BOTSWANA ACTION PLAN FOR THE ORANGE–SENQU RIVER BASIN

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The Orange–Senqu River Commission – ORASECOM – was established by the governments of Botswana, Lesotho, Namibia and South Africa to promote equitable and sustainable development and management of the resources of the Orange–Senqu River. This joint commitment was sealed through an Agreement on the Establishment of the Orange–Senqu River Commission signed in November 2000 in Windhoek, which conforms with best international practices regarding the joint management of shared rivers.

The highest body of ORASECOM is the Council, consisting of delegations from each country, supported by various 'Task Teams' that manage projects, and a Secretariat. The Council serves as technical advisor to the member states on matters related to development, utilisation and conservation of water resources of the Orange–Senqu River system. The Secretariat, established by agreement with South Africa in 2006 and hosted there, coordinates ORASECOM activities, implements ORASECOM decisions and is the focal point of the institution.

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BOTSWANA ACTION PLAN FOR THE ORANGE–SENQU RIVER BASIN

Growing green peppers as part of a rangeland management demonstration project in Khawa. Assisting communities to establish vegetable gardens in this harsh environment helps provide a buffer for food security.

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FOREWORD

Capped wheatear, *Oenanthe pileata*

The Orange–Senqu River Commission (ORASECOM) was established by the governments of Botswana, Lesotho, Namibia and South Africa to advise them on water-related issues towards promoting equitable and sustainable development and management of the resources of the Orange–Senqu River basin.

ORASECOM and its four basin states have been supported by a United Nations Development Programme–Global Environmental Facility (UNDP–GEF) programme, in the development of a basin-wide Strategic Action Programme (SAP) and an Action Plan for each basin country to address a variety of identified water-related environmental concerns. The SAP is a negotiated document that provides a basin-wide framework for the implementation of a prioritised set of national and joint transboundary actions and investments. In the context of the Orange–Senqu River Basin Integrated Water Resources Management (IWRM) Plan, the SAP is specifically focused on addressing priority environmental concerns. At national level, the SAP initiatives are integrated into the respective Action Plan of each basin state.

The Botswana Action Plan for the Orange–Senqu River Basin is based on an assessment of the priority environmental concerns as identified by the Orange–Senqu Transboundary Diagnostic Analysis (TDA), a scientific and technical assessment of the priority environmental concerns and shared management issues in the basin. For the priority issues, the analysis identifies the scale and distribution of the environmental and socio-economic impact at national and basin levels and, through an analysis of the root causes, identifies potential remedial and/or preventative actions. The Botswana Action Plan defines technical and management interventions to address these priority concerns at national level. It was developed through an extensive consultation process and has been validated at national level in order to ensure that it reflects the priorities of the country. It is well aligned with the country's national development and sector plans, as well as the institutional frameworks at national and local levels.

Developed under the auspices of ORASECOM, this Action Plan – together with the Action Plans of the other three basin states and the SAP – forms the environmental component of the Orange–Senqu River basin IWRM Plan.

ABBREVIATIONS AND ACRONYMS

BWP	Botswana Pula
BORAVAST	Bokspits, Rappelspan, Vaalhoek and Struizendam Trust
CBO	community-based organisation
CBNRM	Community-Based Natural Resources Management
CSO	Central Statistics Organisation
DWA	Department of Water Affairs
IVP	Indigenous Vegetation Project
KCS	Kalahari Conservation Society
IWRM	integrated water resources management
LAKIPs	Local Authorities Key Issues Papers
NBSAP	National Biodiversity Strategy and Action Plan
NEF	National Environmental Fund
NDP	National Development Plan
ORASECOM	Orange–Senqu River Basin Commission
OSB	Orange–Senqu basin
PCN	project concept note
PILUMPs	participatory integrated land-use and management plans
PLUS	participatory land-use strategies
RADP	Remote Area Development Programme
SAP	Strategic Action Programme
SASSCAL	Southern African Science Service Centre for Climate Change and Adaptive Land Management
TDA	Transboundary Diagnostic Analysis
USD	United States Dollar
WMAs	Wildlife Management Areas
WUC	Water Utilities Corporation

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EXECUTIVE SUMMARY

The Botswana Action Plan for the Orange–Senqu River Basin is a strategic implementation plan to address priority environmental concerns in the Botswana part of the Orange–Senqu River basin. It is closely aligned with the Orange–Senqu Strategic Action Programme (SAP), a programme addressing priority environmental concerns at the basin-wide level. In the context of the Orange–Senqu River basin, the Action Plans (and the SAP) are closely linked with the basin-wide Orange–Senqu Integrated Water Resources Management (IWRM) Plan, together forming the environmental component of the IWRM Plan. The Action Plans and SAP, like the IWRM Plan, are developed for a ten-year planning time span with targets set for that period.

The Botswana Action Plan was developed through an intensive stakeholder consultation process. This process involved intersectoral dialogue to achieve integration in water resources management and, most importantly, national endorsement of the Botswana Action Plan. The political and technical guidance for the Action Plan came from Botswana through an Action Plan Working Group as well as a broader National Stakeholder Platform, each structure specifically set up for the purpose of Action Plan (and SAP) development. Botswana's delegate to the Orange–Senqu River Commission (ORASECOM) Technical Task Team was appointed as the national coordinator of the Action Plan/SAP process. The National Stakeholder Platforms comprised stakeholders representing a wide range of role-players, including both state and non-state participants. While established initially for the purposes of Action Plan/SAP development, the aim is that the National Stakeholder Platforms and the Action Plan Working Groups are maintained in the long term and become permanent national counterparts for ORASECOM.

The Botswana Action Plan is based on an assessment of the priority environmental concerns as identified by the Orange–Senqu Transboundary Diagnostic Analysis (TDA), a scientific and technical assessment of the priority environmental concerns and shared management issues in the basin. For the priority issues, the analysis identifies the scale and distribution of the environmental and socio-economic impacts at national and basin levels and, through an analysis of the root causes, identifies potential remedial and/or preventative actions. The Botswana Action Plan is based on the findings of the Orange–Senqu TDA and is closely integrated with the basin-wide Orange–Senqu SAP.

The Botswana Action Plan is structured around the four environmental priority areas of concern identified in the TDA: increasing water demand, declining water resources quality, changes to the hydrological regime and land degradation. Through the Action Plan consultation process, the stakeholders ranked them in order of priority from their national perspective. In Botswana, the following order of priority was determined.

1 Increasing water demand

There are few sources of water remaining to be developed in Botswana, leading water development authorities – including the Ministry of Agriculture – to consider water demand management as a development option. This requires an IWRM approach which shifts away from exclusively supply-oriented strategies and considers demand management options regarding water resources. There have to be deliberate efforts to create awareness on water demand management.

2 Declining water resources quality

The basin area in Botswana suffers from water resources quality problems. Groundwater is often saline and there are a limited number of boreholes that provide adequate quality water for livestock watering and other uses. Coupled with limited options for additional supply to be developed, this necessitates an integrated water resource management and comprehensive water demand management approach, including water re-use and the protection of groundwater from pollution.

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A community member waters plants in a rangeland management demonstration project at Khawa

Opposite page: Sociable weaver (*Philetairus socius*) nesting colonies

Kalahari scrub-robin (*Cercotrichas paena*)

3 Land degradation

The Botswana part of the basin is affected by land degradation. The causes of land degradation are mainly over-exploitation (increased livestock densities accompanied by crowding of livestock watering points and veld product harvesting), fragmentation of habitats, introduction of alien species (*Prosopis*), limited access to livestock markets, inappropriate policies and climate change. The threat posed by climate change means that stresses caused by water scarcity and land degradation will worsen. Considering the socio-economic importance of access to productive land for the majority of the population, it is critical that the land resources are protected and managed in a sustainable way.

4 Sustainable natural resources use practices for livelihoods improvements

In line with government objectives of optimising land resources utilisation, a number of land-use plans were prepared for various districts in the basin area to ensure best use of land and reduce land-use conflicts. The communities have further developed community plans under the Community-Based Natural Resources Management (CBNRM) Programme. While wildlife management areas (WMAs) have been designated, it is noted that due to disjointed development policies and sectoral planning by various stakeholders, other land-use forms have encroached into the WMAs, most noticeably agriculture, thereby exacerbating the human–wildlife conflict issues/incidents. Wildlife has proven to be resisting the harsh conditions in the area and could do better than other land uses if promoted and managed properly. Therefore concerted efforts should be made for the community-based organisations (CBOs)/ Trusts in the area to benefit from wildlife.

In response to each priority area of concern, national targets were set to address the concerns over a ten-year time period. Interventions were then identified that are required to meet the targets. In line with national policies, strategies and plans, project concepts were developed that package the proposed interventions into structured, implementable projects. These project concept notes (PCNs) form the backbone of the Botswana Action Plan. The proposed projects identified for Botswana are listed below.

The Kalahari Desert, Botswana

Addressing: Increasing water demand
- PCN 1: Improving water use for future generations
- PCN 2: Improved fresh water availability and knowledge of groundwater potential

Addressing: Declining water resources quality
- PCN 2: Improved fresh water availability and knowledge of groundwater potential
- PCN 4: Treatment and re-use of wastewater

Addressing: Land degradation
- PCN 3: Conservation and sustainable land management

Addressing: Sustainable natural resources use practices for livelihoods improvements
- PCN 1: Improving water use for future generations
- PCN 5: Integrated CBNRM for Kgalagadi District (Orange–Senqu basin (OSB))

The implementation of the Botswana Action Plan is project-specific. The mechanism of implementation of a project is determined by the requirements of the lead implementing agent of that project. Overall coordination and monitoring of the Botswana Action Plan is through national government structures using their established structures and systems. Therefore, close collaboration between the ORASECOM Secretariat and responsible national structures is necessary to ensure coordination and monitoring between the implementation of SAP and Action Plan activities in the four basin states.

Funding is sought for each project, either individually or for a combination of projects. Potential funding sources are primarily national governments, international cooperation partners and, to some extent, the private sector. Importantly, given the extensive consultation process through which the Botswana Action Plan has been developed and its close alignment with national policies and strategic planning priorities, the Botswana Action Plan also provides valuable guidance for targeted budget decision-making and spending at national level.

1. INTRODUCTION

1.1 PURPOSE OF THE ACTION PLANS

The Action Plans are strategic implementation plans for addressing priority environmental concerns in the national part of the Orange–Senqu River basin. They are closely aligned with the Orange–Senqu Strategic Action Programme (SAP), a programme addressing priority environmental concerns at the basin-wide level. The Action Plans are critical tools for the implementation of SAP priority actions at national level and the integration of transboundary and basin concerns into national legislative, policy and budget decision-making processes.

In the context of the Orange–Senqu River, the Action Plans (and the SAP) are closely linked with the basin-wide Orange–Senqu IWRM Plan, together essentially forming the environmental component of the IWRM Plan. The Action Plans and SAP, like the IWRM Plan, are developed for a ten-year planning time span with targets set for that period. Thus, while the IWRM Plan is a comprehensive plan dealing with a wide aspect of water resources management (including water allocation) and economic development aspects pertinent to the basin, the SAP and related Action Plans primarily concentrate on priority environmental issues and form the environmental core component of the IWRM Plan.

The Botswana Action Plan for the Orange–Senqu River Basin was developed through an extensive consultation process in order to ensure that it reflects Botswana's priorities. It is well aligned with the country's national development and sector plans as well as the institutional frameworks at national and local level.

1.2 RELATIONSHIP OF THE ACTION PLAN TO THE TDA, SAP AND NATIONAL POLICIES AND PLANS

The Botswana Action Plan is based on an assessment of the priority environmental concerns as identified by the Orange–Senqu Transboundary Diagnostic Analysis (TDA) and defines technical and management interventions to address them. The TDA is a scientific and technical assessment of the priority environmental concerns and shared management issues in the basin. For the priority issues, the analysis identifies the scale and distribution of the environmental and socio-economic impacts at national and basin levels and, through an analysis of the root causes, identifies potential remedial and/or preventative actions. The Botswana Action Plan is based on the findings of the Orange–Senqu TDA and is closely integrated with the basin-wide Orange–Senqu SAP.

Like the Action Plans at national level, the SAP is a negotiated document that provides a basin-wide framework for the implementation of a prioritised set of national and joint transboundary actions and investments. At national level, the SAP initiatives are based on and integrated into the respective Action Plan. Neither the Action Plans nor the SAP work independently – the SAP reflects basin-wide priorities identified through the Action Plan development processes in the four states, while the Action Plans provide the framework for the national level implementation.

Botswana is currently undergoing the National Development Plan 10 (NDP 10) review process, the findings of which have been fed into the Botswana Action Plan. The end of NDP 10 coincides with the end of the national Vision 2016 period, and the NDP 10 Review is the last opportunity to adjust the NDP and associated policies with a view to coming as close as possible to the targets set out in Vision 2016. The NDP 10 Review has indicated that, in the years remaining for the development plan, the country has to overcome the challenges posed by environmental degradation by undertaking legislative

Opposite page: A goat foraging in the arid lands near Khawa. Goats are particularly well adapted to conditions in southern Botswana, not always to the advantage of the environment.

intervention via promulgation or review of policies, laws, regulations standards and guidelines in sectors which include agriculture, water, energy, transport, mining, environment and health.

In addition to the NDP 10, the Botswana Action Plan takes cognisance of the National Water Policy, which has been developed and is before Parliament for endorsement and subsequent implementation. Furthermore, the national Integrated Water Resources Management and Water Efficiency Plan developed in May 2013 was considered in the development of the Botswana Action Plan and successfully launched by the Minister of Minerals, Energy and Water Resources on 10 December 2013. It provides important guidance for sectors to better utilise the limited water resources and it addresses both national and transboundary water management priorities. A significant challenge for Botswana is to put in place inclusive, robust systems, tools, mechanisms and capacities for sustainable natural resource management. Therefore the Botswana Action Plan, like other national and district plans in the area, is intended to play a major role in ensuring the conservation and wise use of natural resources, including those other than water.

In that context, the Botswana Action Plan also complements the country's Action Plan to Combat Desertification, as well as the Biodiversity Strategy and Action Plan and the Community-Based Natural Resource Management (CBNRM) Programme. Other key policies to which the Botswana Action Plan relates are the:

- Rural Development Policy (2003);
- Poverty Reduction Strategy; and the
- Economic Diversification Strategy.

1.3 GEOGRAPHIC COVERAGE

The Molopo–Nossob system forms part of the Orange–Senqu basin and falls in the south-western part of Botswana covering the Kgalagadi District and part of the Ghanzi and Southern districts. Figure 1 shows the portion of the catchment that falls within the country. The administrative town for the basin is Tsabong where most services are provided.

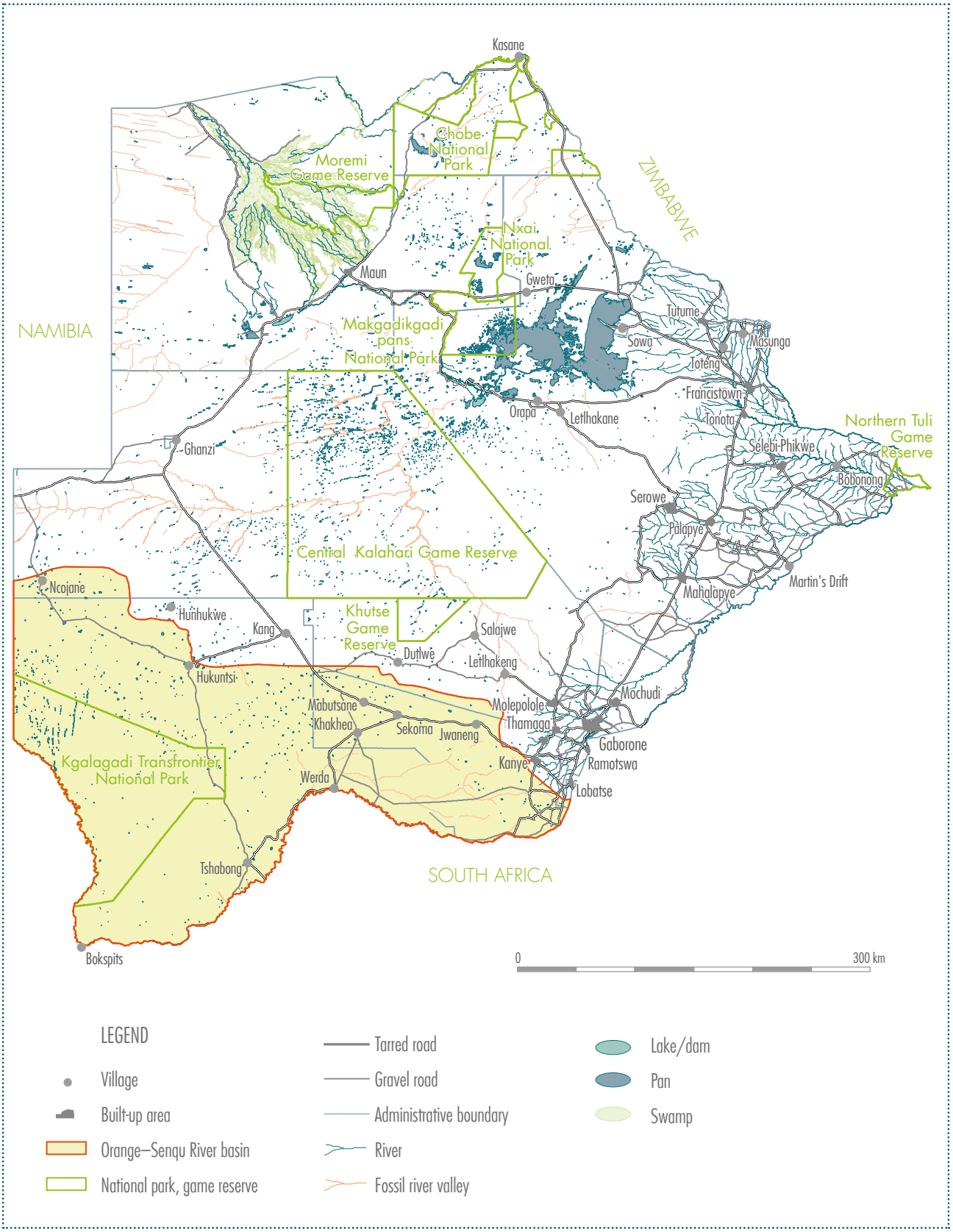

Figure 1: Map of basin in Botswana
Source: Debswana

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2. GOVERNANCE FRAMEWORK

2.1 LEGAL AND INSTITUTIONAL FRAMEWORK

The Water Act (1968) controls access to and use of water in the country, and provides an institutional framework for water allocation and control. A draft Water Bill has been produced as part of the ongoing water sector reform in the country and will, once promulgated as an Act, replace the 1968 Water Act. The Water Act (1968) specifies conditions for water rights for industrial, mining, power generation and forestry use. According to this Act, water rights are needed to abstract, store, dam and divert water and indicate the maximum amount and period of abstraction. The other relevant document for water allocation is the draft Botswana National Water Conservation Policy (2004). The policy prioritises different water uses as follows: water for human consumption (urban and domestic use has top priority), followed by water for production, environment, agriculture and livestock. The recent water sector reform project implemented far reaching institutional reforms, and prepared new water legislation and tariffs. The Department of Water Affairs developed a draft National Water and Wastewater Policy for the country in 2010, which is firmly based on IWRM principles. An Integrated Water Resources Management and Water Efficiency Plan was concluded in May 2013.

The new draft Water Bill is based on the above-mentioned policy and will, once enacted, replace the 1968 Water Act, the Borehole Act and the Water Works Act. The proposed new Act will bring the country's legislation in line with IWRM principles. This Act will also establish a new water resources board with key decision-making functions in water resources management, allocation and development of policies related to water resources. National water planning will be supported by formal mechanisms for ensuring cross-sectoral consultation and inputs from all sectors whose interests must be taken into account and this function will be the responsibility of the proposed water resources board. The technical functions of this body will be carried out by a division of the Department of Water Affairs (DWA), which will act as the executive arm of the water resources board. Under the new legislative framework, the DWA will no longer have any water delivery functions, but will be responsible for assessing, national planning, and developing and managing water resources for short-, medium- and long-term purposes, while the Water Utilities Corporation (WUC)takes on the responsibility of a water supply authority (including wastewater operations) for all cities, townships and villages. An overview of the relevant water sector institutions and their responsibilities post-water sector reform is provided in Table 1.

Opposite page: Donkeys slake their thirst at a pan near Zutshwa. There is a high dependence on the seasonal clay pans that are found interspersed in the Kalahari Savannah, for stock watering. They also play an important role within the Kalahari ecosystem and are vital to wildlife.

Table 1: Water management institutions in Botswana

Institution	Responsibility
Ministry of Minerals, Energy and Water Affairs (MMEWA)	Formulates, coordinates and implements national policies and programmes for water resources. Important inter-ministerial planning and liaison.
Botswana Energy and Water Regulatory Authority	Recommends tariff amendments and promotes operational efficiency.
Department of Water Affairs (DWA)	DWA of the MMEWA leads the process of planning for surface water management and development, as well as information and data management.
Water Apportionment Board (WAB)	WAB falls under the DWA, and is responsible for reviewing and approval of applications for water abstraction.
Water Utilities Corporation (WUC)	Responsible for water supply and delivery functions together with other institutions (DWA, WAB, etc.); also mandated for wastewater resources management countrywide and for developing the nation's water resources.
Water Resources Council (WRC)	Council is to be established via the new Water Act and will have a range of advisory functions, but importantly includes hydrological and hydrogeological investigations and the coordination and direction of the preparation of a national Water Resources Strategy.
Water Management Area Bodies	To be established via the new Water Act, Water Management Area bodies.
District Council	An elected body with assigned responsibilities for the provision of social services, such as water, health and education.
Village Water Development Committees	Advises residents regarding water resource management, promotes community participation and supports the development of the national water resource strategy.
Kgotlas	Localises participation and dispute resolution.

2.2 SOCIO-ECONOMIC CONTEXT

According to the 2011 Population and Housing Census, Botswana's total population is 2.2 million compared with 1.7 million in 2001. The population has grown faster than was forecast in 2001. Botswana has transformed itself from a least developed country at the time of independence in 1966 to an upper-middle income country within four decades. This transformation was propelled mainly by effective use of revenue from mineral resources, such as diamonds. Real per capita income rose from USD250 in 1960 to USD4,800 in 2008 (in constant 2,000 USD) (World Bank, 2010). Macroeconomic growth in recent years was, however, below the 7.5 percent growth target required for the Vision 2016 objective of 'Prosperity for all' to be achieved (NDP 10 Review, 2013).

Government efforts through the investments of the Botswana Development Corporation, the National Development Bank, the Citizen Entrepreneurial Development Agency (and its precursor the Financial Assistance Policy), the Local Enterprise Authority, and Botswana Enterprise Development and Investment Agency are all hands-on endeavours towards economic diversification. At policy level, the government takes guidance from the Botswana Excellence Strategy for Economic Diversification and Sustainable Growth (2008) and the 2010 Economic Diversification Drive, a comprehensive strategy framework to pursue economic diversification. Sector-specific policies, such as the draft National Policy on Agricultural Development, the recently approved Policy on Forestry (2011), the CBNRM Policy (2007), the draft Wildlife Policy and others, also include reference to and objectives towards economic diversification.

Despite its impressive growth rate, Botswana faces serious challenges related to chronic unemployment, high poverty levels and inequality (for an upper-middle income country), exacerbated by the HIV/Aids pandemic. The unemployment rate worsened from 14 per cent in the early 1990s to 24 per cent in 2004/05, and is estimated at 17.8 per cent in the latest Labour Survey (2011). Poverty levels and inequality are high and the country still reflects low human development indicators, though Botswana's second progress report on the Millennium Development Goals released in November 2010 indicates that the country is on target for most of these goals (Government of Botswana and the United Nations Country Team, 2010).

Therefore, the Botswana Development Plan needs to make a deliberate effort to improve the water availability situation in the south-western part of the country to realise all the poverty eradication drives that have been put in place for Batswana through the revised Remote Area Development Programme (RADP) of 2009, which lays the foundation for affirmative action for remote area communities. The programme provides broad strategies that the various sectoral organisations should pursue to promote affirmative action under the support of the RADP.

Mining is a key economic driver in the country, although the role of the mineral sector in employment creation compared with other economic sectors has declined over time. Diamond mining, in particular, is closely linked to economic growth and poverty eradication in Botswana. This is because the government uses its dividends and royalties to invest in infrastructure, human capital development and maintenance of safety nets. It is also a major source of revenue which is used to maintain public sector jobs. Survey data indicate that transfers from employed relatives and government remittances are the major sources of income for poor households (Moepeng, 2010). The mineral sector, especially diamond mining, has therefore been a key driver of declining malnutrition rates, increasing school enrolment and the sustained decline in the incidence of poverty in Botswana. The United Nations (2002) indicates that employment in the Orapa, Letlhakane and Damtshaa mines declined by about 30 per cent from 5,232 people in 1998 to 3,647 in 2004. However, during the same period, employment at Jwaneng mine (in the basin) increased from 2,654 to 3,042.

© Stefan Kuna

Jwaneng diamond mine is considered to be one of the richest diamond mines in the world. Apart from contributing significantly to Botswana's gross domestic product, it provides employment to many Batswana.

2.3 STAKEHOLDER TYPOLOGY

The Botswana Action Plan is aimed at addressing priority environmental problems in the Botswana part of the Orange–Senqu River basin. Table 2 provides an overview of stakeholder groups relevant for the development and/or implementation of the Botswana Action Plan.

Table 2: Relevant stakeholders

Category	Stakeholders
Government ministries and institutions	Department of Wildlife and National Parks Department of Environmental Affairs Department of Tourism Department of Forestry and Range Resources Ministry of Agriculture Ministry of Minerals Energy and Water Resources Ministry of Finance and Development Planning Ministry of Lands and Housing Ministry of Local Government and Rural Development Land boards Councils
Non-governmental organisations and community-based organisations	Ditshwanelo Kalahari Conservation Society Veld Products Research and Development Thusano Lefatsheng Bokspits, Rappelspan, Vaalhoek and Struizendam Trust (BORAVAST)
Parastatals	Water Utilities Corporation Botswana Tourism Organisation
Local authorities	Chiefs Village development committees Parents and schools Community members
Private sector	Farmers associations Tour operators Botswana Confederation of Commerce, Industry and Manpower Mining

3. DESCRIPTION OF THE BOTSWANA PART OF THE BASIN

3.4 PHYSICAL PARAMETER

The Orange–Senqu River basin extends over four countries: Botswana, Lesotho, Namibia and South Africa and covers an area of just under 1,000,000 km². Only 7.9 per cent (79,000 km²) is in Botswana, mainly falling within the Kalahari Desert – an area that receives the least amount of rainfall in the country. The average annual precipitation in that part of Botswana is 295 mm/a, much less than the mean annual rainfall for Botswana of approximately 400 mm/a (FAO, 1997). The Molopo and the Nossob rivers (which form the border between southern Botswana and South Africa) are the major surface drainage features in the area and the main tributaries of the Orange–Senqu basin in Botswana. However, these rivers are ephemeral, flowing occasionally after heavy rainfall events. Generally, the Molopo River rarely retains surface water, due to the arid and semi-arid climatic conditions that prevail in the area. Runoff from Botswana has not contributed any surface runoff to the Orange–Senqu River main stem in living memory (ORASECOM, 2007).

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Kori bustard, *Ardeotis kori,* is the largest of the bustards. It is considered vulnerable, especially outside protected areas, due to habitat loss and snaring.

3.5 HYDROLOGY

Most of Botswana's land is in the Kalahari Desert where the climate is semi-arid. The basin falls in this area, which is subject to sustained periods of severe droughts where annual rainfall is about 400 mm varying between 250 mm in the south-west (the project area) and about 650 mm in the north-east (DEA, 2006). Almost all the rainfall, generally unreliable and unevenly distributed, occurs in the summer months (October to April). The average daily maximum temperature ranges from 22 °C in July to 33 °C in January. Winters are cool, with an average daily minimum of 5 °C in July and 19 °C in January. Temperatures can reach 43 °C in January, resulting in very high evaporation rates.

Botswana relies on both groundwater and surface water. Groundwater supplies two thirds of the water consumption, whereas dams, rivers and other surface water contribute about one third to national water consumption (FAO, 2008). The semi-arid climate and the lack of permanent surface drainage in the basin area mean that the area experiences hydroclimatological water scarcity, i.e. evaporation exceeds rainfall.

3.6 WATER QUALITY

The basin area groundwater is characterised by salinity. Consequently the government should install desalination plants in some of the villages in the basin to treat groundwater so that it is potable. Most of the causes of groundwater quality problems in the basin are due to human activities, such as spillage of oils and lubricants at borehole points; disposal of wastewater through soak-away systems; and elevated nitrate levels from unlined pit latrines, cattle kraals and around watering points.

According to the Central Statistics Organisation (CSO) (2009), water quality standards are designed to provide an understanding of the critical importance of adequate supplies of clean, available fresh water for the environment, the country's economy and quality of life. Botswana Bureau of Standards has established upper limits and ranges for chemical levels allowable in drinking water, livestock drinking water, irrigation, bottled water and wastewater discharge. Routine water quality monitoring is carried out at dam catchment areas, as well as treatment and distribution systems (WUC, 2009). According to WUC (2009), samples are collected and analysed for various microbiological and chemical constituents.

There remain problems of water salinity in south-western districts, such as Kgalagadi. The district uses a desalination plant in Tsabong to reduce levels of salinity.

Opposite page: Water trough at a farm near Zutshwa . The rangeland around watering points such as this are subject to overgrazing.

The arid landscape of southern Botswana; the basin area receives the lowest rainfall in the country.

3.7 ECOLOGY

Botswana possesses a wide diversity of wild fauna and flora, with at least 150 species of mammals; 593 species of birds; over 157 species of reptiles; 38 species of amphibians; and over 80 species of fish, none of which are endemic to the country. Despite a rich biodiversity, the number of some species has declined over the years as a result of poaching, veterinary cordon fences (which straddle much of the country) and droughts (BIDPA/MFDP, 2012).

Botswana vegetation is classified into the hardveld, Kalahari sandveld and Okavango Delta. The basin area is within the sandveld ecological area (Table 3) which receives the lowest rainfall in the country.

Table 3: Botswana ecological regions

Ecological regions/sub-regions	Elevation above mean sea-level (m)	Rainfall (mm)	Average temperature (°C)
Hardveld	850–1,489	400–500	20.6 (Gaberone)
Sandveld	800–1,200	250–690	22.4 (Maun)
Okavango Delta	990–1,030	400–500	22.0 (Shakawe)
Makgadikgadi Pans	905–930	400	22.0 (Rakops)

Sandveld soils are typically made up of between 96 per cent and 99 per cent fine sand particles and are extremely infertile. Intensive grazing has occurred since the demarcation of ranches in the 1970s as part of the Tribal Grazing Lands Policy (TGLP) and the subsequent provision of boreholes which extract groundwater from a depth of over 60 m. The major ecological change associated with grazing intensification is that of bush encroachment. A shift in vegetation species composition, cover and density was observed after the expansion of the livestock sector in response to borehole provision in the 1970s (Moleele and Mainah, 2003). The expansion of livestock has led to degradation of the vegetation. Most of the severely degraded areas are around the livestock watering points and this has been exacerbated by the increase in numbers of livestock. The growing demand for high-quality Botswana beef from the European Union and elsewhere has led to overstocking by farmers trying to improve their livelihoods.

The expansion of livestock farming has led to degradation of the vegetation.

3.8 LAND COVER AND LAND USE

Botswana has 582,000 km^2 of land cover with about 44 per cent reserved for protected areas and wildlife management areas. There are three land categories: customary (70 per cent), state (25 per cent) and freehold (5 per cent). The main uses of land are for agricultural, residential, commercial, industrial, civic, community and recreational activities. The main policy concern in this sector is the limited availability of land for development, despite an apparent abundance of land (NDP 10, 2009–2016). The main focus during NDP 10 has been the development and implementation of land management policies to facilitate access, distribution and the demarcation, development and utilisation of land to achieve sustainable development.

The draft Land-Use Policy has been developed and is expected to be approved before the end of the plan period. Out of a total of 29 planned settlements, 16 were prepared (2012) and the national land-use plan was revised. Efforts to establish a land information database are ongoing with a view to capturing data on land ownership and land use. With regard to land for agricultural use, 2.1 million hectares of land have been gazetted. A further 960,900 hectares of agricultural land have been identified for countrywide gazetting (NDP 10 Review, 2013).

According to the Botswana Livelihoods Assessment Report (2009) some parts of the Kgalagadi Transfrontier National Park portion of the basin are categorised as state and reserved land. Another portion of the basin is categorised as Tribal Grazing Land Policy ranches, while other portions are categorised as lease and freehold farms. There are also portions that have pastoral and arable land uses. The remainder of the basin is reserved for wildlife management areas and residential purposes.

The main activities in the communal areas include dry-land farming, pastoral agriculture and wildlife management, with both consumptive (hunting) and non-consumptive resource utilisation. The government has, however, announced its intention to ban hunting altogether by 2014.

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4. PRIORITY CONCERNS

The priority areas identified by the TDA process for Botswana are:

- Increasing water demand;
- Declining water resources quality;
- Land degradation;
- Sustainable natural resources use practices for livelihoods improvement.

4.1 INCREASING WATER DEMAND

The Botswana part of the basin is an ecologically fragile marginal dry land (Molopo–Nossob River basin) which continues to experience land degradation, loss of biodiversity and primary productivity. The TDA and a number of studies, reviews and projects that have been carried out in the area revealed that increasing water demand, land degradation, declining water resources quality and sustainable natural resource use practices for livelihoods improvement are the major concerns for Botswana.

Water availability in the southern Kalahari is very limited. Perennial surface water and springs are entirely absent. During years of good rainfall, pans can hold water for extended periods; traditionally these pans provided the essential water supply to enable people to settle there permanently. Today, however, these wells are either dry or too saline for use (HCB/KCS Kalahari–NAMIB Baseline Study, 2012).

The recharge rates are nil or negligible over large parts of the country including southern Kgalagadi, and for many aquifers recharge occurs only in times of excessive wetness. As a result, groundwater can hardly be considered a renewable resource in Botswana, especially where the rate of extraction far exceeds the rate of recharge. Much of the groundwater is therefore effectively being mined. Studies indicate that in Kgalagadi District the problem of finding groundwater is complicated further by the fact that supplies are typically highly saline, requiring expensive desalination. The Molopo villages of Bokspits, Rappelspan, Struizendam and Vaalhoek (BORAVAST) are all dependent upon groundwater that is becoming increasingly saline. Currently, Ukhwi settlement depends upon a council borehole for its supply of potable, but slightly saline, water. The numerous blanks or saline boreholes that have been drilled in Kgalagadi District (see Figure 2) also reflect the extremely poor groundwater potential of the area (Knight Piesold, 1991). Ngwatle relies upon council bowsers to supply water since the two boreholes that were drilled close to the settlement yielded saline water. Although they are

Opposite page: Tsamma melon (*Citrullus lanatus*) is widespread in the basin area in Botswana. It is a source of juicy, watery pulp as well as nutritious seeds and is considered an important veldkos.

Left: Cattle at a pan near Tsabong. Ephemeral pans rapidly dry up after the rainy season in Botswana.

presently unequipped, two boreholes with potable water supplies exist at Masetlheng Pan, with numerous other blank or saline exploration boreholes found throughout Kgalagadi District (Van der Jagt, 1998).

The settlements of Ukhwi, Ncaang and Ngwatle all have rainwater catchment schemes in the pan basins that were dug under the drought relief scheme (Van der Jagt, 1998). Most water schemes operated by the district councils do not have chlorination systems or the capacity to maintain such systems (District Development Plan 6 (DDP 6), 2003). There are also a number of boreholes drilled for livestock usage. Recently the Government of Botswana commenced the Middlepits cross-border transfer scheme which will be completed in early 2014.

Jwaneng mine imports water from a well field outside of the basin, some 55 km north, at an average annual level of 10 Mm^3, by far the largest single water user in the basin in Botswana.

4.2 DECLINING WATER RESOURCES QUALITY

As stated in the previous sections, Botswana relies mostly on groundwater resources. However, groundwater resources are limited in quantity and quality, and the limited resources are unevenly distributed throughout the country. The groundwater is therefore abstracted to meet the water demand for competing uses in the basin area. In some instances, the aquifer formation for the available groundwater causes the water to be saline and therefore unsuitable for particular water demands, like human, livestock and wildlife consumption. In some cases groundwater is polluted by human activities, such

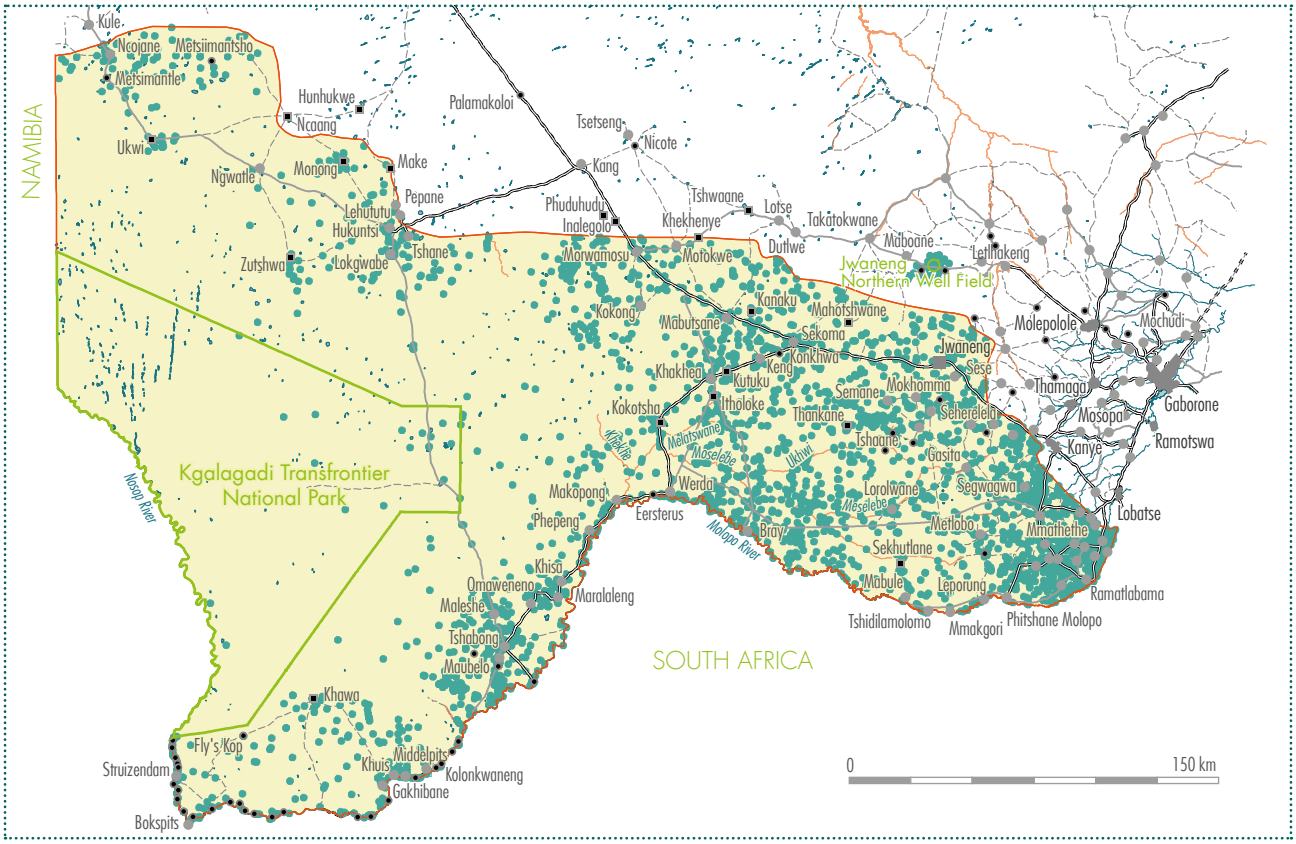

Figure 2: Boreholes drilled in the Botswana part of the basin
Source: Debswana, from data provided by the Department of Water Affairs (boreholes) and the Department of Surveys & Mapping (rivers, roads, settlements & waterbodies)

as unlined pit latrines and overcrowding of livestock in kraals and at water points. This leads to nitrates polluting good groundwater.

Serious water supply shortage problems have emerged in the south-western part of the country where the groundwater is deeper and saline (see Figure 3). The recharge rates are also generally low with an average of less than 3 mm/a.

In Botswana, groundwater collects in aquifers and is abstracted through well fields, mostly for use in villages, mines, power plants and for irrigation; individual boreholes serve the livestock sector as well as small villages. Only a small part of the groundwater resources can be economically abstracted due to high abstraction costs, low yields, poor water quality and remoteness of aquifers in relation to consumer centres (SMEC et al., 1991; Masedi et al., 1999). Recharge is virtually zero in western Botswana. Groundwater depth is related to rainfall level and recharge: it is around 20 m in northern Botswana and more than 100 m deep in south-western Botswana.

In 2003, Botswana had 30 well fields, and another 13 had been proposed. Of the 30 existing well fields, 27 were operational, 2 were rested (Palla Road and Mochudi), and one well field (Ramotswa) was closed in 1995 due to underground water pollution. Government operates 22 well fields. On average, there are 30 production boreholes per well field. Each well field has a number of boreholes which monitor the yields, water levels and quality.

DWA has a computerised well-field database (WELLMON) and its water quality division monitors the water quality (for example organic pollution, NO_3, TDS and pH). There are 25,000 officially registered boreholes of which over 10,000 are government owned (SMEC and EHES, 2006).

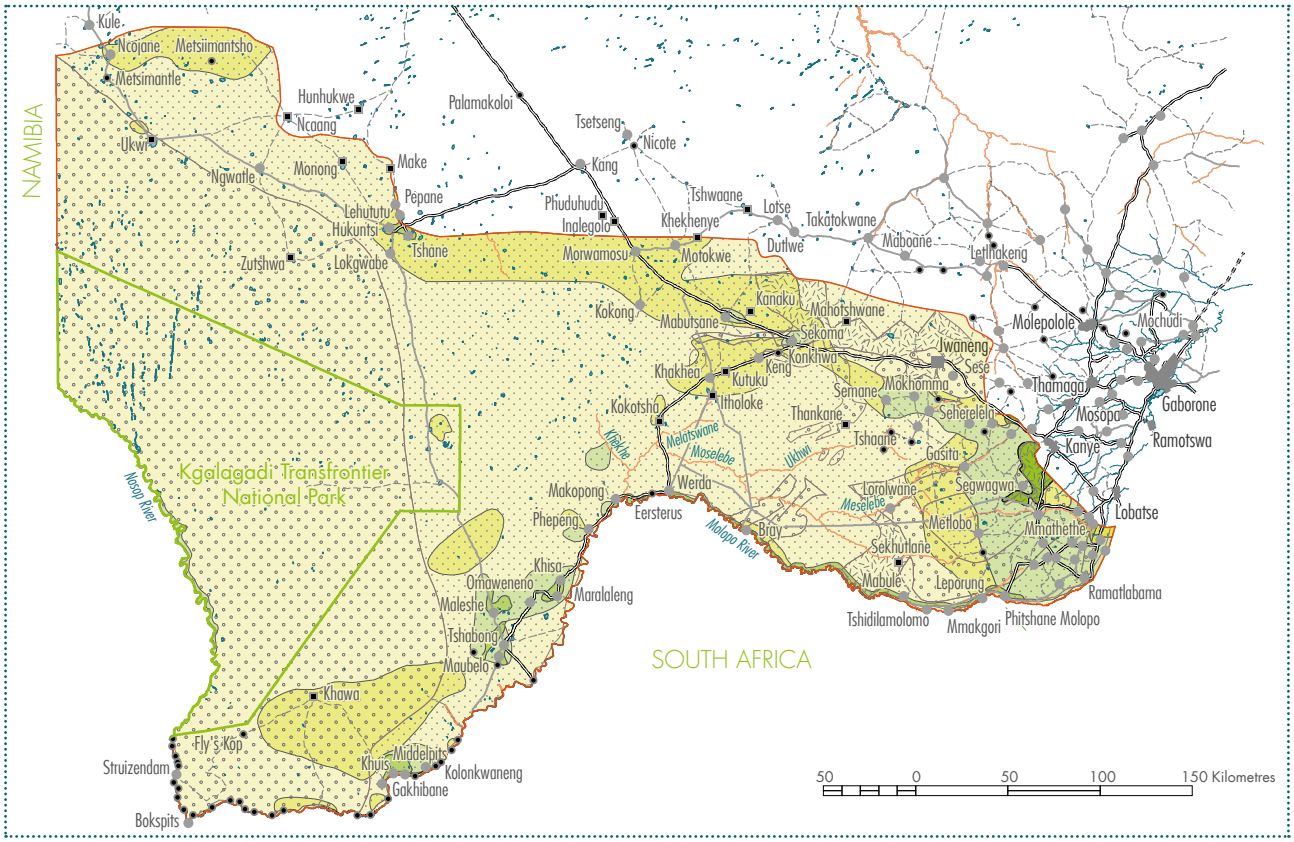

Figure 3: Groundwater vulnerability map
Source: Debswana, from data provided by the Department of Water Affairs (boreholes) and the Department of Surveys & Mapping (rivers, roads, settlements & waterbodies)

A dry pan in the Kalahari Desert.

4.3 LAND DEGRADATION

Land degradation is a serious problem in Botswana, the major causes being overgrazing, fires, erosion and deforestation, factors which are driven by poverty and increasing population pressure. Considering the socio-economic importance of access to productive land for the majority of the population, it is critical that land resources are protected and managed in sustainable ways.

One of the factors causing land degradation is that the Department of Lands has authority to allocate and manage land but generally does so without consideration of water, sanitation, agriculture or waste management at local level. There is limited concern for water when land is being allocated: this is the main concern for potential rangeland degradation (Swatuck, 2004).

The issue of overstocking and lack of livestock management in the basin has resulted in overgrazing of the rangeland areas and bush encroachment in many areas, loss of soil and nutrients into rivers and out of the ecosystem, and a decrease in the overall productivity of the habitat.

Land degradation of the communal areas in the basin is also attributed to overstocking and lack of livestock management: the area is covered with Kgalagadi desert sands up to 100 m deep which have poor water retention capacity, low nutrient levels and organic matter content, and are marginally productive. Consequently, livestock graze in areas with more palatable and nutritious grass over extended periods which eventually leads to degradation of pastures.

The issue of drought being an endemic and recurring natural hazard in the area poses serious problems, because large areas are degraded as livestock frequently move to the areas with good pastures. Meanwhile, the severity and extent of drought is difficult to predict due to the absence of a fully established monitoring system in the area, and this may inhibit preparedness of farmers and community members.

The problem of land degradation has led to the problem of sand dune movements, especially in residential areas. In areas where the water table is low, the sand dunes

increase the depth of the water table by increasing the sand cover making it more difficult to access the limited groundwater resources. Veld fires, which occur seasonally in Botswana, destroy the vegetation that would otherwise help to bind the soil together, and the land is consequently left bare and susceptible to erosion.

Therefore, the basin area's land degradation issues, associated with the growing livestock industry, are resulting in water scarcity and the disappearance of pasture land. This is further exacerbated by the spread of the invasive *Prosopis* (an aggressive plant invader and competitor that negatively affects biodiversity as its roots usually lead to reduced forb and grass cover which, due to its thickets, causes reduction of the available grazing area, livestock carrying capacity and limited access to watering points).

4.4 SUSTAINABLE NATURAL RESOURCES USE PRACTICES FOR LIVELIHOODS IMPROVEMENTS

One of the main threats to Botswana's natural resources is habitat destruction and reduction. This is due to a variety of factors, including direct destruction through infrastructure development, damage caused by pollution and unsustainable land and resource use, including unsustainable rangeland management resulting from localised overgrazing and bush encroachment, overharvesting and excessive water abstraction.

Botswana has three main categories of land tenure: state land, freehold land and tribal land, which account for 25 per cent, 5 per cent and 70 per cent of the country's area, respectively. Tribal land, also called communal land, comprises pastoral, arable and residential land administered by the land boards in terms of the Tribal Land Act. Batswana are entitled to use communal land for residential, commercial or agricultural purposes, and the responsibility for allocation and regulation lies with local land boards. Water rights are granted through the Boreholes Act and borehole ownership. Tribal land gives the owner de facto rights to the surrounding grazing land, as well as woodland and veld products.

Permission from the Land Board is required for sinking a borehole or digging a pit well. To avoid crowding of boreholes, and therefore of settlements and cattle posts, a general rule of 6 km between new boreholes or livestock watering points is applied. However, following this rule has not been easy in most parts of Botswana as borehole siting is dictated by other factors, including availability of water and land ownership.

The basin area consists mainly of tribal land surrounded by state land in the form of the Kalahari Transfrontier Park, wildlife management areas (WMAs) and some Tribal Grazing Land Policy (TGLP) ranches. The main land use, as permitted by land tenure, is therefore rural with the majority of the population depending on livestock and natural resources for their livelihoods as well as a range of government welfare and development programmes, including the Remote Area Development Programme (RADP), the Old Age Pension, World War II Veterans' Allowance, Destitution Policy, Orphan Care Programme and Home-Based Care Programme.

Botswana's unique environment and abundant wildlife give it a natural advantage in nature-based tourism. The sector has strong future potential, particularly as it is increasingly being perceived as an engine for economic growth. Botswana's tourism industry is expected to generate USD1.62 billion in economic activity according to the latest Tourism Satellite Account Report produced by the World Travel and Tourism Council. According to forecasts, tourism already contributes to over 19 per cent of total employment and some 16 per cent of GDP.

To move this sector closer to its potential, in 2007 Botswana updated its travel and tourism policies and is undertaking a series of actions (for example, sub-leasing of

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A carefully-tended vegetable garden in the Kgalagadi District

community safari concession areas and selling of annual wildlife hunting quotas) designed to open up development opportunities for the rural poor while maintaining an ecological balance. However, recent studies and interviews with stakeholders confirm that three predominant reasons are contributing to limited economic performance and investments: (i) the absence of large international investments capable of driving high value markets and building local supply chains; (ii) the high input costs and poor levels of service, as well as immigration and customs constraints; and (iii) the high prevalence of HIV/Aids among adults which has had a debilitating effect on the workforce and could potentially jeopardise the future development of the travel and tourism industry.

Environmental changes and the expansion of the livestock sector has compromised the tourism and wildlife utilisation potential of the basin area rangeland. Rangelands are being overexploited to meet the needs of vulnerable communities with limited efforts to develop alternative livelihoods, including tourism and other businesses.

4.5 NATIONAL PLANS ADDRESSING PRIORITY CONCERNS

International context

The SAP is developed against the background of international agreements. Since the Botswana Action Plan is consistent with the SAP, these international agreements have been considered in the formulation of the Botswana Action Plan. Botswana is party to numerous international treaties and instruments on the environment, such as the Rio Declaration, the United Nations Convention on Climate Change (1992), the Convention on Biological Diversity (1992), the Revised Protocol on Shared Watercourses in the Southern African Development Community (SADC) (2000), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Basel Convention on Transboundary Movements of Hazardous Wastes.

National context

This section highlights the policies and strategies that have been formulated at the national level to address the national concerns which are also the priority environmental issues for the Botswana Action Plan.

National development plans and policies

Botswana has started the process of developing comprehensive strategies and action plans for the promotion of sustainable management of its natural resources with, for example, the National Action Programme to Combat Desertification and the National Biodiversity Strategy and Action Plan (NBSAP). As a water scarce country, Botswana is implementing a water demand management strategy which was recommended in the National Water Master Plan Review of 2006. This included the construction of a water transfer scheme known as the North–South Carrier Project. This pipeline carries raw water about 400 km from Letsibogo Dam in the northern part of Botswana to Gaborone in the southern part of the country.

Phase 1 was completed in 2001; once completed, Phase II will duplicate the pipeline to carry water from the recently completed Dikgatlhong Dam (2012). The North–South Carrier Project has improved the water supply situation in Botswana and the government's future plans include extending the pipeline to deliver water from the Zambezi basin.

The country still depends on groundwater but further supply of groundwater is only considered feasible in areas not yet fully investigated, and therefore groundwater exploration is a continuous activity until the entire country is covered and documented. At the same

time, the mining sector will increasingly explore the use of non-potable (polluted or saline) groundwater for mining processing (CAR, 2013).

The national Water Policy (2013) represents the first step in a continual process to ensure that water is properly utilised to meet the current and future needs of the nation and its people. Adoption and full implementation of the National Water Master Plan Review, Water Conservation Policy, protection of water resources, the IWRM Policy and other strategies are critical. To this end, development of the national Water Policy and review of the Water Act are under way.

Furthermore, the water accounting component of the natural capital accounting programme implemented in cooperation with the World Bank, Wealth Accounting and Evaluation of Ecosystems Services (WAVES) will provide information about water supply and use (flow accounts), as well as costs and revenues (monetary accounts) to improve the management of the resource. The information will assist in monitoring the implementation of the IWRM principles, the Botswana National Water Master Plan and the Water Policy. Water management strategies in the area have failed as various institutions and/or developmental projects have been working in isolation.

A further 60 laws and regulations relevant to the reform have been identified for review in the next two years. These include the enactment of the Water Act.

In addition, during NDP 10, a process to start the second review of the plan will be undertaken. The introduction of reforms towards the development of water accounts through international partnerships is planned. The International Union for the Conservation of Nature with regional partners (the Global Water Partnership Southern Africa, the Kalahari Conservation Society and the Desert Research Foundation of Namibia) and the partnership between the Botswana Government and the Swedish International Water Institute are also implementing three projects to address concerns of the basin. These are:

- *The Kalahari–Namib Project:* Enhancing decision-making through interactive environmental learning and action in the Molopo–Nossob River basin in Botswana, Namibia and South Africa.
- *A Water Secure Future for Southern Africa:* Applying the ecosystem approach in the Orange–Senqu basin.
- *Botswana and the Swedish International Water Institute:* Two-year capacity building partnership financed by the Swedish International Development Cooperation Agency and the Botswana Government for BWP1,000,000. The partnership was a result of the water sector restructuring exercise that saw major changes in the capacity of the department. This capacity building is motivated by Botswana's goal to be world-class in research and development capacity in order to address its water-scarcity related challenges and further the goals of economic growth, diversification and poverty eradication.

Under the Remote Area Development Programme, the water sector will continue to provide water for human consumption and livestock for the remote area communities, including a number of villages identified in the basin area. There will also be concerted efforts to establish rainwater harvesting schemes in settlements. These plans and other economic initiatives will have an impact on available water in the area. Additional supporting initiatives include the Ipelegeng Programme (a government scheme for unemployed people to do casual work in their community area) and housing schemes for the needy.

Ipelegeng's backyard gardening initiative commenced in January 2011 and covers 15 constituencies. The basin area is benefiting from alternative packages which have also been rolled out since the beginning of the 2011/12 financial year. These include poultry, small stock, pig breeding, bee-keeping, handicrafts, agro-processing and bakeries.

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Cisterns constructed in ephemeral pans in Zutshwa under the UNDP–GEF Strategic Action Programme have helped to prolong the availability of these water sources.

Prosopis is an aggressively invasive alien plant of ephemeral watercourses in southern Botswana.

In May 2012, Botswana convened and hosted the Summit on Sustainability in Africa, leading to the Gaborone Declaration. The Declaration aims to 'ensure that the contributions of natural capital to sustainable economic growth, maintenance and improvement of social capital and human well-being are quantified and integrated into development and business practice'.

In implementing the Declaration, several activities contribute to the action areas highlighted in the summit which cut across both environmental and non-environmental sectors.

Environmental laws and policies

Botswana has a comprehensive list of environmental laws that are implemented by a number of ministries and departments. An overarching Environmental Management Act is expected to be promulgated soon, while a legal instrument to guide the performance of environmental impact assessments has been approved (2012).

The environment sector will continue with the implementation of the National Biodiversity Strategy and Action Plan (NBSAP) and the Community-Based Natural Resource Management Programme (CBNRM). The latter is meant to encourage community participation in conservation strategies to promote sustainability of resources. The NBSAP is currently under review and this will enable incorporation of current issues on biodiversity and strategies to involve different stakeholders in biodiversity conservation. Furthermore, strategies geared towards conservation, such as tree planting, land rehabilitation and forest inventories, will continue.

The sector has also established a National Environmental Fund (NEF). This financing mechanism is meant to ensure access to sufficient resources to maintain and enhance the environmental activity agenda, especially where it concerns civil society involvement.

The National Strategy for Sustainable Development, the National Energy Policy and the Land Infrastructure Servicing Policy will be formulated and the implementation of the Land-Use Policy and the Wildlife Policy will be intensified. The Mines and Minerals Act will be amended to address mine closure and rehabilitation, and illegal mining. The sector will further continue to identify, survey and rehabilitate old mine sites.

The strategy during the remainder of NDP 10 will be to implement measures to promote re-use, recycling and reduction of water use in all sectors of the economy. These measures will include rainwater harvesting, control of loss through evaporation, wastewater and greywater recycling and water pricing. Efforts towards improved valorisation and utilisation of natural resources and ecosystems will be supported by natural resource accounting activities for water, energy, land and tourism.

The main focus in the remaining years of NDP 10 will be to develop a national Climate Change Policy and a comprehensive national Climate Change Strategy and Action Plan to facilitate effective implementation, adaptation and mitigation of intended actions countrywide. Integrated environmental pollution prevention and control policies and legislation will also be developed.

Efforts are being made to engage enforcement officers on a temporary basis to ensure that the existing Waste Management Act is followed by all waste generators. In addition, the emphasis on recycling rather than disposal will be pursued through the implementation of the solid waste recycling guidelines. The involvement of the private sector will also be considered in the entire waste management chain. It is anticipated that waste deposited into landfills will greatly reduce and communities will earn a living from waste recycling.

Over 120 sectoral officers, including planners, have been trained in environmental economics principles and methodologies with the intention of integrating these concepts

While the ephemeral rivers that cross southern Botswana do not carry much water, they support trees, which provide a valuable source of fuel and fodder. Here, a woman gathers firewood near the settlement of Vaalhoek in the Kgalagadi District of Botswana.

into the development planning activities. It is the expectation of the Department of Environmental Affairs that planning for NDP 10 will demonstrate that planners in all ministries have received training in natural resources accounting.

The government is using the Ipelegeng Programme to control the *Prosopis* with the hope of eventually eradicating it.

The following projects will be implemented through the Government of Botswana–United Nations Development Programme Operational Plan:

- strengthened institutional systems and processes for environmental assessment, implementation and monitoring;
- national strategy on sustainable development;
- increased access to clean energy services and energy efficiency;
- guidelines for CBNRM policy implementation.

Table 4: Government departments responsible for environment and natural resources management

Department	Mandate
Department of Meteorological Services	Provides quality weather and climate data and information to enable timely and informed decisions in circumstances where weather plays a significant role.
Department of Environmental Affairs	Coordinates activities relating to sustainable development within the country.
Department of Waste Management and Pollution Control	Provides policy direction and leadership in matters relating to sanitation and waste management, and facilitates sectoral coordination among stakeholders.
Department of Tourism	Responsible for the promotion and development of tourism in Botswana and for the formulation and implementation of strategies and policies related to tourism.
Department of Wildlife and National Parks	Ensures the management and effective use of the wildlife resources.
Air Pollution Control Division	Scientifically determines the state of the environment, including air and water quality, and enforces appropriate legislation.
Department of Forestry and Range Resources	Promotes the sustainable management of the country's forestry resources.

The environmental keynote paper for the NDP 10 Review (2012) advised that the NDP 10/DDP 7 Review should make reference to the Urban and Rural Local Authorities Key Issues Papers (LAKIPs) produced for the NDP 10 planning period as the rural

areas of Botswana experience a variety of environmental problems. These indicate local authoritys' ongoing plans to address the concerns identified by the Botswana Action Plan.

The reviews below had to take this into consideration as these divergent comparative advantages will enhance diversity and specialisation in rural development in the future. Therefore one-size-fits-all developmental planning was limited. Table 5 highlights the comparative advantages in the basin districts as well as resource management issues that could inform development planning at the local authority level.

Table 5: District comparative advantage and environmental resources use issues

Issues	Kgalagadi	Southern	South-east district
Comparative advantage	• Wildlife management and ranching as an alternative land-use system • Veld products	• Cattle ranching	• Proximity to South Africa lends this district to the development of tourism facilities as has happened in Madikwe in South Africa, as well as development of facilities in major centres, such as Gaborone and Lobatse
Land resources	• Land-use conflicts (WMAs and livestock grazing) • Land degradation	• Dual grazing rights • Communal area overgrazing • Shortage of serviced plots	• Shortage of grazing land • Land degradation
Water resources	• Inadequate water supply • Salinity of water resources	• Limited surface water resources	• Ramotswa well fields
Use of other resources	• Harvesting of veld products, such as devils claw	• Deforestation • No compensation for injury by wildlife	• Illegal abstraction of riversand and gravel • Illegal harvesting of veld products and live trees • Poaching • Wildlife-farming conflicts • Lack of community involvement in eco-tourism
Pollution	• Potential pollution from tourist facilities and vehicles	• Littering from major villages	• Pollution of groundwater and surface water • Illegal dumping of solid waste • Air pollution from land fill • Littering
Others	• Conflicts between natural resources use and mining • Veld fires	• Veld fires threaten cattle ranching	• Veld fires • Lack of stormwater drainage

Source: LAKIP (Environmental Keynote Paper for NDP 10 Review, 2012)

4.6 KNOWLEDGE GAPS AND OTHER CONSTRAINTS

Effective policy implementation is necessary in the basin area. Policy implementation requires concerted efforts by all role-players, hence there is a need to undertake measures to strengthen stakeholder linkages and to achieve the same level of understanding and a broader perspective on planning across policy implementation actors.

Departments with related functions need to plan activities together in order to reduce costs of implementation, which could be shared. Therefore scenario and landscape planning approaches are recommended, i.e. overarching district and local level plans that would guide all developmental processes in the basin. The resultant plans would be in the form of localised IWRM Plans, participatory integrated land-use and management plans (PILUMPs) and forums for integrated resource management, depending on the capacity and resources of the various institutions.

As stated in the Government of Botswana–United Nations Programme operational plan (2010–2014), environmental sustainability is central to many of Botswana's core development issues, including the exploitation of mineral resources; the use and re-use of scarce water resources; the potential for renewable energy generation, most notably solar; and the development of the cattle industry and arable agriculture. The future of tourism is also dependent upon the maintenance of Botswana's considerable wildlife resources and finely balanced ecological zones, such as the Okavango Delta, the Makgadikgadi Pans and the Kalahari Desert. Environmental sustainability in natural resource management is particularly important to ensure the future viability of various economic activities through CBNRM, with the aim of raising incomes in the rural areas, thus reducing poverty (CCA, 2007). Therefore, there is a need for the various participants to pursue coordinated planning for environmental sustainability and livelihoods improvements.

Furthermore, capacity at rural levels for development planning requires scaling up to meet the expectations of the policy. Important investments in rural planning capacity include those in which community institutions were associated with the implementation of the CBNRM policy, i.e. developed natural resource-use plans and received training in inclusive governance, commercialisation of local resources and biodiversity conservation. Currently, CBNRM policy implementation is riddled with challenges due to a lack of trained and experienced extension service staff, among other things. Community-based organisations need guidance to govern their operations to the satisfaction of all stakeholders, particularly government, as they own the natural resources.

Martial eagle (*Polemaetus bellicosus*)

5. THE ACTION PLAN

5.1 ACTION PLAN DEVELOPMENT PROCESS

The Action Plan in each country is structured around the four environmental priority areas of concern identified in the TDA: increasing water demand, declining water resources quality, changes to the hydrological regime and land degradation. Through the Action Plan consultation process, each country prioritised four areas of concern from its national perspective. In response to each priority area of concern, national targets were set to address these concerns over a ten-year time period. Interventions were then identified to meet the targets. In line with national policies, strategies and plans, project concepts were developed that package the proposed interventions into structured, implementable projects. These project concept notes (PCNs) form the backbone of each Action Plan.

The Action Plan development process involved intersectoral dialogue to achieve integration of water resources management and, most importantly, national endorsement of the Action Plan. Action Plans feed into the SAP but are independent planning products and their success depends on receiving full support of both state and non-state stakeholders. In practice this means that the political and technical guidance for the Action Plans comes from the countries, through an Action Plan Working Group as well as a broader National Stakeholder Platform, each structure specifically set up for the purpose of Action Plan (and SAP) development.

While it is part of the national stakeholder forum, the Action Plan Working Group is smaller in size (between five and eight members), comprised mostly of individuals holding positions in government related to water, planning and finance. Each country's delegate to the Orange–Senqu River Commission (ORASECOM) Technical Task Team was appointed as the national coordinator of the Action Plan/SAP process for their country. With support from the consultant team, the Action Plan Working Group was primarily responsible for the development of the Action Plan (and the SAP, together with the Action Plan/SAP Working Groups from the respective other countries) and provided the technical and political guidance for the formulation of the Action Plan.

The National Stakeholder Platforms consist of stakeholders representing a wide range of role-players, including both state and non-state participants. While established initially for the purposes of Action Plan/SAP development, the aim is that the National Stakeholder Platforms and the Action Plan Working Groups are maintained in the long term and become permanent national partners with ORASECOM.

Two workshops of the National Stakeholder Platform were held at national level in each country, in addition to regular meetings of the (smaller) Action Plan Working Groups. Furthermore, the Action Plan Working Groups from the four basin states met collectively three times throughout the process, forming the regional Action Plan/SAP Working Group. This served to ensure synergy between the four Action Plans, as well as joint development of the SAP as the basin-wide planning document.

In addition to the National Stakeholder Platforms and Action Plan/SAP Working Groups, there were other key role-players in the Action Plan/SAP development process. The ORASECOM Secretariat and the United Nations Office for Project Services (UNOPS) provided important political and technical guidance to the process. Likewise, regular information exchange and coordination with other ongoing initiatives (notably the Orange–Senqu Basin IWRM Plan development process) took place in order to ensure technical coherence and harmonisation of the Action Plans (and SAP) with the Orange–Senqu Basin IWRM Plan.

Opposite page and above: Constructing cisterns to prolong the ephemeral water sources of seasonal pans, and protecting these with fences, has been piloted by the UNDP–GEF Orange–Senqu Strategic Action Programme in Zutshwa.

© Stefkuna/Panoramio

Large tracts of land are under extensive livestock farming largely dependent of groundwater sources. To make farming economical in this arid environment, the farms are necessarily large and often remote.

5.2 ACTION PLAN RATIONALE

In response to the problems identified at transboundary level and the priority areas of concern identified at national level, four thematic areas were developed for the Botswana part of the Orange–Senqu River basin. The priority areas are closely interlinked because of the integrated nature of the natural resources being managed and the common goal for management of the Orange–Senqu River basin as a whole. The Botswana Action Plan plan comprises Botswana's specific actions to ensure its objectives are met, as well as the creation of national conditions to meet the SAP's objective.

5.3 ACTION PLAN OBJECTIVES, OUTCOMES AND INTERVENTIONS

The overall objective of the Botswana Action Plan is to identify actions and activities with a view to resolving the problems and threats to the integrity of the river basin, at national level, in order to promote sustainable management and development of the Orange–Senqu River basin. This overall objective will be achieved through a set of four thematic areas which include:

Thematic area 1: Increasing water demand
Thematic area 2: Declining water resources quality
Thematic area 3: Land degradation
Thematic area 4: Sustainable natural resources use practices for livelihoods improvements

The proposed interventions for each thematic area are discussed in the Botswana Action Plan on pages 37 to 39.

Thematic area 1: Increasing water demand

There are few sources of water remaining to be developed in Botswana, leading water development authorities, including the Ministry of Agriculture, to consider water demand management as a development option. This requires an integrated water resource management (IWRM) approach, which shifts away from exclusively supply-oriented strategies and considers demand management options for water resources. There have to be deliberate efforts to create awareness of water demand management. To address this situation, a number of activities, including research, have been recommended in the Botswana IWRM Water Efficiency Plan (2013):

- promotion and use of non-conventional water supply sources: treated effluent (estimated to be 73 Mm^3 in 2030);
- increased use of saline and polluted groundwater and rainwater harvesting;
- reduced water wastage among water consumers;
- negotiations for fair and equitable as well as sustainable water abstractions from shared water resources (CAR, 2013).

Thematic area 2: Declining water resources quality

The basin area in Botswana suffers from water quality problems. Groundwater is often saline and there are limited boreholes to provide adequate quality water for livestock watering and other uses. Coupled with limited options for additional supply to be developed, this necessitates an integrated water resource management and comprehensive water demand management approach, including water re-use and protection of groundwater from pollution. Jwaneng mine is in the basin and could be a good pilot for using saline/wastewater. Saline water has been found at a distance of more than 200 km away.

Thematic area 3: Land degradation

In the Botswana part of the basin, it is generally agreed that the causes of land degradation are overexploitation (increased livestock densities accompanied by crowding of livestock watering points and veld product harvesting), fragmentation of habitats, introduction of alien species (*Prosopis*), limited access to livestock markets, inappropriate policies and climate change.

Considering the socio-economic importance of access to productive land for the majority of the population, it is critical that the land resources are protected and managed in a sustainable way. The Action Plan therefore promotes sustainable land-use practices, which allow for development without damaging ecological processes or reducing biological diversity.

The threat posed by climate change means that stresses caused by water scarcity and land degradation will worsen. Without doubt, the poor and most vulnerable will be those most severely affected by climate change in Botswana. The challenge is therefore to ensure appropriate coordination and harmonisation between government departments to develop preparedness to tackle climate change through adaptation measures. Such measures could include use of drought resistant eco-tourism activities in the area as suggested during the Action Plan stakeholder consultation process. An integrated land-use management plan is urgently needed to assess different development scenarios in terms of their water-use efficiency and drought resistance in order to optimise land-use planning and development.

Thematic area 4: Sustainable natural resources use practices for livelihoods improvement

Effective and efficient land and environmental management must be guided by sound land-use planning. In line with government objectives for optimising land resources utilisation, a number of land-use plans were prepared for various districts to ensure the best use of land and reduce land-use conflicts. Communities have further developed community plans under the CBNRM programme. The main purpose of CBNRM is that the value of natural resources should be maximised for the local people. These communities are given proper skills enhancement, empowerment and incentives (revenues from resource utilisation) to assist them to successfully use natural resources, such as wild animals, forestry, landscapes and cultural sites, and their products, like fruits, leaves, honey and roots. This is in accordance with the Gaborone Declaration Action Statement, which calls for the integration of the value of natural capital into national accounting and corporate planning and reporting processes, policies and programmes.

The primary form of land use of WMAs is biodiversity utilisation with agriculture and other forms of land use being secondary. All the WMAs in Kgalagadi are designated for CBNRM-related activities which have been geared towards wildlife utilisation, mainly through joint venture partnerships. It is however worth noting that due to disjointed development policies and sectoral planning by various stakeholders, other land-use forms have encroached into the WMAs, most noticeably agriculture, thereby exacerbating the human–wildlife conflict issues/incidents. As a result, affected communities have tended to develop negative attitudes towards wildlife, which threaten the viability of CBNRM activities. Wildlife can exist in the harsh conditions in the area and could do better than other land uses if promoted and managed properly. Therefore, concerted efforts should be made for the CBOs/Trusts in the area to benefit from wildlife.

While the area is never likely to rival the Chobe and Okavango as a prime tourism destination, it has potential in that it has unique scenery, and the presence of wildlife and diverse ethnic groups have the potential to support a substantial tourism industry

Having disappeared from large tracts of lands outside protected areas due to poisoning, the spectacular bateleur eagle, *Terathopius ecaudatusis*, is commonly seen gliding above open Kalahari savannahs and on the ground at pans in the Kgalagadi Transfrontier Park.

based on photographic tourism and eco-tourism. Areas with magnificent sand dunes also add value to the tourism product.

The manufacture and sale of crafts represents a major household income-earning opportunity generated by tourism. Craft-making skills are widespread in the project area, and there is a need to provide capital resources as well as assess risks involved in promoting craft production and marketing.

5.4 ACTION PLAN IMPLEMENTATION, COORDINATION AND MONITORING

The Botswana Action Plan has been designed as a portfolio of project concepts. Funding is sought for each project, either individually or for a combination of projects. Potential funding sources are primarily national governments, international cooperation partners and, to some degree, the private sector.

In line with the project approach to the Botswana Action Plan, implementation is not through a central implementation agency responsible for the entire Action Plan. Instead, implementation is project-specific and the implementation mechanism is dependent on the requirements of the lead implementing agent for each respective project. A proposed implementation mechanism at project level is described in each project concept note.

Overall coordination and monitoring of the Botswana Action Plan is through the relevant government line ministry(ies) using their established structures and systems. Therefore, close collaboration with ORASECOM is necessary to ensure synergy in coordination and monitoring of the implementation of Action Plan (and SAP) activities in the four basin states.

Table 6: Botswana Action Plan

Targets	Proposed interventions	Project concept note	Ongoing initiatives	Policies/strategies/plans/ programmes
PRIORITY AREA 1: INCREASING WATER DEMAND				
Objective: Optimal use of available water for sustainably improved livelihoods				
Improved availability and utilisation of water through alternative water-use options (water recycling, water re-use, etc.)	• Reduce water loss and wastage • Transboundary and intra- and inter-basin water transfer • Reduce water demand • Stormwater and rainwater harvesting • Audit of existing well fields and review use of idle boreholes. Consider connecting idle boreholes to augment supply	PCN 1: Improving water use for future generations PCN 2: Improved fresh water availability and knowledge of groundwater potential	• Middlepits cross-border water transfer • Lesotho Highlands Water Scheme • Magagarapa Water well fields • North–South Carrier (Kanye) • Kang well field (Mabutsane) • Matsheng well field (northwestern part of basin) • Tsetseng saline well-field potential to supply water to Jwaneng mine • Educational campaigns	• National Water Master Plan Review • The national Water Policy • Water Conservation Policy • National IWRM Water Efficiency Plan • Review of the Water Act • Wealth Accounting and Evaluation of Ecosystem Services (WAVES)
Groundwater resources potential defined	• Further groundwater assessment required through exploration, drilling and testing; assessment of the groundwater flows • New aquifer potential maps showing sustainable yields and water quality • Identification and development of saline groundwater potential for all sectors including desalination for potable water supply • To prioritise water use per sector	PCN 2: Improved fresh water availability and knowledge of groundwater potential SAP PCN 2: Groundwater management and use	• UNESCO transboundary aquifer study	• National Water Policy • National IWRM Water Efficiency Plan • IWRM Water Efficiency Plan • Draft Water Policy
Water use effectively and efficiently integrated to support improved food security and employment opportunities	• Wastewater for agricultural use from existing treatment plants (Jwaneng, Tsabong (prisons) and Goodhope) and sites where there is potential for treatment plants (Kanye, Tsabong, Hukuntsi) • Study and introduce biosaline agriculture	PCN 4: Treatment and re-use of wastewater		• Waste Management Act
PRIORITY AREA 2: DECLINING WATER RESOURCES QUALITY				
Objective: Water resources quality improved				
Effluent discharge reduced	• Waterless technologies and low volume flush systems • Grey water and black water treated effluent re-use • Water conservation and preservation techniques • Determine the link between effluent discharge and groundwater quality	PCN 4: Treatment and re-use of wastewater		• Waste Management Act
		PCN 2: Improved fresh water availability and knowledge of groundwater potential		• Water Conservation Policy • National Water Policy

Targets	Proposed interventions	Project concept note	Ongoing initiatives	Policies/strategies/plans/programmes
Involvement of private sector in the entire water and waste management chain	• Review ongoing WUC plans for privatisation of waste (sewage) disposal • Fully enforce by also including private sector Waste Management Act • Local authorities to develop and implement waste management guidelines for solid waste management • Private recycling initiatives to be introduced including institutions, community centres, etc.	PCN 4: Treatment and re-use of wastewater		• IWRM Water Efficiency Plan • Waste Management Act
Aquifer vulnerabilities assessed and mapped and well-field zoning/protection enforced	• Audit/inventory point sources of pollution and identify risk to existing and potential new well-field water supplies • Implementation of recommendations of physical well-field protection zones • Requirement for mandatory cooperation between land boards and DWA with regard to future land-use plans	PCN 2: Improved fresh water availability and knowledge of groundwater potential SAP PCN 2: Groundwater management and use		• Water Policy • IWRM Water Efficiency Plan
Technologies for more efficient and minimal use of potable water for industrial/mining processes implemented	• Memorandum of Understanding between large water users (mines, heavy industries, etc.) and universities/research institutions • Department of Research and Technology to look at current developments, best practice, process technology, paste thickening • Research on appropriate use of non-potable water for uses, such as mining, construction, agriculture	PCN 4: Treatment and re-use of wastewater		• Water policy • Ipelegeng – government scheme for unemployed to do casual labour
PRIORITY AREA 3: LAND DEGRADATION				
Objective: Land degradation halted				
Nutrient recycling from wastewater implemented	• Packaging best agricultural practices, e.g. nutrient recycling method, etc.	PCN 3: Conservation and sustainable land management	• Sunnyside Dairy Farm and Lobatse recycling projects ongoing	• NDP 10 Review
Spread of alien invasive species controlled	• Adopt and implement existing *Prosopis* control measures • Establish port health and quarantines systems	SAP PCN 5: Control of alien invasive species	• Removal of *Prosopis* with integrated approach (biological, physical and chemical) in collaboration with Kalahari–Namib/EC project	• Action Plan for Combating Desertification
Grazing systems implemented	• Revive community-based inventory rangeland monitoring land system • Water reticulation to grazing areas		• Department of Wildlife and National Parks management-oriented monitoring systems	• (Conservation Agriculture) NAMPAADD • Livestock management and infrastructure development
Degraded areas reforested with indigenous plants	• Expand the sand dune stabilisation project to other areas • Proper management of woodlots • Promote youth re-forestation projects through YDF, FCB and NEF • Identify and map degraded areas	PCN 3: Conservation and sustainable land management	• BORAVAST and Khawa • Woodlot projects ongoing • Area mapping ongoing	• NBSAP • CBNRM Policy • Forest Act
Integrated dry land resilience programme developed and implemented	• Comprehensive disaster management • Development of climate change policy, strategy, adaptation and mitigation		• Climate change policy development • Action Plan	• NDP 10 Review • Climate Change Policy

Targets	Proposed interventions	Project concept note	Ongoing initiatives	Policies/strategies/plans/ programmes
PRIORITY AREA 4: SUSTAINABLE NATURAL RESOURCES USE PRACTICES FOR LIVELIHOODS IMPROVEMENTS				
Objective: Natural resources used sustainably for livelihoods improvements				
Community environment management plans developed and implemented	• Foster community-based natural resources management initiatives (CBNRM) • Identification of new income generation initiatives (eco-tourism) • Introduce appropriate conservation agricultural techniques, e.g. introducing rotational grazing, improving cattle health and meat yield and holistic farm management systems • Initiate and revive community camel projects	PCN 5: Integrated CBNRM for Kgalagadi District (Orange–Senqu basin (OSB))	• Capacity building and awareness raising on the shift from consumptive utilisation of wildlife • Water conservation • Revival of the Zutshwa salt project • Dorper sheep project in Struizendam • Sand dune stabilisation project in BORAVAST • Conservation agriculture (NAMPAADD) • Eco-tourism and training on use of camels and camel husbandry	• CBNRM Policy • Tourism Strategy
The revised Botswana Land-Use Policy adopted and implemented	• Develop strategy and action plan to implement the policy for the area	PCN 5: Integrated CBNRM for Kgalagadi District (OSB)	• Integrated farming • Kgalagadi small stock programme	• Botswana Land-Use Policy
CBNRM policy resourced and implemented	• Develop institutional framework for implementing CBNRM (structure, budget, focal institution) • Water harvesting in pans	PCN 5: Integrated CBNRM for Kgalagadi District (OSB) PCN 1: Improving water use for future generations	• Khawa Trust, Koinaphu Trust, Mahumo Trust, Nqwaa Khobee Xeya Trust and Qhaa Qing Trust and BORAVAST Trust • Rainwater harvesting in Khawa	• CBNRM Policy • Livestock management and infrastructure development
Economic and ecological valuation of ecosystems undertaken	• Prioritise scarce, critical and endemic resources for valuation • Initiate relevant payment for ecosystem services for future implementation	PCN 5: Integrated CBNRM for Kgalagadi District (OSB)	• Kalahari–Namib economic study ongoing	• Gaborone Declaration – Summit on Sustainability in Africa • Water Policy
Human–wildlife conflicts reduced	• Gazetting of WMAs • Establishing income generating tourism facilities for communities closer to the WMAs • Capacity development for community Trusts • Create a balanced human–wildlife conflict strategy • Tangible economic benefits related to tourism and wildlife communities adjacent to Pas • Implementation problem animal control (PAC) human–wildlife conflict guidelines	PCN 5: Integrated CBNRM for Kgalagadi District (OSB)	• National CBNRM forum training programmes • Dithopo game ranch (pilot)	• Wildlife and Conservation Act • CBNRM Policy • Wildlife Policy
Poverty eradication drives implemented	• Derive economic benefits from *Prosopis*	PCN 5: Integrated CBNRM for Kgalagadi District (OSB)	• Ongoing use of *Prosopis* for as fuel wood and also used as livestock feed	• Remote Area Development Programme (RADP) • Action Plan for Combating Desertification
Negative impact of human activity on biodiversity and surface and groundwater resources mitigated and expansion prevented	• Research on the impact of increased and improved water availability on human–wildlife conflict • Evaluate impact of cross-border animal migration in relation to water demand • Evaluate the impact of providing water to wildlife that no longer migrate due to blockage of migration routes	PCN 5: Integrated CBNRM for Kgalagadi District (OSB)		• NDP 10 • Wildlife and Conservation Act

This resident's bed is outside her home, as with the heat in the Kalahari, it is preferable to sleep outdoors in summer.

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ANNEXURE 1: RELEVANT LEGISLATION

With the advent of borehole technology in the 1960s, wells were replaced by boreholes and many pans have become ringed by sizeable human settlements making them less accessible to wildlife.

Acquisition of Property Act, Cap.32:10

Agricultural Resources Conservation Act, Cap.35:06

Aquatic Weeds (Control) Act, Cap.34:04

Atmospheric Pollution (Prevention) Act, Cap.65:03

Building Control Act, Cap.65:02

Diseases of Animals Act, Cap.37:01

Factories Act, Cap.44:01

Fencing Act, Cap.33:03

Fish Protection Act, Cap.38:05

Forest Act, Cap.38:04

Herbage Preservation (Prevention of Fires) Act, Cap.38:02

Industrial Development Act, Cap.43:01

Land Control Act, Cap.32:11

Locusts Act, Cap.35:03

Mines and Minerals Act, Cap.66:01 (this Act has been repealed by the Mines and Minerals Act of 1999)

Monuments and Relics Act, Cap. 59:03 (to be repealed by the Monuments and Relics Act of 2001, which is not yet in force)

Noxious Weeds, Cap.35:04

Plant Diseases and Pests Act, Cap.35:02

Public Health Act, Cap.63:01

Seeds Certification Act, Cap.35:07

Sleeping Sickness Act, Cap.63:03

Tourism Act No. 22 of 1992

Town and Country Planning Act, Cap.32:09

Tribal Land Act, Cap.32:02

Waste Management Act No. 15 of 1998

Water Act, Cap.34:01

Waterworks Act, Cap.34:03

Wildlife Conservation and National Parks Act No. 28 of 1992

ANNEXURE 2: PROJECT CONCEPT NOTES

PROJECT CONCEPT NOTE 1

CORE DATA	
Project number	Botswana PCN 1
Project title	Improving water-use for future generations
Action Plan priority area	Increasing water demand
Short description	The Botswana part of the Orange–Senqu River basin has serious water-shortage problems. This has resulted in the government putting various schemes in place to augment water supply in the area, mostly using groundwater.
PROJECT RATIONALE	
Background	Botswana faces a major challenge to sustainable development in the efficient utilisation of its scarce water resources to support further economic growth, diversification and the eradication of poverty. This is exacerbated by the country's semi-arid nature and low rainfall. The basin is the driest area of the country and receives only 250 mm rain on average per year. In addressing the problem of water shortage/demand, the Government of Botswana has drilled numerous boreholes in the basin, a significant number of which have highly saline water and/or low yields. Most of the basin area is used for agriculture - mainly livestock rearing. The most significant water demand is therefore for agricultural purposes and domestic use. In some areas of the Kgalagadi District, the Government of Botswana has erected water desalination facilities to reduce the salinity of the water for domestic purposes. Problems are encountered in the maintenance of these facilities, with respect to cost and personnel capacity.
Project objectives	1 To promote sustainable use of available water resources while improving livelihoods. 2 To promote integrated planning, development, management, utilisation and protection of intra- and inter-basin water resources.
Integration with relevant ongoing projects/ initiatives	Ongoing initiatives to reduce domestic consumption and wastage of water are the introduction of pre-paid water systems and the removal of automated sanitary systems. Poorly managed water reticulation systems contribute to water losses resulting in demands not consumed. Agricultural developments have been restricted due to insufficient and restricted availability of suitable water. In some parts of the basin, well fields are zoned and boreholes within these zones are protected to prevent them from pollution. Other initiatives in the area include a water transfer scheme from South Africa to Middelpits. The other planned or ongoing projects in the basin include: • establishment of the well-field protection zones; • mass water transfer schemes; • Lesotho Highlands Water Transfer Scheme; • Magagarapa well fields expansion; • North–South Carrier (Kanye); • Kang well field (Mabutsane); • Matsheng well field (north-western part of basin); • Tsetseng well field (saline) for Jwaneng mine; • Tsabong well field. In other parts of the country, the government has retro-fitted some of the public buildings that have been operating with automatic flushing urinals (Shoshong Secondary School, etc). Lessons from this could be used to inform the initiatives in the basin.
Project outcomes	1 Increased water-use efficiency. 2 Alternative sources of water harnessed. 3 Wasteful technologies eliminated.

Vegetated Kalahari dunes have become denuded of grasses through heavy grazing by livestock in areas close to settlements.

Technical approach	**OUTCOME 1: INCREASED WATER-USE EFFICIENCY** The project entails demand management and water conservation in the basin by all stakeholders. It recognises that the management of water demand hinges on both public awareness and technology investments for efficient water use within communities and industry, especially agriculture and mining. **Output 1.1 Water used efficiently** *Activities:* • Conduct baseline study to ascertain water demand in the basin. • Undertake regular technical and operation audits with a view to improving efficiency in water use. • Develop and apply guidelines on the application of water fit for purpose as part of the permitting system. **Output 1.2 Water conservation awareness strategy developed** The intension is to promote water conservation initiatives as efforts in the sector to promote conservation of the scarce water resources, water losses and wastage have continued unabated. *Activities:* • Undertake stakeholder analysis for targeting the campaigns. • Develop a communication strategy. • Develop targeted campaign materials. • Undertake education and awareness campaigns on water demand management initiatives across the basin. • Undertake evaluation to inform replication campaigns. **Output 1.3 Water supply increased** The intention is to address water shortages in the basin as most villages are at the limit of their resource availability. *Activities:* • Introduce water loss controls to reduce unaccounted for water/non-revenue water in the villages. • Enable timely responses to water leakages and maintenance of networks. • Expand existing water transfer schemes to water-scarce villages in the basin. **OUTCOME 2: ALTERNATIVE SOURCES OF WATER HARNESSED** The rationale is to encourage and promote the use of alternative sources of water, such as rainwater harvesting, for potable use and recycled effluent for non-potable uses. **Output 2.1 Incentives for use of alternative water sources implemented** *Activities:* • Develop a hierarchy of alternative water-use measures. • Promote the accepted measures to stakeholders. • Implement alternative water-use measures, with economic incentives, focused on promoting reduction, re-use, recycling and safe disposal, such as pre-treatment before disposal. • Formulate strategic development plans integrating water management within the broader spatial planning to explore options for conjunctive application. **Output 2.2 Sustainable techniques introduced to increase productivity in agriculture** *Activities:* • Support research, development and extension of affordable, appropriate and sustainable techniques for increasing productivity and application of emerging crops, irrigation technologies and livestock to improve water efficiency. • Build capacity within the agricultural sector in relation to water conservation and value-added business opportunities. • Develop mechanisms and incentives to improve irrigation technologies that will increase water-use efficiencies. • Exchange visits. • Water harvesting in pans. **OUTCOME 3: WASTEFUL TECHNOLOGIES ELIMINATED** The rationale is to introduce water controls to reduce unaccounted use of water. **Output 3.1 Improved technologies for efficient use of water** *Activities:* • Introduction of water conservation strategies in building codes. • Install prepaid water systems at public standpipes and pilot these at household levels. • Retro-fit all the automated water urinals in public/private institutions. • Develop and implement mechanisms to encourage the adoption of technologies that are more efficient and allow minimal use of water for industrial and commercial processes. • Use of reduction taxes for water-saving equipment compared to ordinary equipment that is not water saving.
Assumptions and risks	• National budgeting processes are able to contribute (budgetary allocations) to the delivery of the proposed projects. • Stakeholders and international cooperation partners participate in the basin development. • Willingness to adopt new technologies by community members.
IMPLEMENTATION	
Project duration	Five years
Project cost	USD6,000,000
Proposed funding sources	To be secured
Implementation mechanism	To be determined

PROJECT CONCEPT NOTE 2

CORE DATA	
Project number	Botswana PCN 2
Project title	Improved fresh water availability and knowledge of groundwater potential
Action Plan priority area	Declining water resources quality
Short description	Groundwater in Botswana is limited, both in quantity and quality, and is unevenly distributed over the country. The extractable volume of groundwater is estimated to be about 100 km^3. However, only a minute amount is rechargeable by rainfall due to the prevailing hydroclimatic characteristics and geological nature of the aquifers. This project seeks to provide understanding and knowledge on the potential of groundwater resources and how the relevant aquifers could be conserved and protected from potential pollution. It further looks at the use of desalination to bring aquifer water quality to potable standards.
PROJECT RATIONALE	
Background	Along its eastern corridor and in the northern parts, Botswana has water that is mostly of good quality, but towards the south-west, groundwater in the Orange–Senqu basin area is characterised by high salinity and often requires further treatment to meet standards for human consumption. Moreover, in some cases, due to over-abstraction, underlying saline water is drawn into a borehole of otherwise acceptable quality. In addition, water quality deterioration results from pathogens and nitrates from unlined pit latrines, cattle droppings, spillage of oils and lubricants at borehole points, and disposal of wastewater through soak-away systems. All of these factors cause overloading of the current desalination systems. A lack of skilled human resources and high maintenance costs mean that when installed, the systems work but effectiveness is not sustainable. There is also a need for an integrated water quality database. Water samples are collected monthly for major analysis and four times per month for microbiological analysis from operating well fields. There is need for a national spring monitoring network with water quality samples taken at each of the springs. The water quality database contains water quality analysis of surface and groundwater. DWA, WUC and the Department of Waste Management and Pollution Control have laboratory facilities for water quality analysis. The DWA and WUC labs are used for the analysis of freshwater while the DWMPC's one is typically for the analysis of wastewater samples. Wastewater samples are also tested at the WUC laboratory as part of the organisation's new mandate on wastewater management. Sanitary conditions have a large impact on surface and groundwater quality. The planned expansion of sewerage and treatment facilities should lead to improvements in groundwater quality. However, concerns remain. The most common household sanitary facility employed by the village populations located within the near vicinity of the rivers are pit latrines. In 1996, well-field abstraction was discontinued in Ramotswa village as seepage from pit latrines in the village caused nitrate levels to rise above the water quality standard (50mg/ℓ). Of the three aquifers in Lobatse, only the Pitanyane aquifer is active as contaminant problems have rendered others unsuitable for potable supply.
Project objectives	1 To provide water that is of good quality to communities and manage it in accordance with the obligations articulated in international, regional, bilateral and national standards. 2 To enhance understanding on the importance of groundwater. 3 To audit/inventory point sources of pollution and identify risks to existing and potential new well-field water supplies.
Integration with relevant ongoing projects/ initiatives	A UNESCO transboundary study seeks to assess the hydrologic movement of water in the aquifers that cross national boundaries. The results of the project will help to determine inter alia if water salinity in Botswana's part of the basin is due to cross-border flows. Aquifer protection zones will be part of the UNESCO study. The rehabilitation and installation of new desalination plants in the district by the Water Utilities Corporation in accordance with the ongoing Water Sector Reform Programme will add to this project.
Project outcomes	1 Low-cost desalination plants that are easy to operate and maintain. 2 The quantity and quality of groundwater resources in the basin determined.
Technical approach	**OUTCOME 1: LOW-COST DESALINATION PLANTS THAT ARE EASY TO OPERATE AND MAINTAIN** The area suffers from critical water shortages and water quality problems, and a comprehensive approach is required in which the elements would include coordination, operation and management of the infrastructure and understanding of groundwater resources. **Output 1.1 Improved infrastructure, particularly desalination plants** *Activities:* • Harness appropriate desalination technology that is affordable and easy to maintain to increase volumes of available potable water. • Identify and develop saline groundwater potential for all sectors, including desalination for potable water supply. • Use water conservation and preservation techniques. • Determine the link between effluent discharge and groundwater quality. • Promote community enterprises that arose out of re-using brine. **OUTCOME 2: THE QUANTITY AND QUALITY OF GROUNDWATER RESOURCES IN THE BASIN DETERMINED** **Output 2.1 Comprehensive groundwater monitoring system established and implemented to improve an informative underground water resources database trusted for its quality** *Activities:* • Audit of existing well fields and review use of idle boreholes. Consideration of connecting the idle boreholes to augment supply. • Undertake groundwater assessment through exploration, drilling and testing. Assessment of the groundwater flows across the basin. • Develop aquifer potential maps showing sustainable yields and water quality. • Audit/inventories point sources of pollution and identify risks to existing and potential new well-field water supplies. • Implementation of recommendations of physical well-field protection zones. • Improved and informative underground water resources database trusted for its quality. • Development of guidelines and training manuals and training for increasing human capacity.
Assumptions and risks	• Cooperation of all stakeholders. • Funding is available. • Communities will embrace economic opportunities from using the brine and find markets for the salt.
IMPLEMENTATION	
Project duration	Ten years
Project cost	USD9,000,000
Proposed funding sources	To be secured
Implementation mechanism	To be determined

PROJECT CONCEPT NOTE 3

CORE DATA	
Project number	Botswana PCN 3
Project title	Conservation and sustainable land management
Action Plan priority area	Land degradation
Short description	The project aims at improving the degraded rangeland areas within the Botswana part of the basin and stabilising the sand dunes. This will also help in the control of the alien invasive species that have infested the area.
PROJECT RATIONALE	
Background	Botswana covers 582,000 km^2 and comprises three land entitlement categories, viz. customary (70 per cent), state (25 per cent) and freehold land (5 per cent). The main uses of land are agricultural, residential, commercial, industrial, civic, community and recreational. The productivity and sustainability of food systems in semi-arid rangelands of south-western Botswana is low. Population growth with increasing food demand and negative impact on soils caused by unsustainable farming systems in these fragile environments, exacerbate the situation. Farmers in southern Africa in the 1990s started to develop more integrated and flexible grazing and livestock management, as well as integrated crop-livestock strategies in order to achieve higher livestock and crop yields, stabilise soil fertility and water cycles, and increase resilience, food security, and incomes. Due to the lack of scientific monitoring and advisory services, these first efforts could not be sufficiently sustained and transferred to other farmers. About two thirds of Botswana's surface, including the area in the Orange–Senqu basin, consists of sandy, infertile soils, mostly of the arenosols type. These soils have low moisture retention capacity and in areas that receive low rainfall, like in the basin, conditions lead to the formation of sand dunes. Overstocking and lack of livestock management in the basin have resulted in overgrazing of the rangeland areas and in turn to bush encroachment and the loss of soil and nutrients from the ecosystem.
Project objectives	1 To combat land degradation through the protection and management of land resources in a sustainable way. 2 To rehabilitate landscapes and ecosystems. 3 To manage *Prosopis* species in the area.
Integration with relevant ongoing projects/ initiatives	There are several sand dune stabilisation projects which can provide lessons. These projects include the Indigenous Vegetation Project (IVP), and the Hoodia Cultivation Projects at BORAVAST (Bokspits, Rappelspan, Vaalhoek and Struizendam) Trust and Khawa villages in south Kgalagadi District (indigenous grasses and woody plants). An ongoing UNDP–GEF programme focuses on increased mobility of livestock herds to provide rest periods for rangelands to recover, and an opportunity for rangeland monitoring. A community-based monitoring system including several biophysical, infrastructural, management and socio-economic aspects is being developed. It is based on MOMS (management-oriented monitoring systems pioneered by Stuart-Hill, et al., 2005), which has previously been successfully piloted in an adjacent area. The woodlot projects in the basin area will also be enhanced. The Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) (www.sasscal.org) is a regional science service centre based in Windhoek, Namibia. It is a joint initiative of Angola, Botswana, Namibia, South Africa, Zambia and Germany, and responds to the challenges of global climate change. The project, which extends to 2016, has the following three main objectives that create important complementarities to and synergies with this project: (i) transdisciplinary, applied oriented research for people; (ii) services and advice for policy, decision-makers and stakeholders; and (iii) capacity development created by SASSCAL. The Kalahari–Namib Project is a transboundary, UNEP–GEF funded project directed at introducing sustainable land management strategies. The Orange–Senqu co-basin states are expected to undertake similar projects and coordination will be beneficial.
Project outcomes	1 Improved dryland ecosystems. 2 Participatory land-use strategies (PLUS) in place and implemented.

A pan in Zutshwa

Technical approach	**OUTCOME 1: IMPROVED DRYLAND ECOSYSTEMS** The project will endeavour to develop tools to better understand land management strategies in Savannah rangelands under current and future environmental conditions. To this end, the project will focus on realistic management options identified by stakeholders and the knowledge and understanding of the ecological, physiological and hydrological parameters and their dependence on seasonality, timing and intensity of biodiversity and livelihoods impact. **Output 1.1 Degraded areas re-forested with indigenous plants** *Activities:* • Identify and map degraded areas. • Expand the sand dune stabilisation project to other areas. • Proper management of woodlots. • Promote youth re-forestation projects through YDF, FCB and NEF. • Nutrient recycling from wastewater implemented. **Output 1.2 Spread of alien invasive species controlled** Several mechanisms for controlling invasive species will be used and harmonised with efforts being made in the other riparian states of the Orange–Senqu basin. *Activities:* • Adopt and implement existing *Prosopis* control measures. • Establish port health and quarantine systems. **OUTCOME 2: PARTICIPATORY LAND-USE STRATEGIES (PLUS) IN PLACE AND BEING IMPLEMENTED** **Output 2.1 Improved environmental management practices** The project will be community-based hence efforts will be made to mobilise and engage communities in decision-making. *Activities:* • Identify existing management bodies in identified clusters/communities for training on PLUS. • Develop an integrated participatory land-use strategy/resilience programme for the cluster/community. • Raise funds for the implementation of the PLUS. • Implement an integrated plan (not privileging one environmental, social or economic benefit over another) developed for the community. **Output 2.2 Grazing systems implemented** *Activities:* • Devise a community consultation plan for all villages in the basin. • Revive a community-based inventory rangeland monitoring land system. • Water reticulation to grazing areas.
Assumptions and risks	• Cooperation by all stakeholders. • Farmers in degraded areas are willing to participate and undertake project components.
IMPLEMENTATION	
Project duration	Five years
Project cost	USD5,000,000
Proposed funding sources	To be secured
Implementation mechanism	To be determined

Heavy grazing around and within the village exposes and mobilises the red Kalahari sands.

PROJECT CONCEPT NOTE 4

CORE DATA	
Project number	Botswana PCN 4
Project title	Treatment and re-use of wastewater
Action Plan priority area	Increasing water demand
Short description	The Botswana part of the Orange–Senqu River basin has a limited number of sewage treatment facilities in the area and effluent is not re-used in places where there are sewage treatment facilities. The project will look into how the treated effluent could be used in the basin.
PROJECT RATIONALE	
Background	Botswana is a semi-arid country which receives low rainfall and is characterised by high temperatures. In view of this, the re-use of treated effluent is considered a valuable option to increase water supply. Jwaneng is the only Botswana town in the Orange–Senqu basin that has a reticulated sewer network with a central wastewater treatment works. Some institutions have dedicated sewage treatment facilities, e.g. the Department of Prisons at Tsabong, the senior school at Goodhope and the tertiary school in Brigade. The effluent from these facilities is currently not utilised and is discharged into the open environment. There is potential for utilising the effluent for non-potable uses, such as crop irrigation. In most areas, communities have soak-away systems and in a number of instances pit latrines are in use. These treatment systems have high potential for polluting the groundwater with nitrates.
Project objectives	1 To increase water supply. 2 To raise awareness, economic viability and the social acceptability of re-using treated effluent.
Integration with relevant ongoing projects/ initiatives	In parts of the basin some of the treated effluent is used for vegetable production, e.g. in Tsabong at the offices of Botswana Prisons. Lessons learned from this could be used to replicate the system in other parts of the basin. The Jwaneng mine is using part of the treated effluent in the town and also re-using the mine water.
Project outcomes	1 Treatment facilities in place and effluent discharge reduced and re-used. 2 Technologies implemented that use treated effluent instead of potable water in all economic sectors. 3 Treated wastewater is used in production and irrigation of green landscapes.
Technical approach	**OUTCOME 1: TREATMENT FACILITIES IN PLACE AND EFFLUENT DISCHARGE REDUCED AND RE-USED** The rationale is that there will be an increase in safe application of wastewater re-use, bio-solids and other alternative sources of water in all sectors. **Output 1.1 Effluent discharge reduced** *Activities:* • Educate and promote communities on greywater and blackwater treated effluent re-use. • Maintain and rehabilitate the existing treatment plants. • Construct new treatment plants to increase potable water supply. **OUTCOME 2: TECHNOLOGIES IMPLEMENTED THAT USE TREATED EFFLUENT INSTEAD OF POTABLE WATER IN ALL ECONOMIC SECTORS** **Output 2.1 Waterless technologies and low-volume flush systems in use** *Activities:* • Research on appropriate use of non-potable water for uses, such as mining, construction and agriculture. • Assess the possibility of waterless sanitation systems in water-scarce areas. • Construct new water efficient sewerage networks and wastewater treatment plants in the basin. • Facilitate for a Memorandum of Understanding between large water users (mines, heavy industries, etc.) and universities/research institutions, departments of research and technology to look at current developments, best practice, process technology and paste thickening. **OUTCOME 3: TREATED WASTEWATER IS USED IN PRODUCTION AND IRRIGATION OF GREEN LANDSCAPES** **Output 3.1 Involvement of private sector in the entire water and waste management chain** *Activities:* • Review ongoing WUC plans for privatisation of waste (sewage) disposal. • Fully enforce the Waste Management Act by also including the private sector. • Local authorities to develop and implement waste management guidelines for solid waste management. • Private recycling initiatives to be introduced including institutions, community centres, etc.
Assumptions and risks	• National budgeting processes are able to contribute (budgetary allocations) to the delivery of the proposed projects. • Community members adopting and undertaking environmentally safe sanitation systems, such as ventilated improved latrines and re-using treated effluent. • Affordable technologies are available in the market for community use.
IMPLEMENTATION	
Project duration	Five years
Project cost	USD6,000, 000
Proposed funding sources	To be secured
Implementation mechanism	To be determined

PROJECT CONCEPT NOTE 5

CORE DATA	
Project number	Botswana PCN 5
Project title	Integrated CBNRM for Kgalagadi District (Orange–Senqu basin)
Action Plan priority area	Sustainable natural resource use practices for livelihoods improvement
Short description	While Botswana has a framework of policies that make provision for community access to and benefit from the use of natural resources, particularly wildlife, there is still a vacuum regarding how the programme can be diversified and integrated with the agricultural sector for sustainable utilisation of the finite land resources and livelihoods improvements.
PROJECT RATIONALE	
Background	The Community-Based Natural Resources Management (CBNRM) Programme has been implemented in Botswana since the early 1990s. The programme was piloted in Chobe and later spread to other parts of the country with the Ngamiland and the Chobe regions accruing more benefits than any other parts of the country. CBNRM is implemented through legally registered structures at community level referred to as community-based organisations (CBOs) and registered as 'Trusts', while being advised and driven by committees which are chaired by the Office of the District Commissioner and referred to as 'Technical Advisory Committees'. Over the years, the programme has made significant revenue from the sale of wildlife quotas allocated to communities and a little from certain veld products and eco-tourism activities. Through this programme, the government also aspires to promote co-management of wildlife resources, contribute towards poverty alleviation and, above all, diversify local economies. However, this had not been fully achieved in resource-rich communities, particularly at the household level. Moreover, it has often worked in isolation from community-oriented development programmes and has consequently been in conflict, particularly with the agricultural sector. There are also suggestions that funds have been mismanaged or put into misdirected investments. The basic principles of the design of the CBNRM programme have proven to be valid. For instance, natural resources can generate significant benefits for rural poor and, as long as benefits are significant, rural communities can be motivated to change destructive attitudes towards natural resources and take part in sustainable management of these resources. The project will also create community awareness and understanding of the shift from consumptive utilisation of wildlife (a hunting ban came into effect in January 2014) and other natural resources to eco-tourism.
Project objectives	1 To improve livelihoods through environmentally sustainable initiatives. 2 To reconcile significant biodiversity assets, development and traditional land-use practices for improved livelihoods. 3 To involve the local population in assessing the desirability and abatement measures and the options for alternative sources of incomes.
Integration with relevant ongoing projects/ initiatives	The CBNRM policy was intended to lay the foundation for conservation-based development in Botswana, balancing the need to protect biodiversity and ecosystems with the need to improve rural livelihoods and reduce poverty. CBNRM has generally provided an incentive for rural communities to consider the need to conserve their natural resources (Mbaiwa, 2006) and has led to a shift from previously negative to positive attitudes towards wildlife in participating communities. There is a need for an assessment of the linkages between the local and national level of CBNRM. Opportunities exist to explore linkages between CBNRM activities and other rural initiatives aimed at poverty eradication. Attention should also be paid to linkages that transcend communities. There is an ongoing discussion to promote stronger collaboration between the institutions, including their systems and procedures, to allow the individuals to work cross-sectorally. Capacity building will therefore target institutions and their individuals. This originated from the realisation that The success of CBNRM hinges on effective planning at community level. This is especially so where natural resources are used for both conservation and agriculture. Numerous conflicts exist in areas where agriculture and tourism co-exist. Veld fires continue to be seen as the responsibility of the Department of Forestry and Range Resources, and are therefore not planned for at community level. Human–wildlife conflict is also seen as a responsibility of the Problem Animal Control (PAC) Unit of the Department of Wildlife and National Parks; such conflict has not declined even as CBNRM activity has grown throughout the country. Therefore an integrated approach to community-level planning is being pursued with the support of a new CBNRM support vehicle to enable communities to increase their benefits from CBNRM. There are existing community projects, such as Hoodia plantations, the Zutshwa Salt Project, the Dorper Sheep Project in Struizendam, water harvesting in Khawa and camel eco-tourism in the Orange–Senqu area. Elsewhere in the country, there are similar projects that can provide guidance.

Camel eco-tourism is being introduced in southern Botswana.

Project outcomes	1 Community enterprise activities that generate income for communities. 2 Integrated land-use and management plans developed by Trusts and CBOs.
Technical approach	**OUTCOME 1: COMMUNITY ENTERPRISE ACTIVITIES THAT GENERATE INCOME FOR COMMUNITIES** It is envisaged that community environment management plans would be developed and implemented to improve land-use practices and attain sustainable management. **Output 1.1 CBNRM initiatives implemented to improve livelihoods in Kgalagadi District** *Activities:* • Establish and assess performance of Trusts/CBOs in the basin. • Identification of new income-generation initiatives (eco-tourism). • Introduce appropriate conservation agriculture techniques, e.g. introducing rotational grazing, improving cattle health and meat yield, and holistic farm management systems. • Initiate and revive community camel projects. • Derive economic benefits from *Prosopis*. **Output 1.2 Human–wildlife conflicts reduced** Governance remains key to the success of CBNRM. District-level capacity to provide oversight and support to CBOs on governance issues is essential. Therefore the inclusion of various disciplines (livelihoods, governance, economics and environment) draws from the understanding that CBNRM occurs within the wider context of rural development and the implementation and monitoring of its impact needs to take a multidisciplinary approach. This is a capacity that will be built for individuals and institutions. *Activities:* • Gazetting of ungazetted WMAs in the area. • Establishing income-generating tourism facilities for communities closer to the WMAs. • Capacity development for community Trusts. • Create a balanced human–wildlife conflict strategy. • Tangible economic benefits related to tourism and wildlife communities adjacent to parks/reserves. • Implementing PAC human–wildlife conflict guidelines. • Establishing community-based fire management teams. **OUTCOME 2: INTEGRATED LAND-USE AND MANAGEMENT PLANS DEVELOPED BY TRUSTS AND CBOS** Communities will be supported to plan for an entire spectrum of assets (including natural resources) and for human development needs through participatory integrated land use and management plans (PILUMPs). This is an important element that carries the hope of elevating the value of CBNRM wherein villages prepare PILUMPs through facilitation by rural development specialists with technical arms of government concentrating on the technical elements of the PILUMPs, viz. education, health, agriculture and security. **Output 2.1 CBNRM policy resourced and the Botswana revised Land-Use Policy adopted and implemented** *Activities:* • Support the development of the institutional framework for implementing CBNRM (structure, budget, for proposed focal institution in Botswana). • Undertake assessment of needs and resources potential for land-use activities by developing a community/cluster PILUMPs. • Develop strategy and action plan to implement components of the Land-Use Policy and the PILUMPs as related to the area. **Output 2.2 Economic and ecological valuation of ecosystems undertaken** *Activities:* • Develop TORs for the economic and ecological valuation of the ecosystems in the area. • Prioritise scarce, critical and endemic resources for valuation. • Initiate relevant payment for ecosystem services for future implementation. • Research on the impact of increased and improved water availability on human–wildlife conflict. • Evaluate impact of cross-border animal migration in relation to water demand. • Evaluate the impact of providing water to wildlife that no longer migrate due to blockage of migration routes.
Assumptions and risks	• The community interest on CBNRM is maintained and all stakeholders are willing to cooperate in the development of integrated management plans for the various villages, Trusts or CBOs. • Strategies and effective communication for Trusts and CBOs shift from consumptive to non-consumptive wildlife utilisation.
IMPLEMENTATION	
Project duration	Five years
Project cost	USD2,000,000
Proposed funding sources	To be secured
Implementation mechanism	To be determined