

IMPACT ASSESSMENT CASE STUDIES FROM SOUTHERN AFRICA

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Clients: Botswana Department
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MAKGADIKGADI PANS NATIONAL PARK WATER DEVELOPMENT PROJECT



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Aims of the Project

Historically the Boteti River was the main source of surface water for wildlife in the Makgadikgadi Pans National Park during dry periods, but the river has steadily dried up since 1991, threatening wildlife populations in the Park. During 2004-6 the western boundary of the Park along the Boteti River was fenced, severely limiting the availability of water to wildlife. More recently the remaining pools of surface water within the Boteti had deteriorated in quality, and the survival of migratory ungulates was being undermined. The demands on water in the area had also grown with increased numbers of elephants and other animals, as well as growth in tourism. The aim of the project was to develop artificial watering points in order to provide water for wildlife in the Park during the dry season, in line with the Park's Management Plan of 2006. This had been recommended in the environmental assessment of fencing the western boundary of the Park.

The park contains large numbers of wildlife that migrate between the grasslands to the east of the Park during the rainy season and the Boteti River on the western boundary of the Park in the dry season. The only dry season water lies along the Boteti River, where water-dependent species

congregate. The provision of water is fundamental to the survival of many wildlife species in the National Park.

Background to the development

The Park's Management Plan aimed to control the development of artificial water points in the Park to minimise the negative impacts of construction activities. In addition, Ecosurv prepared a Code of Conduct regulating exploration activities and audit requirements for the construction and operational phases of water points. Location, design and operation of boreholes and watering points were predetermined by Botswana's Department of Wildlife and National Parks (DWNP) and the Kalahari Conservation Society (KCS), while Ecosurv provided much of the information needed for the decision making process.

No EIA was undertaken in the preparation of the Management Plan and issues identified were based on review of the planning framework, literature, remote sensing, consultations and review of documentation.

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Location and sensitivity

The Makgadikgadi Pans National Park falls in both the North-West and Central Districts of Botswana. The area contains large herds of wildlife that migrate between grasslands to the east of the Park during the rainy season and the Boteti River on the western boundary of the Park in the dry season. Historically the Boteti River received surface water flows from the Okavango and thus formed the main physiographic feature of the study area.

The Makgadikgadi palustrine wetland is characterised by open expanses of saltpan. The pans are alkaline, and salinity is extremely high during periods of inundation. For most of the year, however, the pans are completely dry and salt-encrusted. It is a unique and fragile ecosystem which supports some of the country's last truly migratory wildlife, notably zebra and wildebeest. Predators such as lions and brown hyena inhabit the region along with a rich array of bird life, including the rare Wattled Crane.

Following a drought in the early eighties and the subsequent drying up of the Boteti River, livestock were able to cross the riverbed and venture into the Park to graze, and in turn wildlife had access

to village areas. This had led to a lot of conflict. The Government of Botswana had made the decision to erect a fence around the Makgadikgadi / Nxai Pans National Park and adjacent Wildlife Management Areas, in order to arrest the conflict between wildlife and livestock in the area.

Legend - Fence Alignment

-  Existing Camp Site
-  New Camp Site
-  New Entrance Gate
-  Boreholes
-  Settlements
-  River
-  Fence
-  Makgadikgadi Pans National Park
-  District Boundries

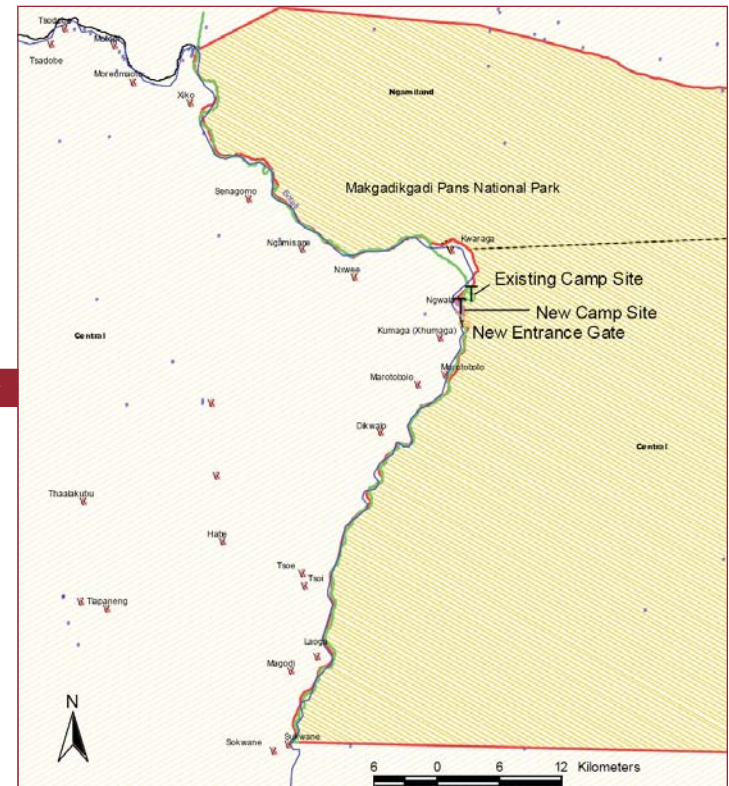


Figure 1: Western part of the Makgadikgadi Pans National Park.
 Note that the Park boundary does not exactly follow the fence.
 On the western side the boundary follows the centre of the main Boteti River channel.

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Environmental setting

Vegetation

Vegetation within the Park changes from savannah woodland with a riparian fringe and dry forest bordering the Boteti River, through mixed scrub to open grassland with groves of Mokolwane palm trees (*Hyphaene petersiana*). The riparian area attractive to elephants is very limited, leading to high densities of elephants and thus considerable pressure on the vegetation.

The ecosystems within the project area, particularly along the axis of the Boteti River, have changed with time. The grasslands, once regarded as having the highest livestock carrying capacity in the country, have become degraded with serious overgrazing particularly in the communal grazing area in a 10 km wide belt along the river. The recent fencing of the Park boundary along the river substantially increased the occurrence of grass within the Park and increased the likelihood of fire.

Wildlife

Large ungulates occurring in the area include zebra, wildebeest, elephant, springbok, gemsbok, giraffe, kudu, steenbok, duiker, hartebeest and ostrich. Hippos were found in a pool in the Boteti

River. The large zebra and wildebeest migration is seen as one of the most important ecological process in the Park

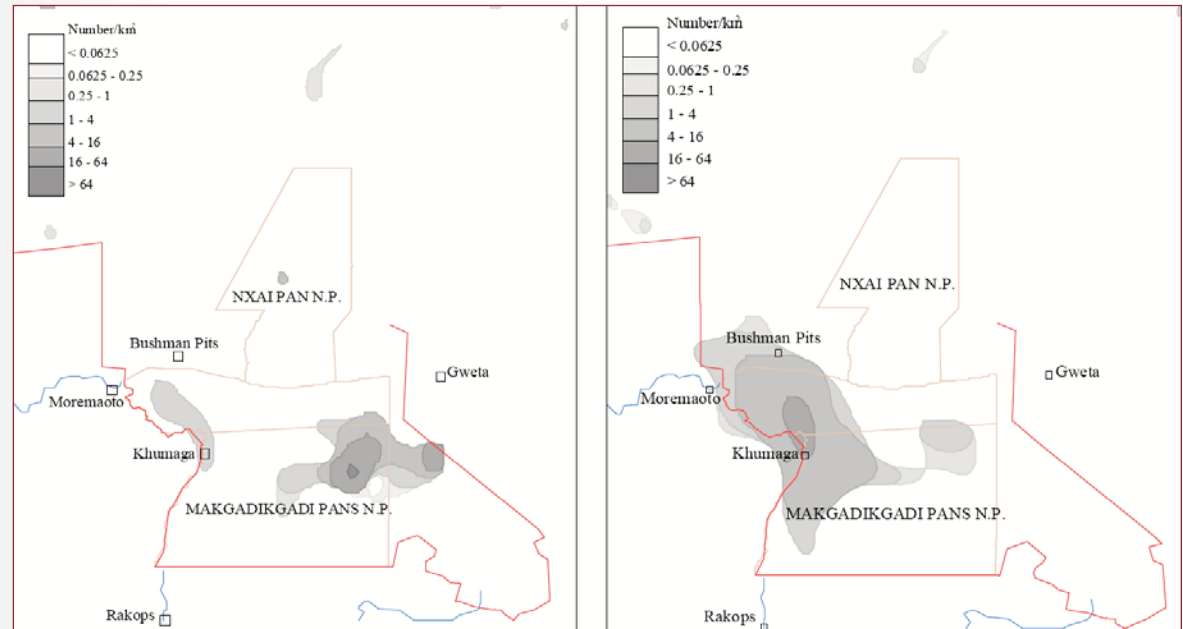
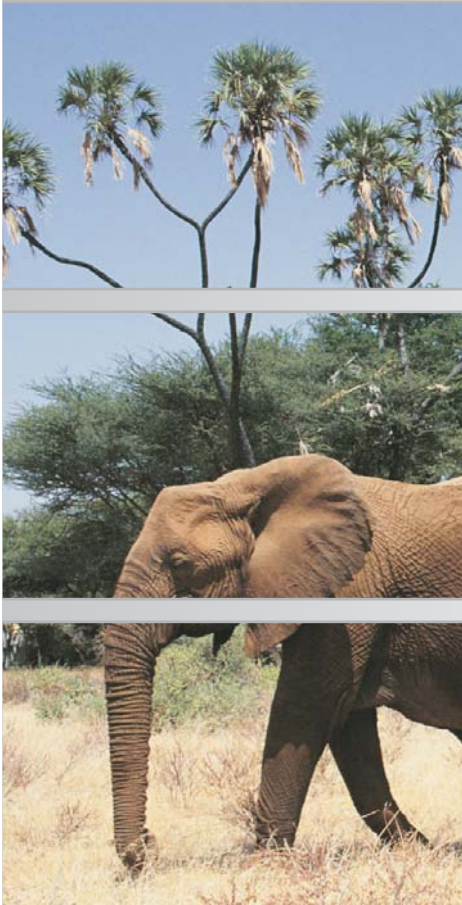


Figure 2: Dry and wet season distribution of zebra and wildebeest. (Source: Scott Wilson, 2002)

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Environmental setting

Elephant numbers have steadily increased and resident populations can be found along the Boteti River throughout the year. Lions are important predators in the Park, relying on the zebra and wildebeest. The conflict between people and wildlife due to lion predation on livestock was one of the main reasons for fencing the western boundary of the Park.

Socio-economics and land use

The areas likely to be affected were between Moremaoto and Khumaga, all the way to the south end of the park. Land use in this areas includes farming and tourism. Tourism is a small but growing industry in the area, for example a public camping ground exists in Khumaga on the banks of the Boteti River opposite Khumaga Village. Khumaga and Moremaoto Villages each have community trusts to develop their tourism and biodiversity conservation potential. Water from Boteti River is used by communities living along the river for human consumption, livestock watering, brick making, and other activities.

Nature of the project

The project involved the development of water points in or adjacent to the Boteti River (Figure 3), including:

- 2 new river extraction points and the enhancement of 2 existing river extraction points
- 10 new boreholes
- 12 solar powered pumps to be installed at the new water abstraction points
- 12 artificially enhanced watering points

There were two types of water abstraction points i.e. boreholes that were between 20 and 40 m deep and water abstraction trenches in the Boteti River. The water would be pumped using solar powered pumps to natural or artificial watering points about 300 m from the riverine forest and game fence. The quality of water would have to be below a Total Dissolved Salts (TDS) limit of 7,500 mg/l.

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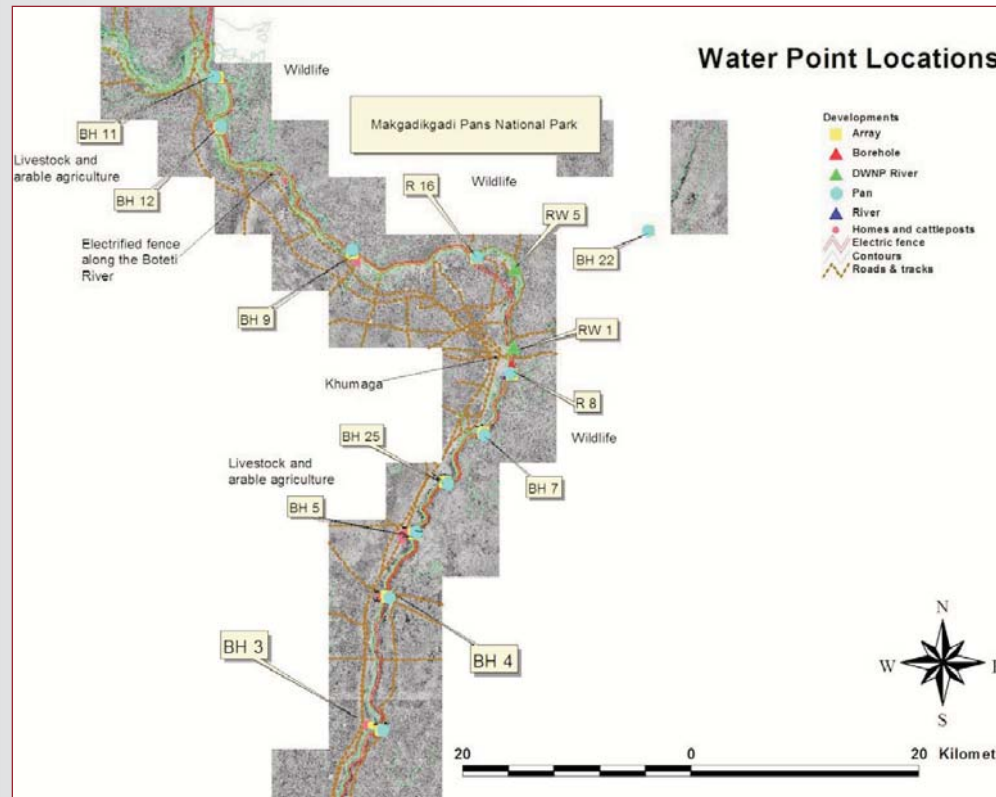
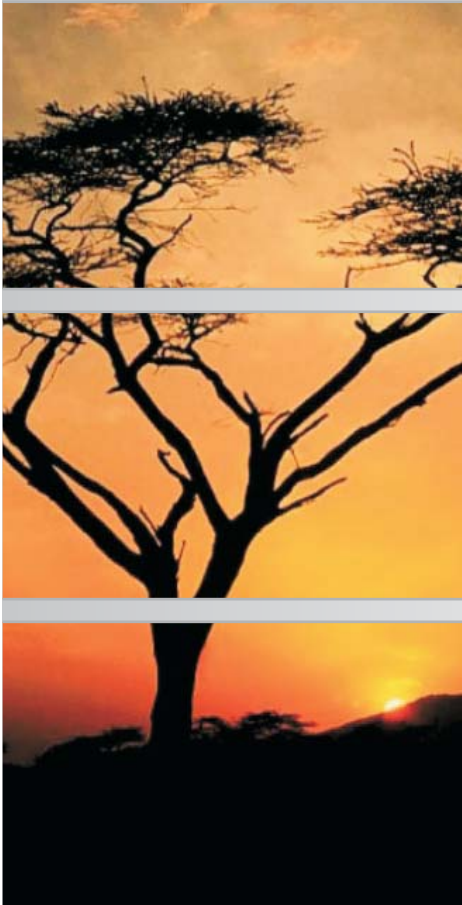


Figure 3: Locations of proposed water points along the Boteti River.

Project management

The Kalahari Conservation Society was appointed by DWNP to supervise the project. A Management Committee was set up, comprising two members from DWNP, one member from MEWT and three members from KCS. The management committee subsequently appointed Water Surveys Botswana to implement groundwater investigations to assess geological and hydrological environments, to site additional watering points and to design abstractions. To carry out the project in an environmentally acceptable manner, Ecosurv Environmental Consultants were appointed to draw up an EMP to ensure that any significant environmental impacts resulting from the implementation of the project were managed.

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Summary of issues identified

The assessment identified constraints and opportunities relating to each of the environmental components. In addition, the following key issues were identified:

The main challenge facing the environmental team was the timing of their work in relation to the rest of the development programme. The water provision was carried out under emergency

conditions as the dry season was advanced and animals were dying due to lack of water. To address the requirement for speed the environmental team prepared a Code of Conduct for exploration at the beginning of the project. Draft EMP requirements to attach to the contract documentation were prepared early and shared with prospective contractors so as not to delay the tender process. The finalisation of the EMP and the audits were undertaken without further time constraints.

Design of Water Abstraction points

- Noise resulting in disturbances and temporary relocation of wildlife and reduced tourism value.
- Increased water usage
- Damage, loss of existing vegetation
- Impact on wetlands and riverine areas
- Disturbance along access routes
- Fire outbreaks
- Erosion of river banks due to use of access tracks
- Solid and liquid (oils and fuel) waste pollution

Design of Water Outlets

- Solid waste: concrete, cement waste, building rubble.
- Disturbances of access routes, wildlife and vegetation
- Potential failure of soils to meet minimum requirements for effective water-tight seal.
- Loss of water

Design of Power Sources

- Noise and visual pollution and loss of wilderness value
- Damage, loss of existing vegetation
- Disturbance to access routes
- Fires from faulty equipment
- Oils spills from machinery



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Summary of issues identified

A brief assessment of the proposed boreholes and watering points was undertaken to identify areas of potential impact. Each site was assessed for an area of 500 m surrounding the extraction points and obvious concerns noted. The main factors influencing borehole location were:

- To secure and expand the provision of water in areas traditionally used by wildlife for dry season watering;
- To maintain the natural migratory movements of zebra and other wildlife;
- To develop water in those areas that had the greatest likelihood of providing a sustainable and potable water supply; and
- To discourage the build-up of a permanent elephant population in the central and western parts of the Park as this would lead to rapid destruction of the unique palm woodlands of the Makgadikgadi.

EIA process followed

Botswana's EIA Act (2005) required that consultations were initiated with the interested and affected parties in order to announce the project and register any concerns and issues that they would like the Environmental Management Plan to cover. The I&APs to the project included Water and Veterinary officials from the Ngamiland and Central Districts and communities living adjacent to the Boteti River and the National Park.

Only two communities, from Moremaoto and Khumaga, were consulted.

Invitation to the public meetings was extended through a notice placed in local newspapers in Setswana and English. The notice's main purpose was to communicate the schedule of the meetings to the I&APs. Key persons were invited to raise their issues and comments through faxed letters and phone calls.

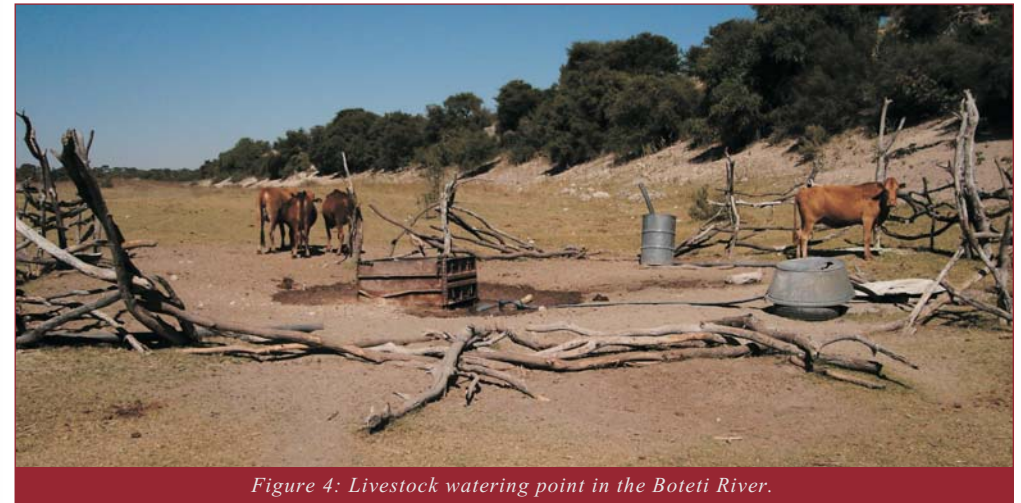


Figure 4: Livestock watering point in the Boteti River.

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EIA process followed

Khumaga

At the Khumaga meeting, the public generally viewed the proposed development as a positive initiative as they had experienced death and mortality of wildlife in the Park due to shortage of water. The public was concerned about the drawdown effect on their shallow wells within the river; and wanted to see this covered in the EMP. The water from these wells is their most important resource as it is used for livestock watering and brick making. In addition, drilling would affect the river bed and the EMP should ensure that the effects were minimised. Location of watering points was important: they should not attract cattle since this could lead to predation and the damaging of the fence. The public highlighted that they should be considered when temporary labour is required during the drilling stage and the construction of watering points. Hiring should be transparent and be carried out at the Kgotla. This would address the issue of unemployment in the Boteti area. As the client was not represented at the public meeting, the Khumaga public wanted the Department of Wildlife and National parks to consult them regarding this project.

Moremaoto

At the Moremaoto meeting the community appreciated the proposed project, but were concerned mostly with the drawdown effect on their wells, since shallow water was being used for livestock watering. Borehole drilling should therefore consider the other users of water and should not be meant for wildlife only. Predation had always been a concern in the area and waterholes should be placed in areas that were unlikely to attract their livestock. As the Government's plans were to empower the youth, the local youth should be employed during the construction stage of the project.

Key persons

A meeting was held with the Water Unit in Letlhakane. The Water Engineer mentioned that the area around Khumaga had a low yield and his main concern was the drawdown effect on the Department's boreholes.

Main environmental impacts & issues

The main impact was positive: securing water supplies for wildlife during the dry season while minimising the social impacts that could have occurred during the construction phase. Also, the project contributed to the well-being of a small group of hippos by digging a new pool that is now fed by one of the new river extraction points. The location of the points also meant that the natural migratory movement of zebras was maintained.

The success of the Makgadikgadi Water Supply programme was safeguarded by developing water in those areas that had the greatest likelihood of providing a sustainable and potable water supply. It also discouraged the build-up of a permanent elephant population in the central and western parts of the park, which would have led to a rapid destruction of the unique palm woodlands of the Makgadikgadi Pans.

There were no negative or cumulative impacts noted.

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Decision making process

The EMP followed the normal review process. The initial screening document (Preliminary EIA) was sent to the Department of Environmental Affairs for comment and approval. The Draft EMP was prepared and submitted for review and approval by the environmental authorities. Apart from the public consultation there was no further review process. Given the timing, the presence of all infrastructure in the National Park and the limited impact on stakeholders other than visitors, no appeals occurred.

Implementation of the EMP & compliance auditing

A number of audits were scheduled to take place to determine compliance with the Code of Conduct and EMP and to determine the impact that exploration and drilling activities had on the social and natural environment. The following were the key audit requirements:

- The audit was to be conducted by qualified and independent personnel, regularly during the exploration and development process;
- The audit was to be preceded by clear documentation of both environmental and social concerns as well as the mitigation measures employed. These would be contained in the EMP.

The success of environmental management is in the implementation and adaptive management based on the findings. Audit is integral for ensuring implementation. Two audits were scheduled:

- At the end of construction prior to project handover to DWNP (to be carried out by the consultant);

- Dry season operation audit during the first year of operation to identify concerns and changes required (to be carried out by KCS/DWNP).

Audit reports will be submitted to DEA, KCS and DWNP.

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Main elements of excellence in this EIA

The client's commitment to protecting the environment was the main element of excellence in this project. The Kalahari Conservation Society lived its values by having a genuine concern for the environment. This NGO was always available and dedicated to the project. It was also a good example of government and civil society collaborating in development projects.

