	A WSP has a contract with a WSA to take responsibility for providing retail water services to one or more consumers within a specific geographic area. It may also accept wastewater for the purposes of treatment from the WSA, or another WSP, who is usually a bulk water services provider.
Catchment Management Agencies (CMAs)	Core function is to ensure that water resources within water management areas are managed in accordance with national policies, guidelines and standards as articulated within their CMS. However, every catchment, its economy and societal fabric is unique, thus CMAs need to tailor national policies etc. to the specific catchment including tailored bylaws, water quality management and other water related interventions. This should be achieved with the active engagement of local communities and other stakeholders in the water resources. CMAs also have a key initial function of ensuring the coordination of the water sector with other sectors and role-players within their water management areas.
Water User Associations (WUAs)	Co-operative associations of individual water users who for the purpose of mutual benefit, carry out water-related functions. Important roles in terms of localised water resource management through the implementation of the CMS and can be delegated implementing agent and billing agent functions. Key role in localised compliance monitoring.
Catchment Management Forums	Structures for supporting stakeholder engagement and facilitating coordination between these stakeholders and other sectors.
International Bodies	These bodies are established to advise the member states with regards to aspects of water resource management and development within the transboundary basins within which they function. Their role is important in fostering alignment in approach between the member states. The responsibility for the joint development of resources remains with the national institutions.
Water Trading Entity	Responsible for the development, operation and maintenance of specific water resource infrastructure and managing water resources in specific management areas.

A.3 Budget forecasts for the main national water infrastructure capital grants administered by the Department of Water and Sanitation

The following table contains the budget forecasts for the main national water infrastructure capital grants administered by the DWS, namely the Water Services Infrastructure Grant and Regional Bulk Infrastructure Grant, and the Urban Settlements Development Grant administered by the Cities Support Programme (CSP) within National Treasury for metropolitan municipalities.

Table 9. National grant allocations in the 2016 Budget

Capital Grant stream	Purpose	2016/17	2017/18	2018/19
		R'000	R'000	R'000
Water Services Infrastructure Grant	To facilitate the planning and implementation of various water and sanitation projects to accelerate backlog reduction and improve the sustainability of services in prioritised district municipalities, especially in rural municipalities; provide interim, intermediate water and sanitation services that ensure provision of services to identified and prioritised communities, including through spring protection, drilling, testing and equipping of boreholes and on-site solutions; to support drought relief projects in affected municipalities.			
	Direct allocations to municipalities	2 844 982	3 729 864	3 959 056
	In-kind allocations to municipalities	311 545	587 122	608 175
Regional Bulk Infrastructure Grant	To develop new, refurbish, upgrade and replace ageing infrastructure that connects water resources to infrastructure serving extensive areas across municipal boundaries or large regional bulk infrastructure serving numerous communities over a large area within a municipality; to develop new, refurbish, upgrade and replace ageing waste water infrastructure of regional significance; to pilot regional Water Conservation and Water Demand Management projects or facilitate and contribute to the implementation of local Water Conservation and Water Demand Management projects that will directly impact on bulk infrastructure requirements.			
	To municipalities	1 850 000	1 865 000	2 060 000
	In kind allocations	3 478 829	2 806 279	2 931 443
Urban Settlements Development Grant	Supplements the capital revenues of metropolitan municipalities in order to support the national human settlements development programme, focusing on poor households.			

Capital Grant stream	Purpose	2016/17	2017/18	2018/19
	To metro municipalities	**10 839 468**	**11 472 247**	**12 052 137**
Municipal Infrastructure Grant	To provide specific capital finance for eradicating basic municipal infrastructure backlogs for poor households, micro enterprises and social institutions servicing poor communities.			
	To non-metro municipalities	14 914 028	15 991 252	16 893 685

B. Gender Assessment and Project Action Plan

Brief Gender Assessment

1 Introduction

This assessment aims to provide an overview of the gender mainstreaming situation in South Africa, identify gender issues that may be relevant to the project, and to examine potential gender mainstreaming opportunities. The assessment was based on available studies conducted by the Government of South Africa, research supported by the WRC and other academic literature, and multinational and donor agencies.

2 Gender inequality in South Africa, specifically relating to water and environmental governance

South Africa is characterized by strong legislative and policy enabling environment (see next section), which actively seeks to overcome the burden of race, class and gender-based inequality, and that is aligned with international conventions to protect and empower women (UNPF South Africa 2016).

The Constitution of Republic of South Africa (1996) Chapter 2 Bill of Rights states that:

- In terms of equality, "everyone is equal before the law and has the right to equal protection and benefit of the law" and that national legislation must be enacted to prevent or prohibit unfair discrimination on any grounds, including race, gender, age, disability amongst others (section 9).
- Everyone has the right 'to an environment that is not harmful to their health or well-being' and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that— (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development (section 24)
- Everyone has a right to have access to sufficient water and that the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights (section 27).

These rights inform policy, legislation and decision-making across all sectors in South Africa.

- The Employment Equity Act (No. 55 of 1998) addresses employment equity in the workplace by promoting equal opportunity and fair treatment in employment through elimination of unfair discrimination and implementing affirmative action measures to redress the disadvantages in employment experienced by designated. Affirmative Action is regarded as a pillar for the transformation of the Public Service and a means to achieve gender equality (PSC 2006).
- The NWA of 1998 makes provision for the establishment of WUAs as vehicles for achieving poverty reduction and gender equity (Mjoli *et al*. 2009). It recognizes the importance of women's voices in water management structures[37], and of addressing issues of equity in terms of imbalances to the access and control of water resources.

Although the water and gender equality policy and legislative framework clearly outline steps to redress past gender imbalances, gender discrimination remains a major problem in several social

[37] The legislative requirement for equitable gender participation, the then Minister of Water Affairs & Forestry has set a 50% quota for women's representation in Management Committees of WUAs (Mjoli et al. 2009).

and economic settings, including the workplace, the family and educational institutions (GSA 2012). This is in spite of a comprehensive set of government programmes and dynamic civil society organisations whose purpose is to promote gender equity, including the Commission on Gender Equality and a dedicated Ministry in the Presidency for Women.

Despite these conducive factors, discriminatory practices, social norms and persistent stereotypes continue to shape inequitable access to opportunities, resources and power for women and girls (UNPF South Africa 2016). Women's realities in South Africa are still determined by race, class, and gender-based access to resources and opportunities (Kehler 2001). Race, class and gender are also the determinants for the prevailing political, social, and economic inequalities, so "poor black women's access to resources, opportunities and education, as well as their access to growth and wealth of the country is severely limited" (Kehler 2001). Because poor people rely heavily on ecosystem services and, with limited other resources, they are more vulnerable to ecosystem change (IIED 2007). Ecosystem degradation increases water problems and these problems hit the poor hardest, often exacerbating poverty, increasing risks associated with natural disaster hazards such as floods or droughts, and contributing to inequalities and disparities across groups (which can fuel social conflicts) (IIED 2007).

The multiple and often conflicting uses of water pose huge difficulties for any system of management. While women in leadership roles at national, provincial and regional or local levels of water management has improved, there remain many issues. Women involved in water management institutions, such as CMAs or WUAs do not necessarily benefit much from their involvement, where for instance women do not own land and water rights in their individual capacity (Mjoli *et al*. 2009).

In terms of women in leadership positions, the last two decades has seen an improvement in women's access to executive power and decision-making in South Africa (Rarieya 2016). Representation of women in the national and provincial departments at senior management level in the Public Service is approximately 30% (PSC 2006, Department of Labour2013). However, there remains a gap between men and women in labour participation, remuneration and advancement – with less than 20% of top management in Public Service being women (Commission for Employment Equity Annual Report 2012-2013), only 13% of women operating in executive roles in the basic resources sector of the private sector, and women senior executives earning less than their male counterparts (PwC 2016)[38].

Public employment programmes contributing to redressing imbalances in employment and development, include the Working for programmes that emphasize rural development and job creation, with a specific focus on women and youth (present targets are 55% women, 65% youth and 2% people with disabilities). The Working for Water public works and conservation initiative has been shown to deliver a range of social development benefits in addition to job creation, including skills training and empowerment (Magadlela and Mdzeke 2004).

Effective implementation and monitoring of policies, as well as setting of clear targets for the advancement of women's rights on which progress can be reported, are needed. Not least because of the importance of women in sustainable development (GSA 2012, GEF 2013). Women and men often have different perspectives and priorities concerning environmental quality, natural resource

[38] The focus on employment equity targets as a main indicator for gender mainstreaming presents limitations in that it fails to address broader institutional change processes required to transform gender relations and empower women (PSC 2006).

use, or access to basic services, and failure to recognised this gender dimensions within projects risks wasted resources and potentially negative effects on the welfare of households, gender equality, and environmental sustainable development (GEF 2013).

3 Recommendations

Key issues in the transformation process to eliminate gender inequality and improve opportunities for girls (young people) include involvement of women in the facilitation of socio-economic development and growth, the enhancement of the standard of living, and the empowerment of women and the poor (Kehler 2001, GSA 2012). Women make up a large percentage of the poor, particularly in rural areas (GSA 2012). Recommendations for the project to advance women's equality therefore include:

- Public employment programmes that provide work for the unemployed, with a specific focus on youth and women.
- Water resource management with active participation and empowerment of women.
- The role of women as leaders in the water and environment sectors (public and private).
- Enhance essential ecosystem services from water-related ecological infrastructure to promote access to safe drinking water, thus helping to reduce risks faced by women and youth (particularly the poor) associated with poor water quality, pollution (health risks), natural disasters (flooding and drought) and intermittent supply.

These recommendations will be pursued through the following actions to be undertaken by the project during implementation:

Table 10. List of actions and indicators

Action	Potential indicators
Component 1: Enabling environment is strengthened for improving water security through the integration of biodiversity and ecosystem services in the water value chain.	
Promoting gender equality: • The project executing agency and sub-executing agencies will adhere to employment equity targets. • Use or encourage use of Broad-based Black Economic Empowerment (BBBEE) scorecards for procurement Promoting gender sensitive inputs into relevant policy frameworks and regulatory instruments that enable the integration of biodiversity and ecosystems services into water sector planning, finance and development	Number of women and men employed through jobs created from the project
Component 2: Application of policies and financial mechanisms in the water value chain improves water security in critical catchments.	
Promoting gender equality: • The project executing agency and sub-executing agencies will adhere to employment equity targets. • Additionally, the NRM programmes operating at the catchment level have targets for employment and training of 55% Women 65% youth and 2% people with disabilities. • Supporting involvement of women in water management institutions in the catchments. Includes relevant capacity building opportunities.	Number of women and men employed through work opportunities aligned with the project Number of men and women trained through opportunities aligned with the project
Component 3: Social learning, credible evidence, and knowledge management improves the integration of biodiversity and ecosystem services into the water value chain.	
Mainstream gender into the knowledge management and social learning for change strategy: This could relate to empowering women through capacity strengthening opportunities, involvement in citizen science,	Number of men and women involved in the knowledge management and social

participation in strategic dialogues and other platforms, ensuring knowledge products are gender sensitive, mobilising women's groups in support of the project, and/or promoting discussion of relevant gender sensitive aspects of ecological infrastructure for water security. This could further enhance project impact and sustainability (as described in GEF 2013) Generation of evidence of the impact of project interventions that is gender sensitive: Ensure monitoring and evaluation and research is gender sensitive.	learning for change strategy and its implementation Number of men and women and/or female-headed households shown to benefit from project interventions in catchments

C. Risk Mitigation Plan

The project risks identified in the Project Identification Form (PIF) were reassessed during the PPG, in discussion with the Project Preparation Grant (PPG) working group and PSC and risk mitigation measures identified. This is reflected in the table below:

Risk category	Project risk	Risk level	Project management/mitigation
Institutional	**Ongoing policy and institutional reform within the DWS diminishes policy priority for ecological infrastructure, resulting in lack of policy support for the project interventions.** A review of the NWA is imminent, the NWRS is due for revision, and the Water Pricing Strategy pending final approval. Shifts in policy priorities and resultant institutional changes may pose risks to the project.	Low	The project will engage closely with the DWS through implementation, including at a Steering Committee level to stay abreast of and adapt to any policy changes that may impact on the project. The project design has, as far as possible, built in flexibility to accommodate shifts in priorities. In addition to direct engagement, the project will also engage in departmental policy processes to ensure comments and inputs are provided in any policy review processes.
	Capacity of institutions in the demonstration catchments inhibits their ability to absorb ecological infrastructure management functions as part of their mandate, resulting in ongoing institutional fragmentation for ecological infrastructure in the water value chain. CMAs are emerging institutions with an important role to play in the management and financing of ecological infrastructure within their Water Management Areas. There are three CMAs in the project area. As new institutions, they are in the process of understanding and absorbing their new mandates, as well as addressing other administrative and governance challenges. The establishment of CMAs has been particularly slow due to ongoing policy and institutional reform in the water sector, however it has been prioritised and fast-tracked in the NDP and NWRS. The project is well-aligned with and able to support efforts towards this national priority.	Medium	Under component 3, the project will work closely with the CEOs of the three CMAs, as well as their counterpart in the DWS to ensure it supports the development of capacity within CMAs to address ecological infrastructure management. In addition, also under components 1 and 3, the project will align with and support the work of other organisations that are supporting the establishment of the CMAs. The project design process has considered this risk carefully and accommodated for it in the final project design. This risk will be monitored and assessed by the project governance and review systems. A range of public, private, civil society institutions involvement will be drawn on to enhance capacity. The capacity of the financial services sector will also be drawn on to help mitigate this risk.
Social	**Responsible institutions, as well as land users and owners, do not maintain the rehabilitation and maintenance of water-related ecosystems in the demonstration catchments, undermining project interventions, and resulting in failure to secure long term project benefits.** Ecological infrastructure requires ongoing maintenance, much like built infrastructure Failure by responsible institutions, land users and owners to maintain initial investments in ecological infrastructure could undermine the long term benefits of the project.	Medium	Under components 1 and 3 the project will work with key stakeholders, including organisations involved in natural resource management, the CMAs and custodians of resources at the local level to support processes that ensure the ongoing activities needed to maintain ecological infrastructure are in place, sufficiently resourced and operational. The significant co-finance raised from natural resource management programmes reflects the commitment and buy in from stakeholders to working with this project in order to address this risk.

Risk category	Project risk	Risk level	Project management/mitigation
			Efforts to address the institutional risk above will also support mitigation of this risk.
Financial	**Funds raised for ecological infrastructure through private or public financing mechanisms in the water value chain are not channeled to appropriate activities, causing underfunding of ecological infrastructure, resulting in ongoing ecological degradation and risk to built infrastructure.**	Low	Institutions that finance infrastructure abide by stringent finance policies and procedures that are well-embedded within their organisations. This will ensure that funds allocated to ecological infrastructure in the private finance of infrastructure are channeled accordingly. Public finance is subject to a stringent set of audit and other financial controls to ensure effective and efficient allocation and utilisation of funds. In addition, through work in component 1, the project will support key institutions to clarify institutional processes for financing the management of ecological infrastructure.
Project	**The Rand appreciates against the Dollar, or the inflation rate is higher than expected, causing underfunding of the project, resulting in failure to achieve project outcomes.** The project budget is in US Dollars while implementation is in South African Rand, thus exposing the project to exchange rate risks which could affect the funding available for implementation and lead to budgetary constraints.	Low	This risk has been considered in the development of the project budget through the adoption of a conservative exchange rate. During project implementation, the exchange rate will be monitored and assessed by the executing agency's Project Financial Manager and implications and recommendations will be addressed in consultation with the implementing agency and the PSC during project implementation. The project implementing agency has appropriate expertise in place to manage this risk.

D. Stakeholder Engagement Report

The PIF identified various stakeholders for the GEF 6 project and was the base from which the stakeholder engagement process was catalyzed. As the project design unfolded, the initial list of stakeholders evolved, particularly as the catchment selection process resulted in a change in the project focus areas[39].

Three primary methods of engagement, documented in the table below, were utilized, namely:

- One-on-one engagements (meetings and teleconferencing)
- Smaller focus group discussions
- National stakeholder workshop

Stakeholder engagement was also supported and enabled through institutional arrangements established for project design oversight and governance:

- The Project Preparation Grant Working Group (PPG WG): The PPG WG is comprised of representatives from SANBI, the DBSA and the National DEA. The purpose of the PPG WG is to provide oversight, strategic guidance, advice, approvals of budget, work-plan and products for the project during the 12 month PPG phase to name a few.
- The Project Steering Committee (PSC): The PSC was established to provide strategic guidance to the Project Preparation Phase for the project. The PSC was initially comprised of representatives from the SANBI, the DBSA, the National DEA, the National DWS, the National treasury and Stats SA. As the project design unfolded, the DAFF, and the WRC were invited to join the PSC.

Stakeholder engagement followed a two-phased approach. Phase 1 represents an initial group of stakeholders (largely identified through the PIF) to inform the situation analysis. These engagements helped to refine the project focus by helping to better understand the project landscape and to inform information gaps (based on which specialist studies would be commissioned. Stakeholder engagement in Phase 2 focused on discussions with stakeholders to inform the project design at a more detailed level, including the design of project interventions.

[39] The PIF had included the Berg and the Kromme/Kouga catchments as the project focus areas, subject to change and finalization during the project design. This process is documented in the CEO endorsement template.

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
DBSA	Analyst	one-on-one	scoping engagement with project implementing agency for briefing and discussion of steps to refine project scope
SANBI	Deputy Director: Municipal Support Programme Municipal Support officer NRM Coordinator Senior Biodiversity Policy Advisor Project Leader: Biodiversity and Land Use Project Director: Biodiversity Information and Planning Director: Municipal Support Programme Chief Director: Biodiversity Information and Policy Advice	workshop	scoping engagement with project executing agency for briefing and discussion of steps to refine project scope
DEA: Biodiversity	Director Director Project Leader: BIOFIN	one-on-one engagement	scoping engagement with key stakeholder, presentation of project concept and discussion of possibilities for linkages/alignment with BIOFIN (BIOFIN closes before GEF 6 is likely to begin implementation; GEF 6 can draw on lessons and outcomes from BIOFIN)
DEA&DP CapeNature WC Department of Agriculture	Climate Change Adaptation Director: Biodiversity and Coastal Management Director Berg River Infrastructure Project: Task Manager Director: Sustainability Environmental Officer Head of Component: Biodiversity Deputy Director Coastal Management Coastal Management Director: Air Quality Management Director: Pollution and Chemicals Management Conservation Planning Scientist Executive Director: Conservation Management Technical Advisor: Conservation Management Program Manager: MPA's, Islands and Estuaries Programme Manager: Integrated Catchment Management Executive Director: Corporate Services District Manager: LandCare	workshop	scoping engagement with organisation identified in the PIF, understanding of priorities in the Western Cape
WWF-SA	Senior Manager: Freshwater Programme	one-on-one	scoping engagement with NGO identified in the PIF, understanding of organisation's water programme and work in catchments
Conservation South Africa	CEO	one-on-one	scoping engagement with NGO identified in the PIF, understanding of organisation's water programme and work in catchments

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
DWS: NWRP	Chief Engineer Chief Engineer: NWRP	one-on-one engagement	scoping engagement with key stakeholder, presentation of project concept and discussion of possibilities for opportunities for project to support DWS planning work in terms of NWRS and engagement with biodiversity
National Treasury	Director: Environment Director Cities Support Programme	one-on-one engagement	scoping engagement with National Treasury to present project concept and understand scope for project to engage in support of fiscal framework
National Business Initiative	Lead: Climate Change, Green Economy and Water	one-on-one engagement	scoping engagement with organisation identified in the PIF, understanding of NBI's Green Economy programme of work in terms of its priority on strategic water source areas
Western Cape Department of Agriculture	Sustainable Resource Management: LandCare	one-on-one engagement	scoping engagement with organisation identified in the PIF, understanding of agriculture and ecological infrastructure priorities in the Western Cape
DEA: Natural Resource Management Programmes	Chief Director: Natural Resource Management Programmes Director: NRM Programmes	Telecon	scoping engagement with key organisation identified in the PIF, understanding and discussion of linkages with NRM programme of work nationally and in catchments under consideration
COGTA - Municipal Infrastructure Support Agent	Executive Manager: Strategy and Operations Support	one-on-one engagement	scoping engagement with organisation supporting municipalities, understanding of opportunities for project to support Municipal Infrastructure Support Agent.
WRC CSIR	Manager Research Manager Principal Scientist	one-on-one Telecon	scoping engagement to understand WRC projects linked to environmental/ecosystem accounting and linkages with project focus on natural capital accounting
TCTA	Business analyst: Office of the Chief Operating Officer Environmental Manager	one-on-one engagement	scoping engagement to understand possible linkages between TCTA and the project - TCTA are the implementing agents for SIP 3 and 18 - opportunity for synergy with this role explored
DWS	Act Director: RQIS Acting Chief Director. CD: Economic and Social Regulation Director: WRC	one-on-one engagement	scoping engagement to understand DWS priorities in a range of areas and opportunities for project to support DWS in terms of implementation of NWRS priorities (e.g. RQOs, monitoring and water pricing)
DEA: Advisory Services	Chief Policy Advisor: Environmental Intelligence	one-on-one	scoping engagement with key organisation identified in the PIF, discussion of linkages and alignment between project and SIP 19

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
Benefits SE	Consultant	national two-day workshop	To introduce the project concept to stakeholders. To provide an opportunity for stakeholders to engage with and test the emerging change logic in the project design. To provide an opportunity for stakeholders to engage with and deepen emerging project interventions. To discuss the approach to selecting sites in catchments for demonstration/pilot interventions.
SANBI	NRM Coordinator		
SANBI	Consultant		
GDARD	Scientist		
DEA:NRM	Chief Director		
Pegasys	Consultant		
SANBI	Municipal Support Officer		
SANBI	Director: Biodiversity Assessment and Monitoring		
DEA	Deputy Director		
DAFF	Assistant Director		
Mpumalanga Department of Agriculture, Rural Development and Environmental Affairs	Assistant Director: Policy Std. Guidelines and Reporting		
	Chief Director: Economic Analysis		
Statistics South Africa	Spatial Planner		
SA Cities Network	Environmental Manager		
Trans Caledon Tunnel Authority	State of the Environment: CTMM		
City of Tshwane	Director: Ecological Infrastructure		
SANBI	Manager: Biodiversity		
City of Cape town	Environmental Analyst		
Development Bank of Southern Africa	Deputy Director		
	Learning Network Officer		
DEA	Director		
SANBI	Chief Director: Biodiversity Information & Policy		
LEDET	Advice		
SANBI	Director: Water Resource Classification		
DWS	Manager		
DBSA	Control Biodiversity Officer		
DEA	DEA		
DEA	Senior Biodiversity Policy Advisor		
SANBI	Consultant		
Pegasys	Director: Biodiversity & Coastal Management		
Western Cape	Threatened Grasslands Species Programme		
EWT	Manager		
LEDET	Assistant Director		
DEA	biodiversity and conservation		
DEA	Science Policy Interface Intern		
LEDET	Control Environmental Officer		
DEA	Chief Director: Environmental Advisory Services		
DAFF	Environmental Officer		

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
EKZNW DEA Palmer Development Group DAFF SA Cities Network Stats SA Conservation South Africa DEA National Treasury WRC Endangered Wildlife Trust SANBI LEDET eThekwini Water & Sanitation SANBI DEA: Environmental Advisory Services Pegasys SANBI GDARD DEA DEA: BIOFIN DEA DEA DEA DEA	Strategic Manager Deputy Director: Biodiversity Economy Consultant Director: Water Use and Irrigation Development Researcher Principal Economist Senior Manager: Sustainable Agriculture Biodiversity Officer Director: Water Resource Classification Manager Manager: Biodiversity & Business Programme GEF 5 Project Officer Control Environmental Officer Deputy Head: Scientific Services Assistant Director: Municipal Support Programme Deputy Director: Strategic Environmental Intelligence Consultant Deputy Director: Knowledge Coordination and Reporting Production Scientist Assistant Director Project Leader: BIOFIN Director: NRM DEA Chief Director National Stewardship Coordinator Director		
TCTA	Environmental Manager Head: Environment Senior Manager: Strat Program	one-on-one engagement	To explore alignment between the project and SIP 3 and SIP 18 being coordinated by TCTA.
DWS	Chief Engineer Chief Engineer NWRP Senior Manager: Water Entity Director: WRC	one-on-one engagement	To further discussions with DWS, as a key sector partner, on emerging project design and present initial ideas on catchment design
DEA&DP DEA&DP Cape Nature Cape Nature City of Cape Town	Various officials	one-on-one	To explore opportunities for linkages or alignment between the project and the Cape Town Water Fund; deepen understanding of City of Cape Town's infrastructure and water security situation

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
City of Cape Town City of Cape Town DWS Green Cape			
WWF-SA	Senior Manager Water Senior Manager Agriculture	Telecon and Skype Call Newlands Office	Understand WWF-SA's current projects in the Berg, Breede and uMngeni systems, and seek extension and alignment opportunities Key partner and pioneer in the freshwater space
Berg Proto-CMA	CEO	one-on-one	Engage Berg Proto CMA CEO to understand priorities and opportunities for project to strengthen CMA's capacity for financing ecological infrastructure rehab and maintenance
DEA&DP	Deputy Director: Ecological Infrastructure	one-on-one engagement	Engagement with DEA&DP in the Western Cape to understand the Berg River Improvement Plan and alignment with the project, as well as planning, regulatory and CME issues and project opportunities
CER	Director Candidate Attorney	one-on-one	Understand CER work on protecting Strategic Water Source Areas and improving Compliance Monitoring and Enforcement. SWSA protection is a potential and CME a key activity to be supported in GEF6
CER Cape Nature DEA&DP CER CER	Executive Director Cons. Planner Director: Biodiversity + coastal Attorney Legal Company	one-on-one engagement	Round Table on protecting Catchments and SWSAs. Key partners assessing alignment with catchment protection and restoration funding Protecting Strategic Water Source Areas
Institute of Natural Resources INR INR INR UKZN UKZN UKZN Msunduzi Municipality Msunduzi Municipality DUCT DUCT WWF	Principal Scientist Scientist Executive Director Principal Scientist CWRR Researcher Director's Lecturer CWRR Environmental Intern Environmental Scientist Acting CEO General Manager Project Manager	one-on-one	Scoping the various catchment project opportunities Scoping project alignment and synergies Identify other stakeholder/Projects of engagement Develop understanding of the GEF 6 Project opportunities Purpose of the meeting: Introduce the project concepts and intent Outline progress to date and processes going forward Discuss potential study catchments and alignment possibilities Discuss possible interventions for the programme

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
WESSA DEA:NRM	Director: Environmental Education Deputy Director: Operational Support		
eThekwini Municipality	Manager: CAB Environmentalist Manager	one-on-one engagement	Purpose of the meeting: Introduce the project concepts and intent Outline progress to date and processes going forward Discuss potential study catchments and alignment possibilities Discuss possible interventions for the programme Relevance to the Project: Develop understanding of the GEF 6 programme opportunities and create support/ ownership Scoping the various catchment project opportunities Scoping potential project alignment and synergies Identify other stakeholders/ projects for engagement
Breede Gouritz CMA	Manager: Water Resources	one-on-one	Explore opportunities and constraints with the Breede Gouritz CMA. Key partner, implementer and regulator in Water Management
Winelands District Municipality	LandCare Manager	one-on-one engagement	Interview Prov Dept Agriculture Breede valley extension officer for priorities, opportunities and alignment with GEF6. Key institutional player. Opportunity to work with LandCare in W C around mobile app for to support real time CME
Pongola-uMzimkhulu Proto-CMA	Deputy Director Control Environmental Officer Scientific Manager	one-on-one engagement	Purpose of the meeting: Introduce the project concepts and intent Outline progress to date and processes going forward Discuss potential study catchments and alignment possibilities Discuss possible interventions for the programme Relevance to the Project: Develop understanding of the GEF 6 programme opportunities and create support/ ownership Scoping the various catchment project opportunities Scoping potential project alignment and synergies Identify other stakeholders/ projects for engagement
WWF-SA	Programme Manager: Water Balance Programme	Telecon	Understand WWF-SA plans, priorities and funding for Sonderend WUA (and upper Breede) Key NGO player, aligned with GEF6 & Biodiversity outcomes.

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
TCTA	Senior Manager Environmental Manager: EMS	one-on-one	Alignment of GEF project interventions with SIP 18 priorities particularly around infrastructure investments in the Greater uMngeni catchment
	Consultant	Telecon	
DEA NRM W Cape Region	Implementation Manager	Telecon	Clarify WfW historic and planned investments in the Berg, Breede and Sonderend. Key National player, aligned with GEF 6 & Biodiversity outcomes
Living Lands	Landscape facilitator	one-on-one engagement	Understand Living Lands plans, priorities and budgets for ecological infrastructure restoration in the catchments Key NGO intermediary and organiser, aligned with GEF6 & Biodiversity outcomes.
DWS	Chief Engineer Chief Director: WE Chief Engineer NWRP Director: WRC Scientific Manager	one-on-one engagement	detailed engagement with DWS on project design; need to clarify issues around CMA mandate; in principle support for project
DWS: Institutional Oversight	Chief Director Director: Institutional Oversight	one-on-one engagement	presentation of project design to DWS Institutional Oversight, support for project design and in principle for project relationship with DWS and CMAs - discussion on need for briefing DDG & DG, thereafter explore opportunity for development of formal agreement (e.g. MOU)with DWS, discussion on opportunities to clarify project's relationship with CMAs
Stats SA	Chief Director Deputy Director Director	one-on-one engagement	further develop project interventions in Natural Capital Accounting with Stats SA
WRC	Manager Water roadmap Business Developer	one-on-one	discussion around evidence, knowledge management and social learning linkages and alignment opportunities with WRC; opportunity to influence and deepen integration of ecological infrastructure as priority that WRC considers in research and other activities
DEA & DP DEA&DP Berg Olifants Proto CMA Breede Gouritz CMA Breede Gouritz CMA DWS: WC DWS: WC	Berg River Infrastructure Project: Task Manager Director: PCM Engineer SW: Water Resources CEO: Breede Gouritz CMA Deputy Director: Berg Olifants CE: Berg Olifants Proto CMA	one-on-one	discussion of relevant aspect of project design with catchment stakeholders; in principle support for project design at high level, discussion on need further engagement with Berg & Breede-Gouritz CMA as implementing partners
Western Cape Department of Agriculture Western Cape Department of	GIS Specialist District Manager: LandCare	one-on-one	discussion and refinement of relevant aspect of project design with catchment stakeholders; support for project design and engagement with Berg River Irrigation Board

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
Agriculture Pontplaas Berg River Irrigation	 Bergrivier Bespat Raad Bergrivier hoof besproeurap raad Chairman		
WWF-SA	Senior Manager: Freshwater Programme	one-on-one	clarify linkages between project and Frewshwater Programme and project design; understanding of WWF's freshwater and biodiversity finance experience; opportunities to align with WWF investment in water stewardship
NBI	Programme Manager for Climate Change, Water and Biodiversity	one-on-one	clarify linkages between project and NBI's Environment, Climate, Water and Biodiversity Programme and project design; understanding of NBI water stewardship work in Mhlatuze and opportunity to convene private sector to as a key stakeholder at catchment level in addressing water problems particularly through NBI membership
WISA	CEO	one-on-one	opportunities for linkages between project and WISA as a membership-based organisation of professionals and organisations in the water sector; support for project
DEA: NRM SANBI	Director: Working for Water Deputy Director: NRM DEA: NRM DEA: NRM KZN Implementation Manager: Working for Water Programme DEA: NRM (Working for Water) Director: Ecological Infrastructure GIS Specialist: Biodiversity Planning GIS technician: NRM SANBI Consultant	workshop	clarify linkages between project and DEA NRM programme of work in the catchments; support for project on a number of levels; opportunity to leverage NRM investments in the catchments and nationally
CMRA	Project Manager	one-on-one	clarify linkages between project and CMRA's Dutch-funded Project Kingfisher, refinement of project design; opportunity to continue support to CMA CEO Forum
WRC	Executive Manager Business Development & Partnerships	one-on-one	clarify linkages between project and WRC's research programme of work in the water sector, clarify project design
UEIP WRC INR UKZN SAPPI SANBI DUCT uMngeni Local Municipality Alliance for Water Stewardship	 Research Manager Executive Director Chair: Centre for Water Resources Research Specialist Director: Ecological Infrastructure Environmental Activist and Teacher (Howick Chairperson) Environmental Management Inspector	workshop	discussion and refinement of relevant aspect of project design with catchment stakeholders

Stakeholder Institution	Official/Individual's Designation	Engagement	Summary
Msinsi Resort and game reserves SANBI DUCT Ezemvelo KZN Wildlife Umgeni Water Board WWF SA Mondi Wetland Programme eThekwini Municipality	Alliance for Water Stewardship Managing Director: Msinsi resort and game reserves UEIP Coordinator Chair: Upper uMngeni Catchment Management Forum Ecosystem goods & services scientist Middle Manager Scientist Project Coordinator: Upper uMngeni Manager: Mondi Wetlands Programme Climate Change Specialist: Ethekwini Municipality		
UNEP Financial Initiative	Programme Manager: Biodiversity, Ecosystem Services, Water	one-on-one	clarify linkages and alignment between project UNEP FI's natural Capital Declaration project
CMA CEO Forum	CEO's of the nine CMAs DWS Director: Institutional governance DWS Chief Director: Institutional Oversight	Meeting	Presentation on the GEF 6 project to the CEOs of the CMAs; support from the CMA CEOs for the project; a request to ensure engagement through the forum with CMA's not covered in the project's demonstration areas

E. Terms of Reference for Main Personnel

E.1 Overview of project staff

The project will consist of the core staff paid for by the project as well as staff dedicated in full or in part to the project but paid for by SANBI co-finance. TORs for the following core staff paid for by the project are provided below:

- Project leader
- Project coordinator
- Finance officer (part SANBI co-finance)

Through its co-finance to the project, SANBI is making available the following staff to support the project:

- Project administrator (SANBI co-finance)
- Finance manager (SANBI co-finance)

In addition, technical leads paid for by the project will be appointed to lead the following components of work:

- Outcome 1.1: Natural Capital Accounting Project Manager
- Outcome 1.2 and 1.3: Senior Policy Advisor
- Outcome 2.1: Berg Breede Coordinator
- Outcome 2.2: Greater uMngeni Coordinator
- Outcome 3.1 and 3.2: Knowledge Coordinator

Terms of Reference are provided only for these core staff in the PMU and not for the other technical component leads, secondments to project partners or short term consultants. This is because it is essential that, once appointed, the Project Leader takes responsibility for the recruitment of other staff and procurement of consulting services in close collaboration with the PSC and/or the relevant agency representatives at the time that such staff or services are required. This is to ensure that recruitment and procurements dynamics that prevail at the time are taken into account and reflected in the Terms of Reference for these posts.

E.2 Terms of Reference: Project Leader

Duration of appointment: 54 months

The Project Leader will provide strategic leadership and management of the implementation of the DBSA-GEF-funded Development Finance, Biodiversity and Water Security Project. The project is a multi-faceted and multi-stakeholder project which will be implemented over five years nationally and in selected catchments in two provinces, with over ten partner implementing institutions and many other sector or co-finance partners. The project has a core budget of $7.2 million from the GEF which has leveraged $50.5 million in co-finance.

The Project Coordinator will be responsible for management of the following people:

- Project coordinator
- Project administrator
- Finance Manager (in terms of KPAs dedicated to the project)
- Finance officer
- Natural Capital Accounting Project Manager
- Senior Policy Advisor
- Berg Breede Coordinator
- Greater uMngeni Coordinator

- Knowledge Coordinator

Responsibility towards these staff includes: development and planning of work programmes, budget allocation, decisions regarding allocation of tasks; setting performance targets; mentorship, management and experiential training; development of performance management agreements and conducting performance evaluations.

The level of autonomy associated with the post is relatively high and the Project Leader must be able to operate with minimal supervision. The incumbent needs to be able to make reasoned decisions regarding management of resources, staff, and tasks; work programs independently; and make strategic decisions or manage politically sensitive situations independently.

The Project Leader will further be responsible for managing and coordinating project partner interaction. This will include drawing up Memoranda of Agreements, preparing regular quarterly reports against work plans and developing future quarterly plans. As the programme hinges on partnerships, relationship management is key. This is not simply a line accountability type of relationship and requires skilled management. The following organisations, as direct implementing partners or in other formal project capacities (e.g. steering committee, co-financiers, and implementing agents) will be involved:

- Development Bank of Southern Africa
- Department of Water and Sanitation
- Department of Environmental Affairs
- Department of Agriculture, Forestry and Fisheries
- National Treasury
- Statistics South Africa
- Water Research Commission
- National Business Initiative
- Breede-Gouritz Catchment Management Agency
- Berg-Olifants Proto Catchment Management Agency
- Pongola-uMzimkulu Proto Catchment Management Agency
- World Wildlife Fund-South Africa
- Centre for Municipal Research and Advice
- University of KwaZulu-Natal
- Berg Irrigation Board
- Zonderend Water User Association
- Water Institute of South Africa
- United Nations Environment Programme

The primary objective of the Project Leader is to provide strategic leadership to the implementation of the Project, including:

- Management of all programme processes, deliverables, finances, procurement and contracting of service providers that results in the achievement of the programme outcomes;
- Mange donor relations including ensuring compliance to donor requirements; communicating key messages from the Development Finance, Biodiversity and Water Security Project to both local and international donors;
- Host regular donor visits; review donor strategies and lobbying government departments to align funding strategies;

- Establish and maintain appropriate internal controls, systems and procedures and manage project funds (including core funds of $7.2million from the GEF) in accordance with policies and prescripts of the donor, project implementing agent and SANBI;
- Ensure the coordination of implementation activities, through effective governance structures
- Effective management of relationships with a diverse range of partners and stakeholders (private sector, public sector, NGOs and academic), resulting in their continued mobilisation and support of the programme
- Leadership on content regarding the water sector, development policy and finance, mainstreaming biodiversity, how to achieve trade-offs between development and biodiversity
- Appointment and supervising of project staff

Qualifications and experience

- Post graduate degree in natural, social or management sciences.
- At least 7 years programme management experience
- Proven leadership abilities.
- Extensive knowledge and/or experience of the policy landscape, institutions and prevailing issues in the South African biodiversity and/or water sectors. Preference is for working knowledge of both sectors
- Experience working with a range of stakeholders including the three spheres of government, the private sector and civil society around environment management.
- Understanding of the linkages between biodiversity management and development with a focus on poverty alleviation

E.3 Terms of Reference: Project Coordinator

Duration of appointment: 60 months

The Project Coordinator will directly support the Project Leader on all aspects of project coordination, with emphasis on coordinating annual and quarterly project donor reporting processes, supporting relationship management, as well as supporting project governance and oversight structures. The Project Coordinator will also support the Knowledge Coordinator in terms of project level monitoring and evaluation in support of donor compliance and annual and quarterly reporting.

Key objectives of the Project Coordinator will include:

- Coordinate, under the guidance of the Project Leader, all quarterly and annual donor compliance and reporting requirements as well as the project's mid-term and terminal evaluations. This includes the compilation of quarterly and annual reports. This will also require engagement with the Finance Manager and Finance Team to ensure relevant financial information is available and included in reports.
- Coordinate, under the guidance of the Knowledge Coordinator, the project's monitoring and evaluation requirements. Support other knowledge management functions of the project as required.
- Support the project's governance and oversight structures including the scheduling of meetings, preparation of agendas, drafting of minutes
- Support the Project Leader in managing key relationships of the project particularly with the donor and project implementing agency
- Represent the Project or Project Leader in various for a and be an active participant in certain programme structures as required

Qualifications and experience

- Post graduate degree in natural, social or management sciences
- Experience in the biodiversity mainstreaming and/or water sectors
- At least 3 years' project coordination or management support experience
- Experience of project level donor reporting
- Experience of stakeholder engagement, relationship management, providing support (particularly in drafting agendas, preparing minutes) to committees and governance structures
- Experience or ability to demonstrate good understanding of knowledge management and project level monitoring and evaluation
- Excellent English writing abilities is essential, as is experience in writing project reports and committee minutes
- Budget management experience is an advantage
- Computer abilities include demonstration of excellent computer literacy including word processing and spreadsheets

E.4 Terms of Reference: Finance Officer

Duration of appointment: 54 months, half-time

This project requires detail financial reporting and the monitoring of the budget in US Dollars and South African Rand. In order to support the finance and admin processes, a Finance Officer is needed to assist the SANBI Finance Manager (SANBI Funded Post), as well as to provide support to the Project Leader and extended project team on financial administration and procurement.

Key objectives of the Finance Officer include:

Finance and procurement:

- Support the procurement processes within SANBI for the project
- Collating the co-financing
- Call for finance reports from implementing partners
- Financial processing for all the GEF related activities

Project support:

- Record and write up minutes
- Liaise with stakeholders around workshops and meetings
- Logistics around workshops and meetings

Qualifications:

- Relevant tertiary diploma with at least 3 years' experience in project finance and management or Grade 12 with at least 5 years' relevant experience.
- Familiarity with accounting processes
- High level of proficiency in Excel
- Excellent writing and communication skills
- The candidate should demonstrate good organizational and coordination skills and record management,
- Office administration

E.5 Overview of inputs from technical component leads

Component lead	Appointment period	Major inputs

NCA Project Manager	54 months	• Co-ordinate development of national ecosystem accounts and detailed catchment-level water accounts for demo catchments • Co-ordinate development of ecological infrastructure maps and selected ecological infrastructure asset accounts in demo catchments • Build relationships and liaise between relevant experts and stakeholders to explore use of accounts in catchment-level planning and management, in supporting project-level investment decisions, and in monitoring effectiveness of investment • Facilitate and convene processes to build skills to develop and interpret accounts including in SANBI, Stats SA and other partner organisations • Co-ordinate work to clarify the data foundations necessary for priority natural capital accounts, and the mandates, roles and responsibilities for ensuring that the data for accounts is collected and available • Explore institutional arrangements for long-term production of accounts with key partners • Ensure appropriate links between Outcome 1.1 and other outcomes, especially Outcome 1.3
Senior Policy Advisor	52 months	• Provide structured inputs regarding ecological infrastructure objectives into applicable policy and frameworks • Support continued development and implementation of RQOs • Support capacity development of DWS CME officers regarding the protection and maintenance of EI • Support the development of Administrative Penalties for DWS to include in the NWRS 3 and Water Policy Reform process • Improve capacity for integrating ecological infrastructure considerations in the planning and options analysis of future water sector infrastructure developments • Work with NRM and other ecological infrastructure related EPWP programmes to improve project prioritisation, such as through the use CMSs • Revisit existing guidelines that pertain to CMS development (e.g. wetlands etc.), examine current practice of CMS development and identify and address opportunities to strengthen how ecological infrastructure is integrated into CMS development
Knowledge management Coordinator	50 months	• Develop and coordinate the implementation and maintenance of a knowledge management and social learning for change strategy with key partners. Include in this the development of a key decision maker survey/tracking tool • Convene and participate in strategically identified platforms, learning alliances, learning events and dialogues with key stakeholders and partners • Work with partners and component coordinators to interpret and translate technical outputs from the project activities, capture lessons through implementation, and co-produce knowledge products • Identify and support relevant knowledge management systems • Support learning and skills development • Coordinate and manage implementation partners linked to component 3. • Identify priority research needs for the programme and explore and operationalize the most appropriate means of meeting these needs Develop calls for proposals for research and generation of evidence where appropriate • Participate in and oversee research, as applicable, and ensure the translation of research and development outcomes into the programme's operations • Build a culture of continuous learning and quality improvement in the programme • Support the translation of findings of research into knowledge products • Develop and implement a monitoring and evaluation system that supports project impact assessment
Berg-Breede Coordinator	50 months	• Coordinate activities in the demo including: o Development of blue print for contracting arrangements with local institutions to manage ecological infrastructure rehabilitation and maintenance implementation with DWS and CMA and assess skills-readiness to implement ecological infrastructure rehabilitation and maintenance in local areas where testing will take place.

		o Development of an ecological infrastructure plan and implementation strategy for the CMA as part of CMS; o Development of a baseline assessment for quantity and quality indicators at strategic points in catchments; o Engagement with IDP and SDF processes of affected District and Local Municipalities to ensure alignment with the CMS and the ecological infrastructure plan; o Oversee implementation of CMA funded or aligned ecological restoration projects; o Coordination of costing studies and support their uptake in CMA tariff setting processes under output 2.1.3; o Support relevant stakeholders to investigate appropriate and innovative monitoring mechanisms for assessing ecological infrastructure performance, flow benefits, water quality improvement against RQOs.
Greater uMngeni Coordinator	45 months	• Coordinate the implementation of GEF 6 activities and partnerships in the Greater uMngeni demo including: o Support the continued functioning of the UEIP o Coordinate research to monitor ecological infrastructure rehabilitation and restoration activities and provide evidence for improvements in water security o Support and coordinate efforts of multiple actors to control invasive alien plants, rehabilitate riparian and wetland ecosystems and related ecological infrastructure activities o Implement priority outcomes from previous studies such as the UEIP Green Fund Report on Ecological Infrastructure o Leverage the projects undertaken under the Aqueduct programme

F. Response to Comments on the PIF

Project ID 9073

Scientific and Technical Advisory Panel (STAP) comment	DBSA response
The threats and impacts in this project concept note are well described, as are the major barriers. In addition, the basic idea behind this project is exciting. It contains some very interesting ideas about how to manage water tariffs to be reinvested in catchment management based on sound economic analysis of costs and benefits. However, the text is complex and difficult to follow. In addition, the mechanisms to deliver on these ideas are vague, complex and insufficiently developed, and made more so by the quality of the narrative. In short, this project appears to have great potential; however, the PIF needs to be put together much more succinctly for the reader to be able to understand and assess the project.	The STAP comments are well noted. PPG funds have been used to improve the narrative and to improve the rigour, logic and level of detail of the project design. All deviations from the PIF are documented in the Project Document and explained in the CEO Endorsement Template.
The most clearly written and operational Outcome is for the two river catchments (Outcome 4). A stronger approach might be for the project to replicate the South African Grasslands approach of involving communities of practice in solving real problems together to develop guidelines, analyses, etc. that are then adopted at higher levels. STAP recommends that this should be the operational focus of this project, with the development of valuation and training material (outputs 2,2, 2.3, 2.4) and economic valuations (outputs 5.1, 5.2) being part of this. It also seems that outputs 6.1 to 6.4 fit directly under these pilots, and it is hard to follow what is meant by outputs 5.2 to 5.5 and if these are intended to be applied in the two catchments or nationally. The second output would then be the stakeholder process of building a 'community-of-practice' and incorporating these practices as guidelines, norms, and eventually new regulations and financing systems at national level.	The comments are well received. We note that SANBI, the executing agency of this project, was also the Executing agency for Grasslands Project. Thus, the knowledge and institutional capacity of SANBI will be readily available to support this project. PPG funds have been used to review the suggested changes in the architecture of the project, with particular emphasis on the necessary activities to deliver the proposed outcomes in the demonstration catchments. The demonstration level outcomes have been organised geographically, rather than thematically, providing a clearer framework for project interventions and outcomes. In support of the STAP comment, the PPG phase moved the project away from a focus on economic valuation to a broader approach to valuation (advocated by comments from GEF Council member) that will focus on quantifying benefits of ecosystem services to people in non-monetary terms, such as the quantum of services delivered in hydrological terms, in the case of water-related ecosystem services). In relation to monetary valuation, the project will calculate the full costs of rehabilitation and maintenance of water-related ecological infrastructure in the demonstration catchments in order to inform water resource management charges prescribed in the Water Pricing Strategy with a view to directing funds raised through this tariff into managing the catchment. This approach does not attach a market-based value to the services provided by ecosystems, but rather costs the activities required to maintain or enhance the delivery of services. Building on the STAP recommendation, the project design has further been adjusted to include a third component (with two outcomes) on knowledge management and social learning, including building and strengthening communities of practice. As per the STAP comment, this component of work is designed to support, strengthen and influence both components 1 (on policy and regulatory instruments) and components 2 (application in demonstration catchments).

Scientific and Technical Advisory Panel (STAP) comment	DBSA response
The table of proposed stakeholders is extensive and well-described; however, it will be useful if the PIF could comment on whether SANBI, WCDA, NMMM and Department of Water are committed to the project as this will be a critical factor in determining overall likelihood of success.	SANBI will be the Executing agency. The PPG has undertaken a detailed stakeholder engagement process (documented in the CEO Endorsement Template and the Project Document) which has resulted in commitment letters, including considerable co-finance from at least fifteen implementing partners at national, regional and local levels in the public, private and civil society sectors.
The risks are well defined and elaborated; however, it will be helpful to indicate whether they are believed to be low, medium or high.	This has been addressed in the PPG. The revised risk table is documented in the CEO Endorsement Template and the Project Document.

Preliminary Comments by Germany on GEF TF Work Program June 2015	Response
South Africa, Unlocking Biodiversity Benefits through Development Finance in Critical Catchments. GEF ID = 9073 Germany agrees with the proposal. However, Germany would like to emphasize that a focus on solely a monetary valuation of ecosystem services includes certain risks due to large value ranges (depending on individual income and willingness to pay), its time and resource intensive character (particularly if it is to be applied to a big variety of ecosystem services) and will most likely not reflect a tradable value (particularly regulative services are oftentimes considered as public benefits). Suggestions for improvements to be made during the drafting of the final project proposal: • The final project proposal would benefit from considering other methodologies for valuating ecosystem services as well. For example, quantitative insights expressed in bio-physical units might- depending of the specific case- be already sufficient to communicate benefits (e.g. number of people benefitting from clean water provision).	The comment is noted. We agree with the risks and shortcomings of economic valuation. The PPG phase moved the project away from a focus on economic valuation to a broader approach to valuation as advocated by Germany that will focus on quantifying actual benefits of ecosystem services to people in non-monetary terms, such as the quantum of services delivered in hydrological terms in the case of water-related ecosystem services). In relation to monetary valuation, the project will calculate the full costs of rehabilitation and maintenance of water-related ecological infrastructure in the demonstration catchments in order to inform water resource management charges prescribed in the Water Pricing Strategy. However this is not economic valuation in the sense of attempting to attach a market-based value to the services provided by ecosystems, but will rather cost the activities required to maintain or enhance the delivery of services.

G. GEF Project Tracking Tool

Submitted separately