Management Plan

Mavinga National Park,

Kuando Kubango, Angola

for the period: 2016-2020

USAID | SOUTHERN AFRICA
FROM THE AMERICAN PEOPLE

SAREP

Southern Africa Regional Environment Programme

Supporting the sustainable management of the Okavango River Basin

Control page

Project: Project code: USAID PRIME CONTRACT NO. 674-C-00-10-00030-00	**Report**: Management Plan for the Mavinga National Park, Kuando Kubango, Angola

Versions:
First Draft Report - 28 April 2016
Second Draft Report – 8 July 2016

Compiled by:

Name: Peter Tarr

Organisation: Southern African Institute for Environmental Assessment

Position: Executive Director

Signature:

Date: 8 July 2016

Distribution Information

Client	**Copies**	**Date**
SAREP	1 soft copy	2016

Table of Contents

Acronyms

ACADIR - Associação de Conservaçãodo Ambiente e Desenvolvimento Integrado Rural

CBFiM - Community-Based Fire Management

CBNRM - Community-based Natural Resource Management

IFM – Integrated Fire Management

INBAC - National Institute for Biodiversity and Conservation Areas

IRDNC Integrated Rural Development and Nature Conservation

KAZA-TFCA - Kavango Zambezi – Transfrontier Conservation Area

MET - Ministry of Environment and Tourism, Namibia

MINUA - Ministry of Urban Affairs and Environment, Angola

MP – Management Plan

NP - National Park

NGO -Non-Government Organization

PAs - Protected Areas

SADC - Southern African Development Community

TFCA - Transfrontier Conservation Area Programme

Acknowledgments

We thank Dr Chris Brooks for support, advice and guidance throughout this consultancy, and SAREP for funding this work. Dr John Mendelsohn and Ms Steffi Mendelsohn are achnowledged for their technical input, especially information on habitats, infrastructure, ecosystem functioning, land use and tourism in the two parks, as well as the production of maps. Mr Vladdy Russo and Mr Abias Huongo are acknowledged for their input on institutional arrangements, and Mr Fidi Alpers from IRDNC is thanked for input on fire management, CBNRM and transboundary matters, whilst Ms Karen Nott from IRDNC provided valuable input regarding devils claw. ACADIR is thanked for conducting field consultations. Lastly, we thank all stakeholders who attending the various consultative meetings.

Executive Summary

This Management Plan (MP) for the Mavinga National Park sets out the vision and guidelines for the management of the park. As such, it represents the intentions of the Ministry of Environment, and their implementing agency the National Institute for Biodiversity and Conservation Areas (INBAC).

The MP must be implemented in an efficient and systematic way. For each annual cycle, an *Annual Work plan* and a *Budget* should be prepared. This work plan will, as far as practical, reflect on the priority management actions outlined in the Plan. The work plan should cover:

- **Routine management issues**, such as developing and nurtering relationships with local communities living inside the park, and counterparts in neighbouring countries, anti-poaching and combatting of illegal logging, fire prevention and fighting, managing human-wildlife conflicts, extension work, etc.
- **Development issues**, such as creating wildlife corridors, erectings signs at strategic locations informing people that they are entering a park, creation of firebreaks, maintenance of roads, initiation of tourism opportunities, construction of staff accommodation and offices, etc.
- **Monitoring activities**, to collect, store, analyse and interpret information for adaptive management, covering such things as key biodiversity indicators, contravention of laws, growth/shifting of settlements and land use, occurrence of fires, industrial impacts (e.g. mining and irrigated agriculture), etc.
- **Research needs** based on the identification of priority information and knowledge gaps, with appropriate ways of implementing such research.
- **Administration,** including work plan & budget preparation, reporting and meetings.

INBAC park staff are ultimately responsible for ensuring that the plan is implemented in effective and efficient ways, and that the regulations are enforced. They are also responsible for ensuring effective day-to-day management, dynamic, responsive and pro-active rolling planning as well as contributing to longer-term planning. It is recommended that the Angolan government considers obtaining some technical support from a professional organisation to help establish robust management systems in the park, at least for the first few years.

This Plan (2016-2020) should be thoroughly reviewed and, where necessary, revised every five years. The next review must be done in 2020 for implementation in 2021.

The Plan must be viewed as a valuable and central document by all management and policy-level staff and stakeholders involved with the park. They should be familiar with its contents, and should make use of it to familiarize new staff with the vision and management actions.

It is part of every staff member's job and stakeholder's responsibility to help implement this plan. It is also every staff member and stakeholder's responsibility to propose improvements to the plan, as well as improvements in how the plan is implemented. Park management is a team effort that cuts across all sectors. The future well-being and development of the Luengue-Luiana National Park depends on this team approach.

…… at …… on day…… month……..…… Year……
Director: Ministry of Environment

Name: ……..

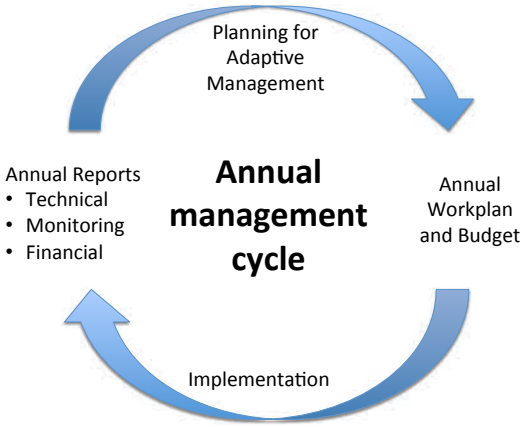
…… at …… on day…… month……..…… Year……
Director General: INBAC

Name: ……..

…… at …… on day…… month……..…… Year……
Governor: Kuando Kubango Province

Name: ……..

At the end of each annual cycle, an ***Annual Report*** and ***Financial Report*** needs to be prepared, plus a draft work plan and budget for the following year (see diagram below for schematic illustration). The Annual Report must include cumulative (time-series) information from the monitoring programme. The cumulative information, showing trends over time, will be used to adaptively manage the park. This information will also be used to prepare the next Annual Work Plan and Budget.



1. Introduction

In 2011, the Republic of Angola proclaimed two new National Parks within Kuando Kubango Province; Mavinga (46,076 km2) and Luengue-Luiana (22,610 km^2). The Parks were created in recognition of the areas' high ecological and biological value. In accordance with the government's need to ensure that future development within the region is managed for sustainability, each park will have its own Management Plan (MP).

This MP for Mavinga focuses on key management and development issues with a short-term perspective of 5 years, detailing the objectives, strategies and principles upon which to manage the Park.

Definition of a Protected Area Management Plan;
"a document that sets forth the basic and development philosophy of the park and provides strategies for solving problems and achieving identified management objectives over a defined period. Based on these strategies, programmes, actions and support facilities necessary for efficient park operations, visitor use and human benefit are identified. Throughout the planning effort, the park is considered in a regional context that influences and is influenced by it" (Young and Young 1993).

Park specific objectives are defined with clear, realistic action plans that encourage results-oriented management that respond to specific threats. To ensure that these plans are effectively implemented, a basic monitoring process is included for measuring the successful implementation of the plan and achievement of results.

The MP outlines the key ecological features of the protected area, bringing together the known ecological and biological baseline information upon which to inform and guide appropriate management recommendations and, where relevant, informing the need for additional monitoring data and more specific research data.

Proposed management actions relate to existing and anticipated future socio-ecological threats that may undermine the objectives of the Park. They also relate to the transboundary importance of these parks for wildlife migrations and international conservation strategies.

Management measures proposed in this MP are flexible enough to deal with future uncertainties and/or unintended consequences. Management must therefore be adaptive, and include positive and negative feedback loops.

This MP is a framework for the initial stages of park management. It is a transitional plan: the "starting blocks" for the management team. The plan should be improved and modified over time. It must be a living document that grows through experience.

2. Vision

The objectives of the new parks were defined within the National Assembly Decree (No. 38/11 29th December) and stated as follows;

- Protect the ecological integrity of the ecosystems and eco-region of Southeast Angola;
- Protect the ecological integrity of one or more ecosystems, biotic community, resources genetic and species;
- To protect and maintain the natural state of the areas, while preserving their rich natural, geological and archaeological heritage, and recognising their national and international importance;
- Conserving wildlife, vegetation and other environmental components of the Parks to ensure the current and future generations have the opportunity to know and enjoy the exemplary representative ecosystems, biotic communities, and biodiversity in general;
- Promote the development of eco-tourism areas allocated to the Parks, contributing to improving the living conditions of the population resident within and peripheral around the Parks;
- Preserving the plant and animal species and their natural habitats, both for its rarity and endangered status;
- Reconstitute and / or recover the animal populations and plants and their habitats;
- To preserve or restore habitats of migratory wildlife;
- Provide opportunities for research in general.

Bearing the above in mind, the following vision is proposed:

Mavinga National Park is a conservation priority because of its wetlands, woodlands, wildlife, and links with the KAZA TFCA. This park will be managed to improve ecological functioning and wildlife populations, and to provide a broad range of ecological services to the people residing therein, as well as visitors.

3. Policy, legal and planning context

The foundation for environmental regulations in Angola is the Environment Framework Act (No. 5/98 of 19 June 1998), which draws on articles 12 and 24 of the Angolan Constitutional Law (No. 23/92 of 16 September 1992). Article 12 of the Constitutional Law states, among other things, that the State shall promote the protection and conservation of natural resources by guiding the exploitation and use thereof for the benefit of the community as a whole. Two important provisions of Article 24 are the following:

- The State shall take the requisite measures to protect the environment and national species of flora and fauna throughout the national territory and maintain ecological balance.
- Acts that damage or directly or indirectly jeopardize conservation of the environment shall be punishable by law.

The Environment Framework Act (EFA) is administered by the Ministry of Environment. The EFA defines the general and specific principles of protection, preservation and conservation of the environment, the promotion of the quality of life and the national use of natural resources by guiding their exploitation and the development initiatives, which benefit all Angolans.

The specific principles for environmental protection, preservation and conservation include, among other things,

- recognition of the right to environmental education and training;
- participation in environmental decision- making and management;
- precautionary principles;
- environmental balance towards achieving sustainable development; and
- the protection and preservation of natural resources, including national genetic resources.

Policy and legislation

The Environmental Framework Act (Ministério das Pescas e Ambiente 1999a) stipulates, in its articles 3/3 and 6, that the State should be responsible for the development and implementation of a National Environmental Management Plan (Plano Nacional de Gestão Ambiental – PNGA). This plan, which is still a draft, is seen as an important instrument guided by the principles of sustainable development. The draft plan gives emphasis to the need to implement an Environmental Management Strategy (Estratégia Nacional do Ambiente – ENA) to protect the environment and promote sustainable development.

The establishment of protected areas (national parks, nature reserves and forest reserves) was first mentioned in a regulation (Regulamento) issued in 1936, and the first protected area (Parque Nacional de Caça do Iona) was established in 1937. The first statute on nature conservation and on the establishment of protected areas for different purposes (initially for hunting and later for nature conservation) was issued on 20 January1955 through Decree No. 40,040 (published in the Official Bulletin on 9 February 1955). It pioneered the establishment of an institution (Conselho de Protecção à Natureza – Nature Conservation Council) responsible for controlling the protected areas and developing important legislation for this effect.

This legislative package included the Hunting Regulations (Regulamento de Caça), Forestry Regulations (Regulamento Florestal) and National Parks Regulations (Regulamento de Parques Nacionais). In its annexes, decree No. 40,040 included a list of mammals and bird species whose hunting was declared illegal.

Some of the above-mentioned legislation was revoked after independence by Decree No. 43/77 of 5 May 1977. This decree also approved the structure of the Ministry of Agriculture and defined five different categories for protected areas, namely national parks; strict nature reserves; partial reserves; regional nature parks and special reserves. This categorization does not cater for issues such as rural community use of wildlife, or the conservation of heritage sites and important monuments. The decree defines the five categories as set out below:

1. National Park: An area reserved for the protection, conservation and propagation of wild animal life and indigenous vegetation, for the benefit and enjoyment of the public.
2. Strict Nature Reserve: An area for the total protection of wild flora and fauna.
3. Partial Reserve: An area where it is forbidden to hunt, kill or capture animals, or to collect plants, other than for authorized scientific or management purposes.
4. Regional Nature Park: An area reserved for the protection and conservation of nature, in which hunting, fishing and the collection or destruction of wild animals or plants and the conduct of industrial, commercial or agricultural activities are prohibited or placed under limits.
5. Special Reserve: An area where the killing of certain species, whose conservation cannot be ensured in any other manner, is prohibited.

In the late 1990s, there were negotiations to transfer the management and protection of protected areas (excluding agricultural areas) from the Ministry of Agriculture and Rural Development to the former Ministry of Fisheries and Environment. Although this was agreed and the structure of the Ministry of Urban Affairs and Environment recognizes that this ministry should manage all the protected areas in Angola, the protected areas are still being managed by the Ministry of Agriculture and Rural Development. Currently, it is IDF – the Forestry Development Institute – located within the Ministry of Agriculture and Rural Development that oversees the development and enforcement of legislation on protected areas. IDF was established in 1989 through Decree No. 41/89 of 22 July and works on five specific areas, namely forestry; wildlife protection; control; administration; and regional centres.

The Ministry of Agriculture and Rural Development published Despacho No. 204/96 of November 11, listing the animals whose hunting was prohibited and allowed. This Despacho was repealed by Combined Executive Decree No. 37/99 of 27 January 1999 (Governo de Angola 1999) issued by the Ministry of Agriculture and Rural Development and the Ministry of Finances. This decree provides an updated list of species whose hunting is prohibited and also those that are allowed.

In terms of forestry, the Decree on Forest Regulation (decree No. 44,531 of 21 August 1962) was developed during the colonial era. The Ministry of Agriculture and Rural Development developed the Forestry development licenses (Order No. 149/00 of 7 July 2000), which established rules on forestry activities and for the conservation of forests. It stipulates that only entities in possession of licences can undertake forestry activities, and it describes the process and requirements for the issuing of forestry licences.

The Angolan policy and legal framework does not specifically provide for devolution of rights over natural resources such as wildlife to local communities. Although the land and natural resources are controlled by the state, there are however, a number of general provisions that enable the state to allow the use of land and natural resources by other parties for various purposes. There is no specific mention though, of using land for wildlife and tourism. Article 3/1 of the Land Act (No. 9/04 of 9 November 2004) provides for the land areas (both rural and urban) in which the State has control and rights. These land areas include that used for agriculture, livestock, forestry, mining, industry, commercial, housing, rural and urban planning, environmental protection and the combating of soil erosion.

Article 10 states that all natural resources are State property and the State's rights over the land are not transmissible. It further notes that the State can determine new rights for the exploitation of natural resources based on appropriate legislation. Article 14 (b) notes that the State can intervene in the management and concession of the land affected by the present Act, in harmony with a number of objectives. An important objective is the protection of the environment and economically efficient and sustainable use of the land. Article 16/1–2 affirms that the occupation and use of the land depends on a number of norms and standards for environmental protection, particularly with respect to the protection of landscape, flora and fauna, the preservation of ecological equilibrium and the right of citizens to a healthy and non-polluted environment.

Through Decreto Presidencial n.o 10/11, the Government created the National Institute for Biodiversity and Conservation Areas (INBAC) in 2014. Article 5 of this decree stipulates (inter alia) the following tasks for INBAC:

- Implement the policies and strategies on biodiversity conservation and the management of national protected areas;
- Planning of national and cross-border conservation programmes;
- Undertake studies of ecological systems: their composition, structure and functioning;
- Undertake studies to improve the management of genetic heritage, and the conservation and management of biodiversity;
- Propose the creation of protected areas and ensuring their management;
- Ensure compliance with conservation laws and regulations;
- Ensure that neighbouring communities benefit from conservation areas.

National Assembly Decree (No. 38/11 29th December) proclaimed the Mavinga and Luengue-Luiana national parks.

4. Geographic context

The park falls within the Kavango Zambezi (KAZA) Transfrontier Conservation Area (TFCA), which embraces contiguous parts of southeast Angola, northern Botswana, northeast Namibia, southwest Zambia, and western Zimbabwe (Figure 1). It contains a mosaic of protected areas, interspersed with extensive communal lands in which small-scale pastoral and agro-pastoral land use is practiced.

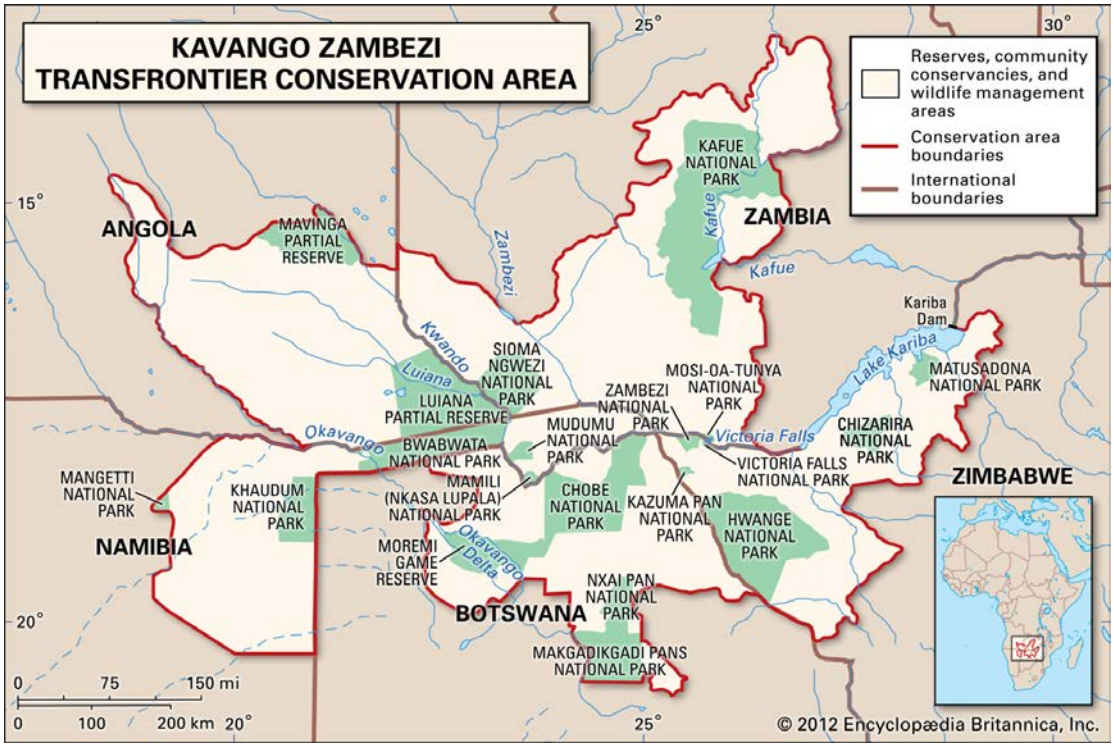


Figure 1: KAZA Transfrontier Conservation Area

Apart from localized areas of crop production, mainly for local markets, multi-species rangeland-based land use systems involving wildlife and livestock have comparative advantages in the KAZA TFCA. This has been shown from numerous research and analytical

studies in KAZA and around it in similar semi-arid to sub-humid biomes. Economically, socially, and environmentally sustainable development in KAZA depends largely on complementary use of rangeland for wildlife and livestock (Barnes 2013).

5. Park description

The official park boundaries as described in National Assembly Decree (No. 38/11 29th December) are as follows:

North limit: Starts nearby the Longo village, follows the main road to the east towards the village of Cuito Cuanavale. From this point it follows the Cuito River until the intersection with the Cuma river until its source. It connects Lomba River to the intersection with the Cuzizi river, following the course of this river to the intersection with the Cumzumbia river.
Northeast limit: Follow the Cueio river until it intersects with the Cuando River.
East limit: Follow the course of this river to the meridian 22º30' with the border line.
South limit: Starts from this meridian with the border line, passes north of Lupanda Lagoon, followed by Samuxambe town, than it follows the course of the Massive river until it reaches the Massive lagoon, passes along the Southern part of Liquinha village and also goes by the Uanhombua spring until it intersects the Nancova village, near the Cuito river.

However, according to Russo (pers comm 2016), these boundaries are inaccurate and need revisiting.

5.1. Management

As noted earlier, park management is the responsibility of the National Institute for Biodiversity and Conservation Areas. Below is the staff structure for the two parks combined. The staff current contingent for Mavinga National Park is 70 rangers, but in future it is expected that there will be 117. It is recommended that the Government of Angolan considers obtaining some technical support from a professional organisation to help establish robust management systems in the park, at least for the first few years. In particular, the following support is regarded as priorities:

- Anti poaching patrols
- Establishment of firebreaks
- Refining the draft fire management strategy presented in this management plan
- Establishing a viable and sustainable CBNRM approach in the park
- Establishing a certified Indigenous Products industry (e.g. devils claw).[1].

[1] IRDNC in Bwabwata National Park, Namibia could perhaps assist

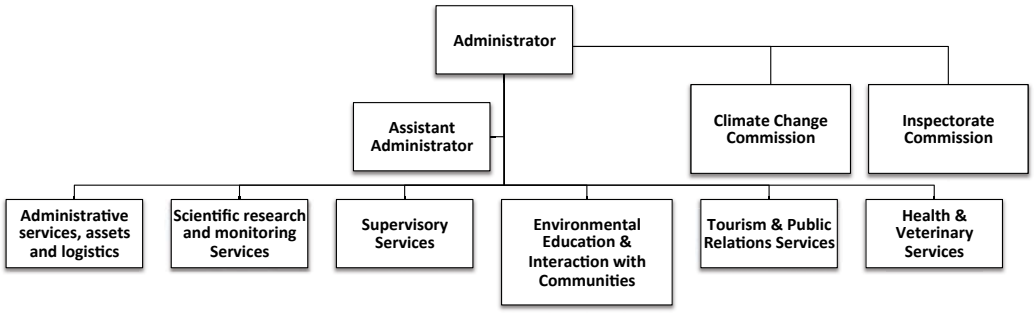


Figure 2: Staff structure of the two parks

5.2. Socioeconomic overview

There have been considerable shifts in the distribution of people in recent years. For example, some substantial villages visible in Google Earth images taken in 2007 have disappeared, while towns such as Mavinga, Rivungo, Licua and Cuito Cuanavale have grown rapidly.

The majority of people in and around the Parks are in the south-east, in the north-west between Longa and Cuito Cuanavale, along the Lomba and Cubia Rivers, and on the west bank of the Cuito Rivers. There are also scattered populations along the west bank of the Cuando River and living on isolated islands within this river's broad valley of marshlands.

Many island households were observed in the Cuando's marshlands during an aerial survey in January 2016, but they could not be mapped individually. Additionally, there are significant numbers of hunter-gatherers living as isolated families throughout the park. Their homes are not easily visible from the air or satellite images.

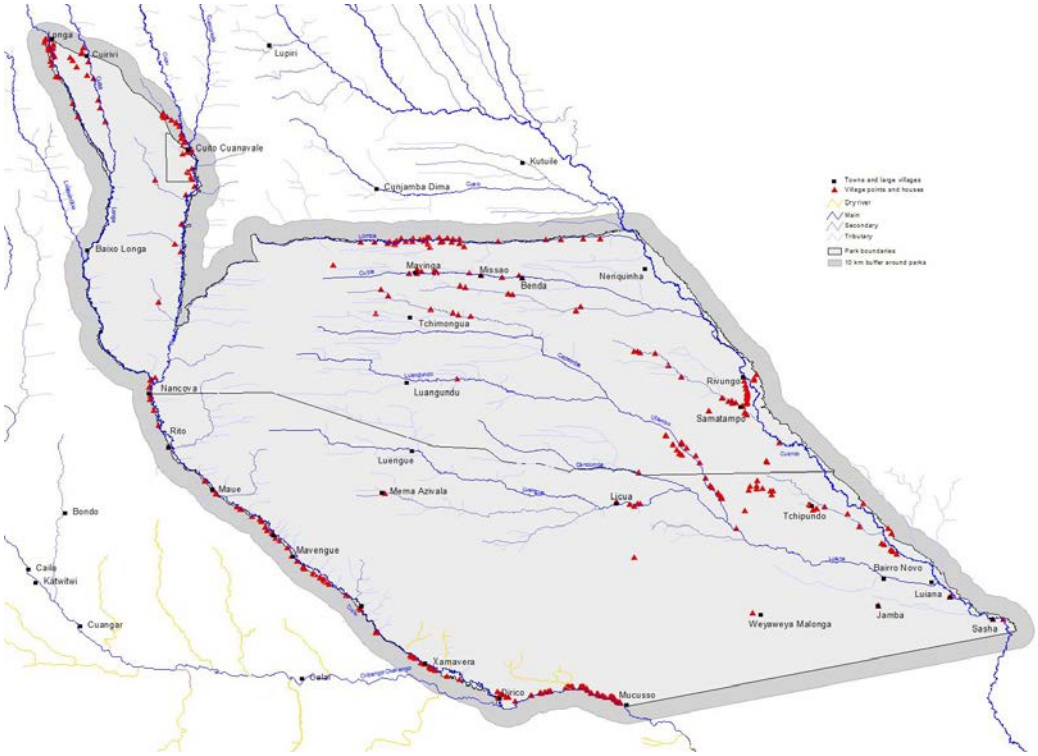
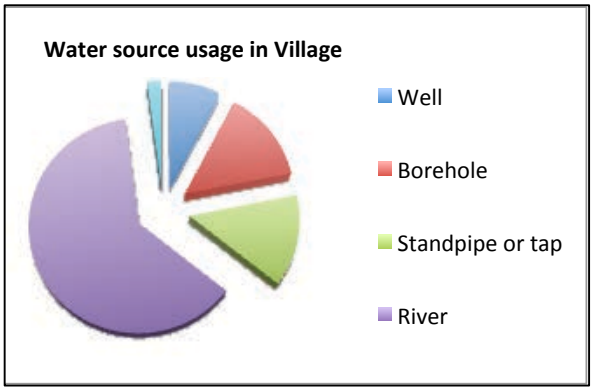


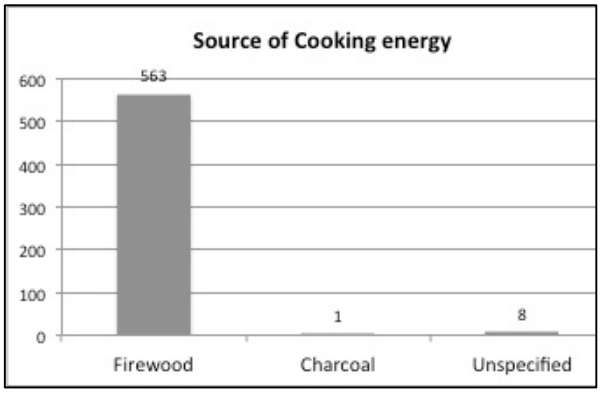
Figure 3: distribution of people in the two parks

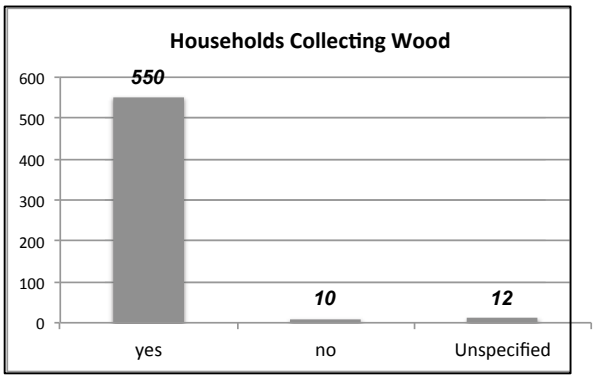
Whilst no systematic or comprehensive sets of data could be assembled on land uses in the park, a number of features and characteristics are clear.

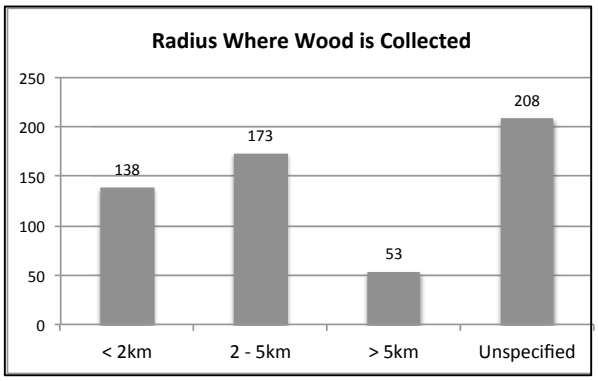
- The great majority of the area is open rural land.
- Exceptions are urban and peri-urban areas in the sizeable towns and settlements.
- According to Mr Belafonte (Deputy Director in Menongue):
    - There are no forest concessions in the park, though there are illicit logging operations. These are mostly in the southern areas of Cuando Cubango.
    - Trees with diameters of less than 20 cm (breast height) are considered to be firewood
    - Logging licences are for 5 years, but are renewable
    - Trees may only be harvested between March and September
    - The export of Devil's Claw has been banned by Presidential decree
    - Forestry and logging is seen as a way to diversify the econmy
    - Although there are many registered loggers and concessions, relatively little logging actually happens.
    - The most successful logging enterprises have foreign partners.

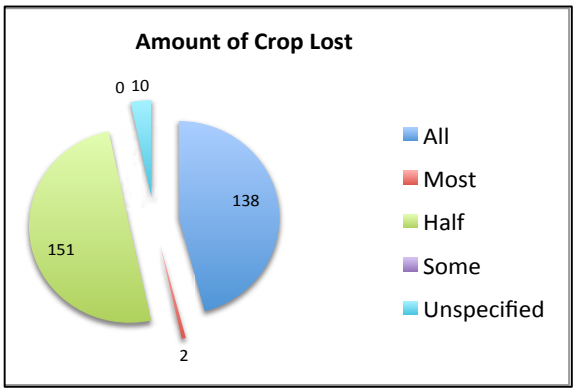
Most of the human population outside of the larger towns is concentrated in small settlements, with fewer than a hundred people per settlement. Most households practice subsistence agriculture, in a slash and burn practice. Some households also sell natural resources such as reeds and thatch grass. Private logging companies extract *Baikiaea plurijuga*, *Burkea africana*, and *Pterocarpus angolensis* within the area. The following graphs (data gathered by ACADIR) illustrate a range of resource use patterns as well as human-wildlife conflicts.

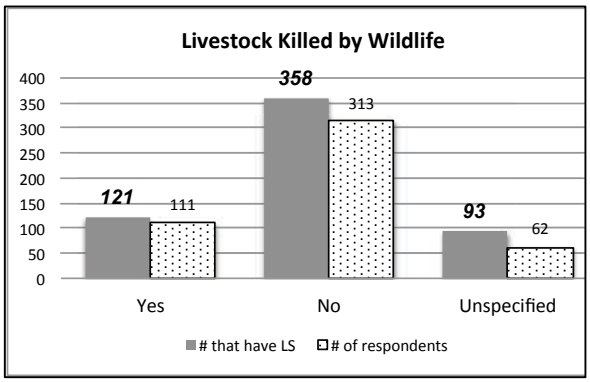

Water source usage in Village
Well
Borehole
Standpipe or tap
River

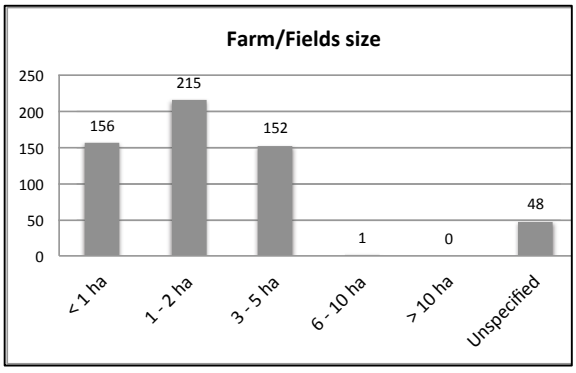

Source of Cooking energy
600
500
400
300
200
100
0
563
1
8
Firewood
Charcoal
Unspecified

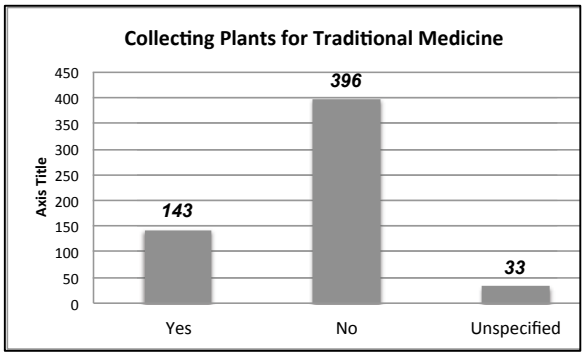

Households Collecting Wood
600
500
400
300
200
100
0
550
10
12
yes
no
Unspecified


Radius Where Wood is Collected
250
200
150
100
50
0
138
173
53
208
< 2km
2 - 5km
> 5km
Unspecified


Amount of Crop Lost
0
10
138
151
2
All
Most
Half
Some
Unspecified


Livestock Killed by Wildlife
400
350
300
250
200
150
100
50
0
121
111
358
313
93
62
Yes
No
Unspecified
that have LS
of respondents


Farm/Fields size
250
200
150
100
50
0
156
215
152
1
0
48
< 1 ha
1 - 2 ha
3 - 5 ha
6 - 10 ha
> 10 ha
Unspecified


Collecting Plants for Traditional Medicine
Axis Title
450
400
350
300
250
200
150
100
50
0
143
396
33
Yes
No
Unspecified

From the above graphs it is clear that the parks provide a great variety of ecosystem services and these are relied upon extensively by the park inhabitants.

According to IRDNC, Devils Claw harvested in Angola is brought into Namibia to sell (quantites vary from a few bags to single consignments of up to 6000kgs). The points of entry have been from Mucusso to Mushangara in the east, through Bwabwata village to the Chetto buying point and the favoured route through Omega 1.

Studies undertaken by TRAFFIC and IRDNC between 2010 and 2015 indicate that almost all of the timber being exported from Namibia is from Zambia and Angola. A total of 15 547 m^3 of Angolan timber was exported via Namibia between 2010 and 2014. This amount does not necessarily reflect the total amount actually leaving Angola through Namibia and is likely to be an underestimate of the true amount.

Large areas of the park burn each year[2] and evidence suggests that most fires are set by people, largely between June and September. There are no thunderstorms or lightening during the above-mentioned months that might cause natural fires. The map below shows the number of times that an area burnt over a period of 11 years, and it is clear from the map that the pronlem is less severe in Mavinga than Luengue-Luiana.

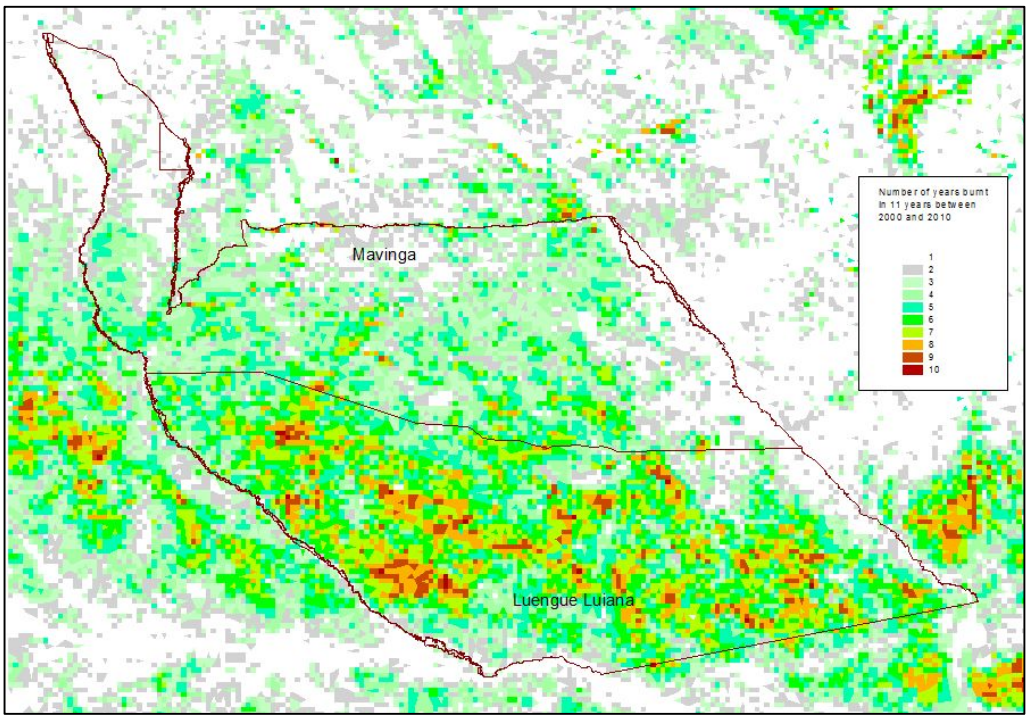


Figure 4: The number of times that an area burnt over a period of 11 years in and around the two parks.

[2] The data shown here come courtesy of Sally Archibald, and Modis Burnt Area products by David Roy, for the years 2000 to 2010, at 500 metre pixel resolution: http://wamis.meraka.org.za/products/firefrequency-map, and described by: Archibald S, Scholes R, Roy D, Roberts G & Boschetti L. 2010. Southern African fire regimes as revealed by remote sensing. *International Journal of Wildland Fire* 19 (7) 861-878.

5.3. infrastructure overview[3]

The road network within the park is fairly well developed (figure 5), though many of these roads are either in poor condition, or inaccessible because of landmines (figure 6).

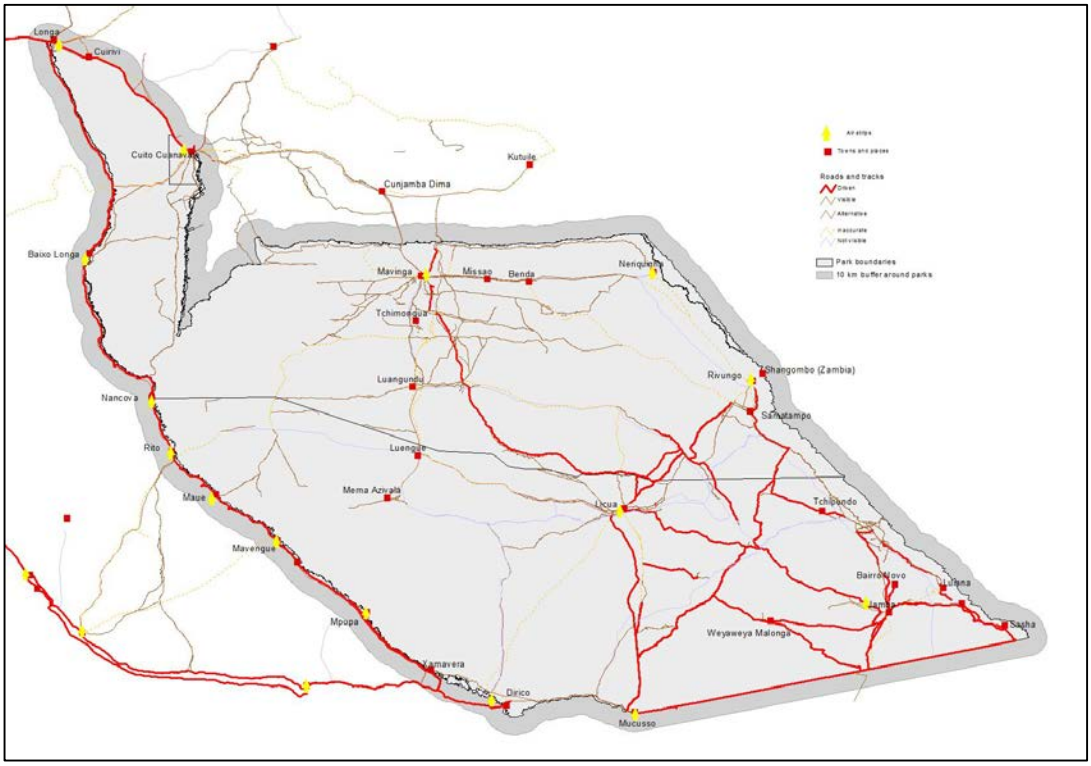


Figure 5: Current network of roads and airfields in the two parks

---

[3] Several road data sources were combined as a basis to develop the roads dataset, these had varying levels of accuracy. Roads were inspected against Google Earth Landsat imagery, adjusted and improved where possible. In addition, new roads found on the imagery were digitized and incorporated into the file. Roads have been classified as:
Driven – roads where the source was a GPS driven track, these came from RAISON field work and the 2015 Panthera field survey in the area. Panthera will survey other areas and roads in the 2 parks between June and December 2016, and that will yield valuable additional information on useable roads.
Visible – roads that accurately followed tracks that are clearly in satellite imagery but where the ground conditions of the roads is not known
Inaccurate – where the roads were visible but did not exactly follow tracks on satellite imagery and where the ground conditions of the road was unknown
Very old or not visible roads – which were not visible or which were visible for a short while but then disappeared
Some roads were also labeled as alternatives, where several dataset had versions or the same track, the best fitting track was labeled as either *driven* or visible as above.
Sources: Google Earth satellite imagery, Peace Parks Foundation roads dataset, Panthera field survey driven tracks, RAISON driven tracks, CNIDA roads dataset.

Air strips:
Lists of air strips, their approximate locations and status for use were provided by Marijn Goud (MAF: Mission Aviation Fellowship) and Ken O'Connell (MGM – Menschen Gegen Minen).

Services:
Information on the locations of schools, health facilities, police stations and administrative offices in major towns were provided by Gime Sebastiao (Menongue: Okavango Toursim Project), ACADIR and from personal observations in the field. The information available is tabulated in an Eccel file: Places and infrastructure.xlsx

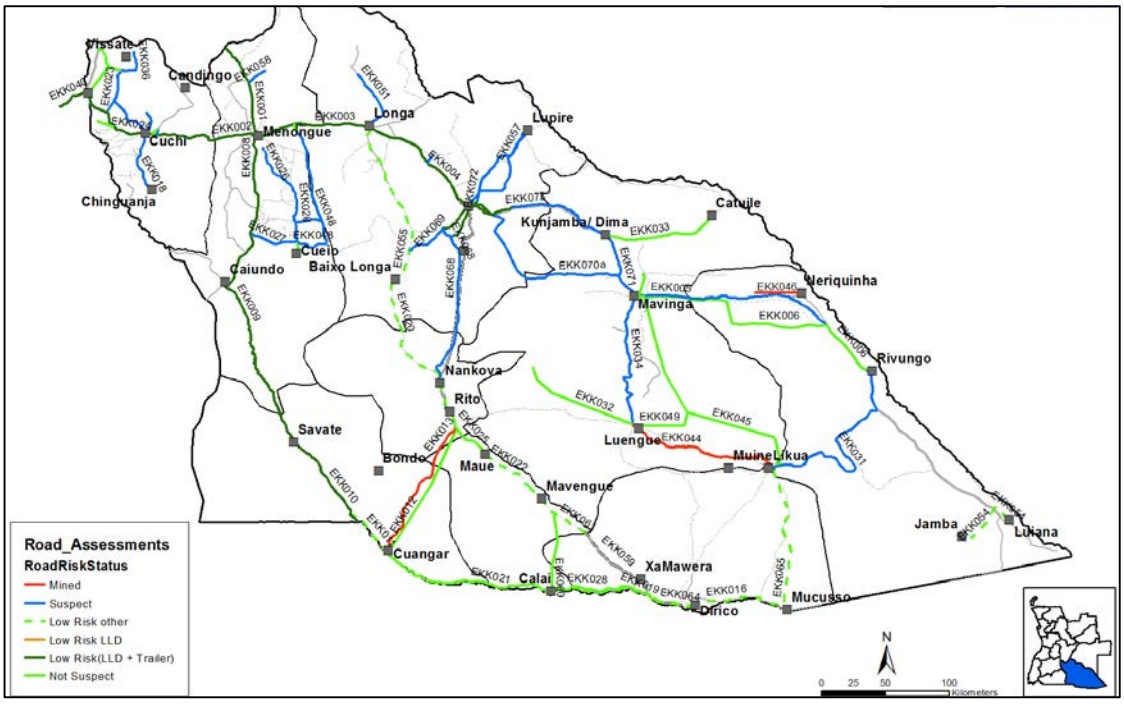


Figure 6: Current status of landmines[4] in the two parks.

5.4. Ecological overview

5.4.1. Natural habitats

Mendelsohn (2016 unpub[5]) has identified the following five habitats in the two parks: open woodland, dense woodland, open grassland, aquatic vegetation, and cultivated land (figure 7).

[4] Source: Halo Trust 2016

[5] Derived from the following sets of data and satellite imagery: classification of LandSat images produced by KAZA, classification of LandSat images produced by Panthera, classification of forest cover and forest loss produced by Matt Hansen (see Hansen MC, PV Potapov, R Moore, M Hancher,S A Turubanova, A Tyukavina, D Thau, SV Stehman, SJ Goetz, TR Loveland, A Kommareddy, A Egorov, L Chini, CO Justice & JRG Townshend. 2013. High-Resolution Global Maps of 21st-Century Forest Cover Change. *Science* 342: 850–53.), and Enhanced Vegetation Index (EVI) data sets for 2000 to 2012 from Africa Soil Information Service: (AfSIS) http://www.africasoils.net/data/datasets?Page=1). Additionally, clear and prominent areas of floodplains, marshes and open grassland were digitised from images available through Bing and Google Earth.

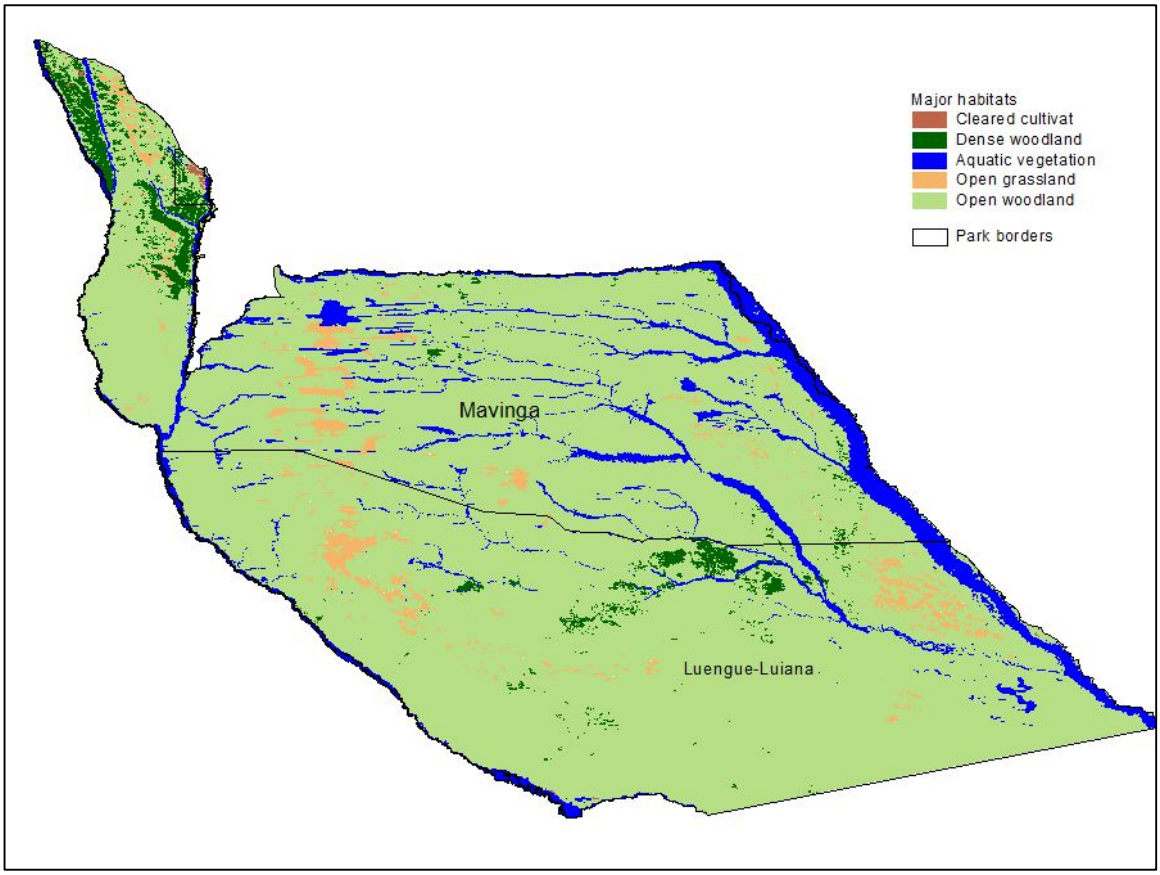
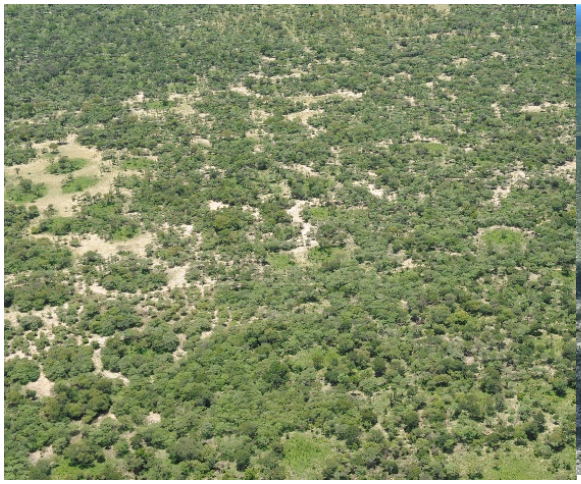


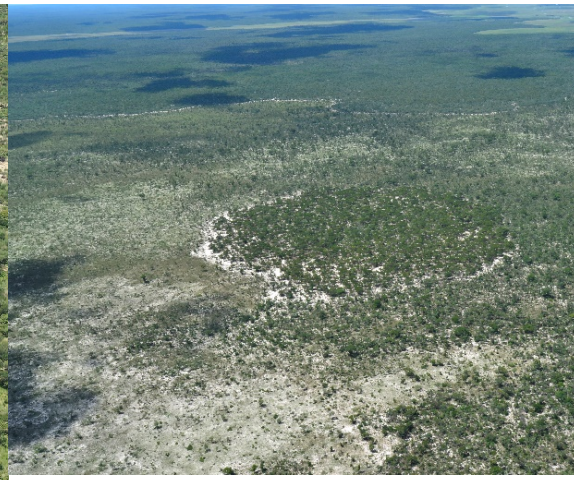
Figure 7: Habitats in the two parks

Open woodland covers most of the two parks, and characteristically consists of fairly widely spaced trees and limited grass cover. The trees are dominated by *Erythropheum, Burkea, Julbernadia* and *Guibortia* towards the northern areas. Some areas are more heavily covered in shrubs. Grass cover in most Open Woodland was sparse, probably as a result of allelopathy and the underlying sandy substrate that is heavily leached and holds little water.

Expanse of typical open woodland with its sparse cover of grasses	Close-up of open woodland, in this case with more grass cover than in most areas



Mosaic of patches of grassland and woodland collectively forming open woodland habitat



A ‘fairy forest’ surrounded by a margin of bare ground and open areas dominated largely by shrubs.

Dense woodland occurs in northern Mavinga Park, especially between the Longa and Cuito Rivers. This is dense miombo woodland, usually less than 15 metres in height and dominated by *Brachystegias, Julbernadia, Guibortia*, and probably *Cryptosepalum*.

Dense woodland (right) found in the Licua area adjoining open woodland to the left

Dense miombo woodland or forest in north-western Mavinga National Park

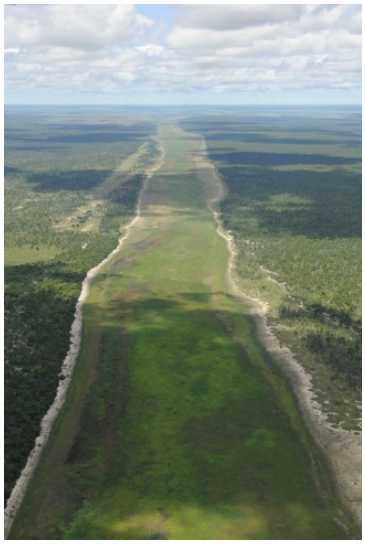
Aquatic vegetation flanks all the rivers in the parks and some interdune valleys that later feed into rivers. The greatest expanses are either side of the Cuando River where the inundated marshlands are generally 10-15 kilometres in breadth. Vegetation is tallest, most dense and often dominated by papyrus close to the river courses and also in their lower reaches. *Phragmites, Miscanthus* and other aquatic grasses and sedges are generally found in shallower water further upstream and away from the river courses. This may reflect a poorer supply of nutrients in upstream areas and away from flowing water. The Cuito River and its floodplains support few papyrus or other tall, dense plants because the extremely low nutrient content of Cuito water. Numerous wooded islands in all areas of aquatic vegetation.

Floodplains along and at the confluence of the Cuito and Longa Rivers

The broad swathe of marshlands that form the Cuando River valley north of Rivungo

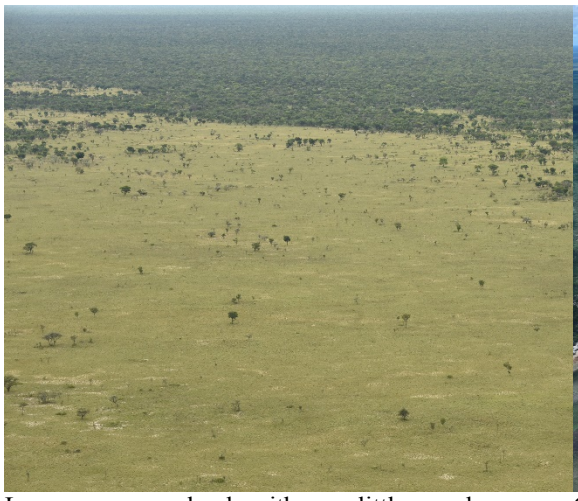
The Longa rice irrigation project on the floodplains of the Longa River

The mosaic of wooded, islands, floodplains and channels that form the broad Luiana River

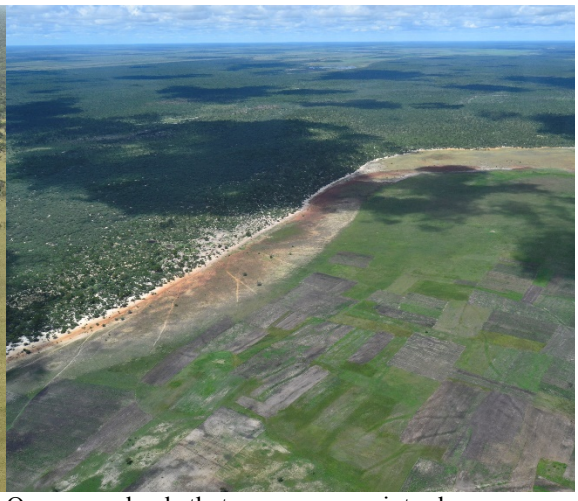


Left: an interdune valley that is often flooded and that forms the headwaters of the Cubia River, a major tributary of the Cuando River.

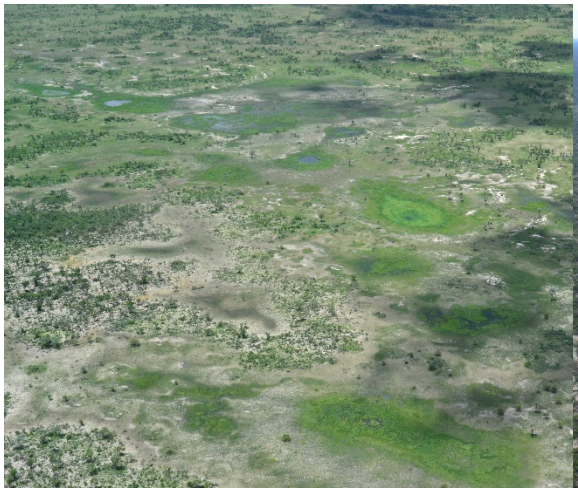
Open grassland areas probably all have a history of inundation during wetter periods. Hardpans probably underlie all these grasslands which also burn very often. Many grasslands are indeed still flooded during particularly wet years, and the division between open grasslands and areas of aquatic vegetation is thus vague in some places. Those areas flooded most frequently support few trees, unlike patches of more wooded grassland that have seldom been inundated in recent times. Between the Cuando and Luiana Rivers there is a broad matrix of grassland patches and woodland which in former times was probably a large floodplain, perhaps dotted with raised, wooded termite mounds.



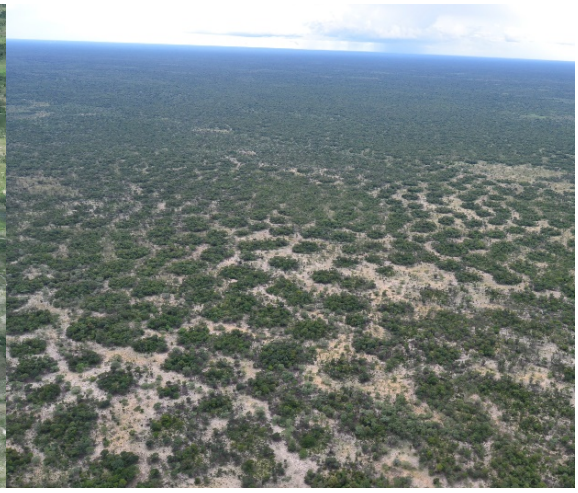
Large open grasslands with very little woody cover



Open grasslands that were once an interdune valley but now extensively cultivated

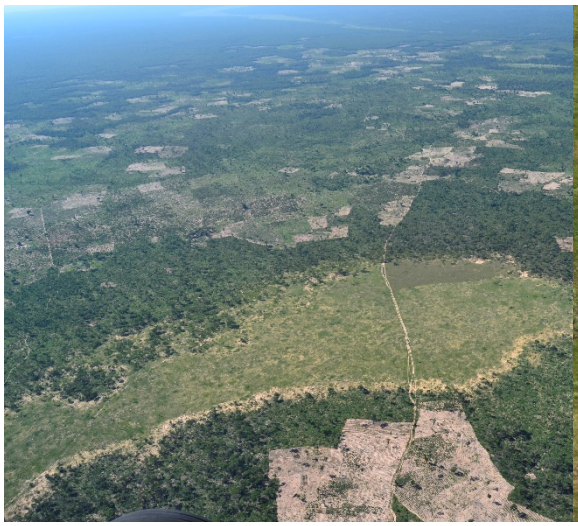


Open grasslands dotted with small pans (green circular patches) and higher areas that support Hyphaene palms and other woody plants



Matrix of grasslands and wooded islands in what was formerly probably an extensive floodplain

Cultivated land is most prominent in the northern areas of Mavinga National Park between and around the towns of Longa and Cuito Cuanavale. Many other smaller patches of cleared woodland were not mapped, mainly because they were not detected by the LandSat classifications or they were cleared subsequent to those and other images being collected. Additionally, a great number of fields in floodplains were not mapped. The GIS data are thus rather inadequate in revealing the extent and distribution of land used for crops. A better measure of this is provided by the mapping of households and villages.



Mosaic of fallow and recently cleared fields used mainly to grow manioc in the area between Longa and Cuito Cuanavale. The surrounding woodland is dense miombo.

Fields of sweet potatoes, maize, sugar cane and other vegetables planted in alluvial soils of the Lomba River's floodplains.

Aquatic vegetation flanks all the rivers in the park and some interdune valleys that later feed into rivers. The greatest expanses are either side of the Cuando River where the inundated marshlands are generally 10-15 kilometres in breadth. Vegetation is tallest, dense and often dominated by papyrus close to the river courses and also in their lower reaches. *Phragmites*, *Miscanthus* and other aquatic grasses and sedges are generally found in shallower water

further upstream and away from the river courses. This may reflect a poorer supply of nutrients in upstream areas and away from flowing water. The Cuito River and its floodplains support few papyrus or other tall, dense plants because of the extremely low nutrient content of Cuito water.

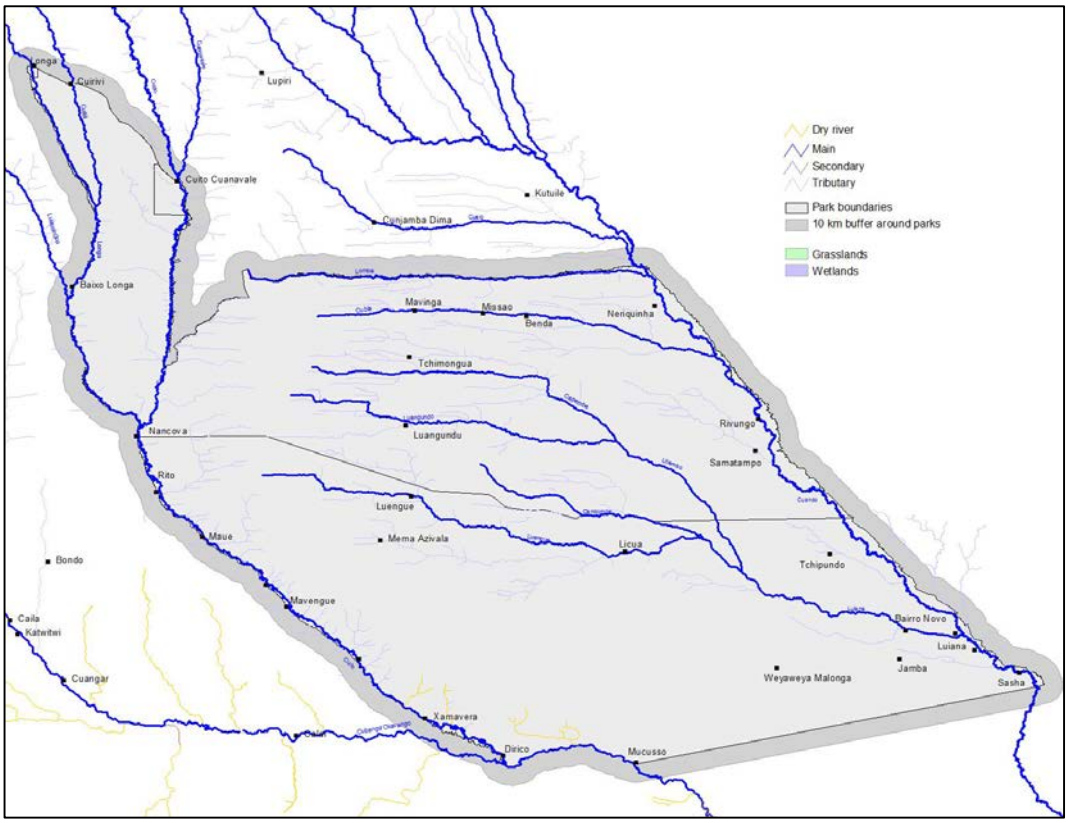
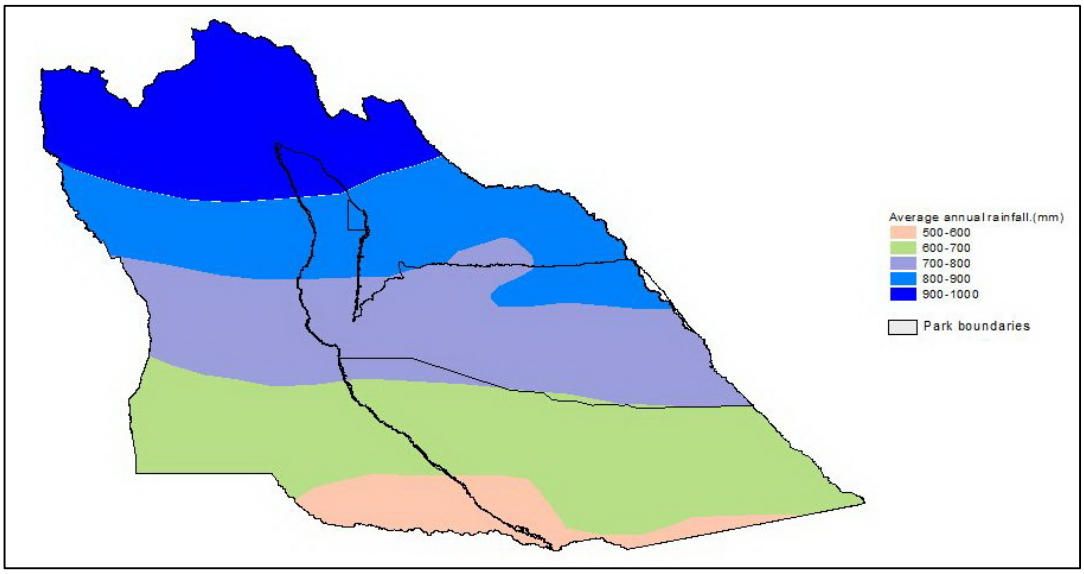


Figure 8: Rivers (above) and rainfall (below) in the two parks.



The perrenial Cuito is deep flowing with clear, open channels. The meandering nature of the river occasionally cuts into the mainland which then provides a mixed woodland habitat on the fringe of the main river channel. Small interspersed palm islands (*Phoenix reclinata*) can also be found dotted in the adjacent floodplains of the river. The lower Cuito River is mainly fed from the upstream catchments of the Cuito and Longa river systems, but a number of smaller tributaries recharge this lower section of the river downstream of the Longa-Cuito junction. These smaller tributaries generally feed from the eastern bank of the Cuito where a gentle escarpment can be found. These feeder channels appear to be seasonal and recharged by rainfall in the lower catchment of this system. The lower Cuito is also characterised by a number of rocky rapids which have been formed by protruding rocky outcrops that run across this river channel. These rapids create partial barriers along the river and offer a unique aquatic habitat for many species. The Cuito river spills water into adjacent floodplains after the summer rains. These floodplains are extensive in some parts and increase the size of this aquatic habitat dramatically. Access into these floodplains is extremely difficult as it is too vegetated and shallow for a motor boat and access on foot is not safe due to crocodiles and hippo in the area.

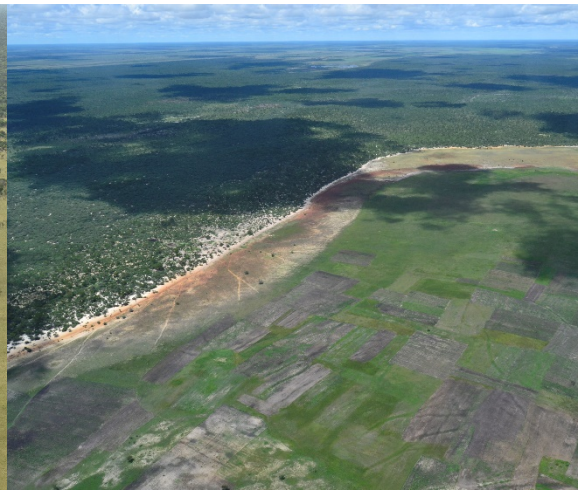
The lower Cuando River is a fairly narrow, slow flowing river lined by *Phragmites* reeds and channel fringing emergents. This river "valley" system is a very wide floodplain (up to 5km wide at some points) that is made up of a number of narrow flowing streams which are likely to vary in strength and depth as the water levels increase and decrease. The sediment load of this river is very likely to play a major part in the flow dynamics of these smaller channels. Access onto the main channel is only possible at a few specific sites where the river channel cuts into the mainland on western bank. The Cuando River is fed mainly by the Luiana river system, who's catchment is in the central part of Angola. A smaller catchment area on the Zambian side feeds into the Cuando near the village of Luiana. From this point onwards, the Cuando travels as a single river channel through this very wide floodplain system.

Floodplains along and at the confluence of the Cuito and Longa Rivers

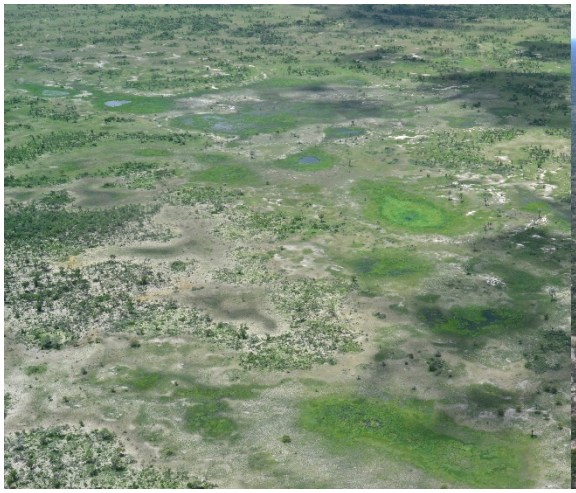
The broad swathe of marshlands that form the Cuando River valley north of Rivungo

Open grassland areas probably all have a history of inundation during wetter periods. Hardpans probably underlie all these grasslands which burn regularly. Many grasslands are indeed still flooded during particularly wet years, and the division between open grasslands and areas of aquatic vegetation is thus vague in some places. Those areas flooded most frequently support few trees, unlike patches of more wooded grassland that have seldom been inundated in recent times.

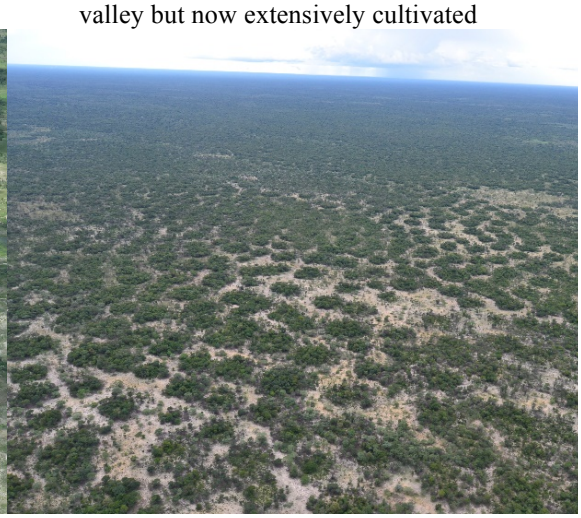
Large open grasslands with very little woody cover



Open grasslands that were once an interdune valley but now extensively cultivated



Open grasslands dotted with small pans (green circular patches) and higher areas that support *Hyphaene* palms and other woody plants



Matrix of grasslands and wooded islands in what was formerly probably an extensive floodplain

5.4.2. **Wildlife**

The three-decades long Angolan Civil War contributed to the serious decline of the once abundant wildlife communities, particularly larger mammals[6]. Verissimo (2008) states that more than 150 species of mammals occurred historically in Kuando Kubango. A 2008 survey of the previously-named Mucasso Game Reserve (now part of Luengue-Luiana National Park) confirmed the presence of 39 different species of mammals reported during the survey in the reserve (***Table 1***).

Table 1 **– List of species confirmed to be present in the Mucusso Game Reserve.**
Aardvark - *Orycteropus afer*
African Buffalo - *Syncerus caffer*
African Civet - *Civettictis civetta*
African Elephant - *Loxodonta africana*
African Wild Cat - *Felis lybica*
Banded Mongoose - *Mungus mungo*
Bat-eared Fox - *Otocyon megalotis*
Bushbuck - *Tragelaphus scriptus*
Bushpig - *Potamochoerus larvatus*
Cape Clawless Otter - *Aonyx capensis*
Caracal - *Caracal caracal*
Common Duiker - *Sylvicapra grimmia*
Common Reedbuck - *Redunca arundinum*
Common Warthog - *Phacochoerus africanus*
Giraffe - *Giraffa camelopardalis*
Greater Cane Rat - *Thryonomys swinderianus*
Greater Kudu - *Tragelaphus Tragelaphus*
Hippopotamus - *Hippopotamus amphibius*
Honey Badger - *Mellivora capensis*
Large Grey Mongoose - *Herpestes ichneumon*
Lechwe - *Kobus leche*
Leopard - *Panthera pardus*
Porcupine - *Hystrix africaeaustralis*
Roan - *Hippotragus equinus*
Sable - *Hippotragus niger*
Scrub Hare - *Lepus saxatilis*
Serval - *Leptailuruss serval*
Side-striped Jackal - *Canis adustus*
Sitatunga - *Tragelaphus spekei*
Slender Mongoose -*Galerella sanguinea*
Small-spotted Genet - *Genetta genetta*
Southern Lesser Galago - *Galago moholi*
Spotted Hyena - *Crocuta crocuta*
Spring Hare - *Pedetes capensis*
Steenbok - *Raphicerus campestris*
Striped Polecat - *Ictonyx striatus*
Tree Squirrel - *Paraxerus cepapi*
Vervet monkey - *Cercopithecus aethiops*
Wild Dog - *Lycaon pictus*

[6] From a report prepared for USAID by Verissimo 2008

In addition to this list, the above author reports that additional species that occur in the greater Kwando-Kubango area include Baboon (*Papio ursinus*), Blackbacked jackal (*Canis mesomelas*), Bat-eared fox (*Otocyon megalotis*), Aardwolf (*Proteles cristatus*), Lion (*panthera leo*), Cheetah (*Acinonyx jubatus*), Pangolin (*Smutsia temminckii*), Plains zebra (*Equus burchellii*), Black rhinoceros (*Diceros bicornis*), Eland (*Taurotragus oryx*), Oribi (*Ourebia ourebi*), Waterbuck (*Kobus ellipsiprymnus*), and Impala (*Aepyceros melampus*).

Recent data[7] show that **large mammals** are more abundant in the south-east than elsewhere in the areas surveyed. Additionally, abundance seems highest close to the Luiana, Okavango and Cuando Rivers. This is in keeping with observations on soil nutrients, aquatic vegetation luxuriance and water bird abundance, which suggest that nutrients are more available in the south and in the lower reaches of these rivers.

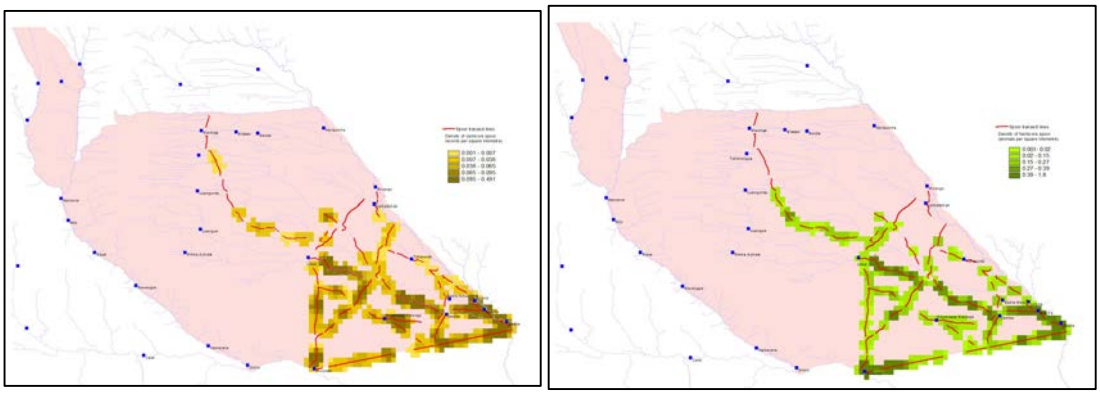


Figure 9: Distribution of carivores (left) and herbivores (right) in the two parks

A recent survey found that the abundance of waterbirds in the Cuito is low upstream, but much higher in the lower reaches. Notably, no piscovorous birds were recorded in the first 180 kilometers of the river, suggesting that few fish occur in the upper reaches of the Cuito River.

All these observations are in keeping with the general conclusion that the Cuito (and other rivers in the Parks) have extremely low nutrient contents, and that nutrient levels increase downstream. The same is true for suspended solids and other dissolved materials.

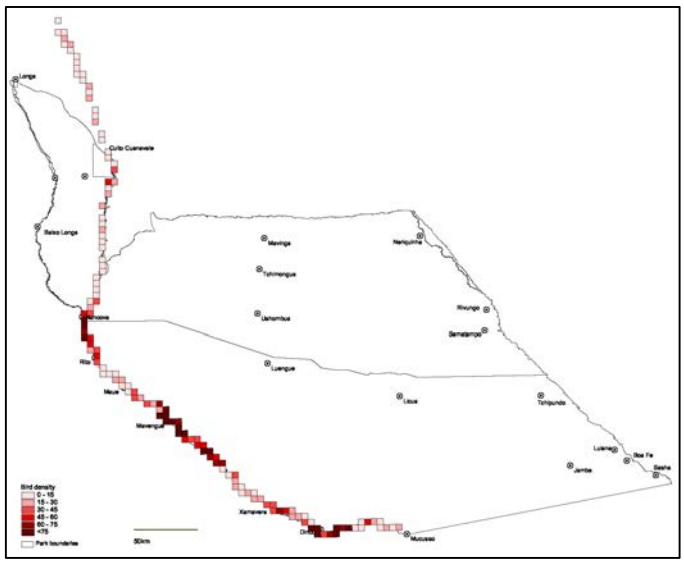


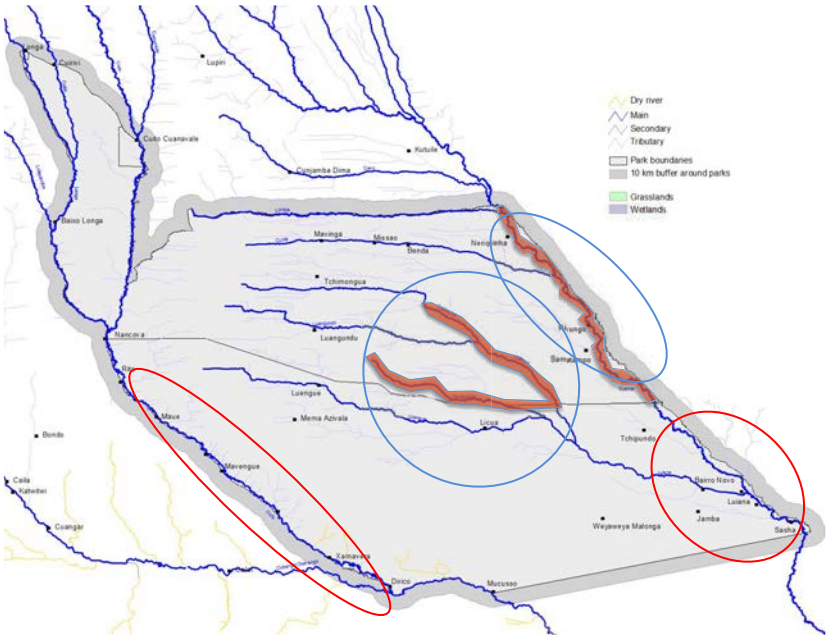
Figure 10: Bird densities in the Cuito river (source: National Geographic Okavango Expedition, 2015)

[7] Data provided by panthera, 2016

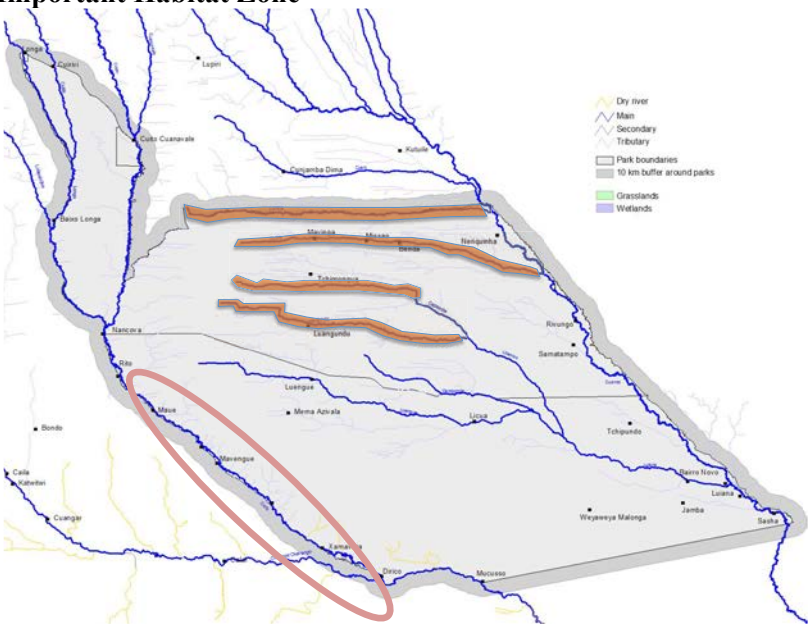
5.5. Sensitivity and zonation

Based on the importance of habitats for biodiversity and the provision of ecological services, the following zonation is proposed:

Very Important Habitat Zone



Important Habitat Zone



Less Important Habitat Zone
None proposed

6. Management priorities: Ecological

Based on literature, stakeholder consultations and expert opinion, the immediate **ecological management** priorities are:

- Controlling fires
- Combatting poaching and illegal logging
- Improving connectivity with neighbouring conservation areas
- Reducing human-wildlife conflicts
- Stopping the spread of urban and cultivation areas
- Improving knowledge about biodiversity in the park.

From an **institutional and development perspective**, the top priorities are:

- Removing landmines
- Clarifying staff structures, job descriptions and performance indicators
- Construction of park entrance gates and the accompanying offices to control entry/exit
- Construction of staff accommodation, garages, store-rooms etc.[8]
- Developing partnerships with local communities
- Raising awareness about the park among residents and authorities
- Developing park-specific regulations
- Identifying tourism potential and initiating an investor conference to attract interest.

6.1. Controlling fires

Problem statement:
The landscape of Mavinga NP is characterized as a fire-dependent Savanna. Fires caused by lightning typically occur during the rainy season, but most of the fires in the park nowadays occur late in the dry season (especially in the Luengue-Luiana National Park). This shows that they are purposefully ignited by humans. This "traditional burning" is used to enhance the subsistence livelihood through slash-and-burn agriculture, enhancement of grazing (domestic and wildlife), driving wildlife for hunting, honey gathering, and pest control.

Recently, the amount of fire is exceeding the ecosystems' capability to maintain historic vegetation species composition and structure, and thus wildlife. This is also likely to lead to degradation of soil productivity impacting both sustenance for humans and wildlife.

The early season of May-July is when fires generally are low intensity and have a high probability of self-extinguishment with nighttime humidity recovery because only fine grasses and herbaceous vegetation burns. From August through October (till the onset of rains) the dryness of shrub and trees results in large fast moving fires that are very difficult to extinguish.

An example of early versus late area burned by fire can be found in the map below. With the yellow areas being early season burning and the red being late season burning. The amount

[8] The authors of this management plan do not have sufficient knowledge of the park to identify the most efficient location for staff infrastructure – it is recommended that a workshop be held internally amongst park authorities to prioritise accommodation requirements.

of late season burning correlates to significant vegetation impacts to human and wildlife sustenance.

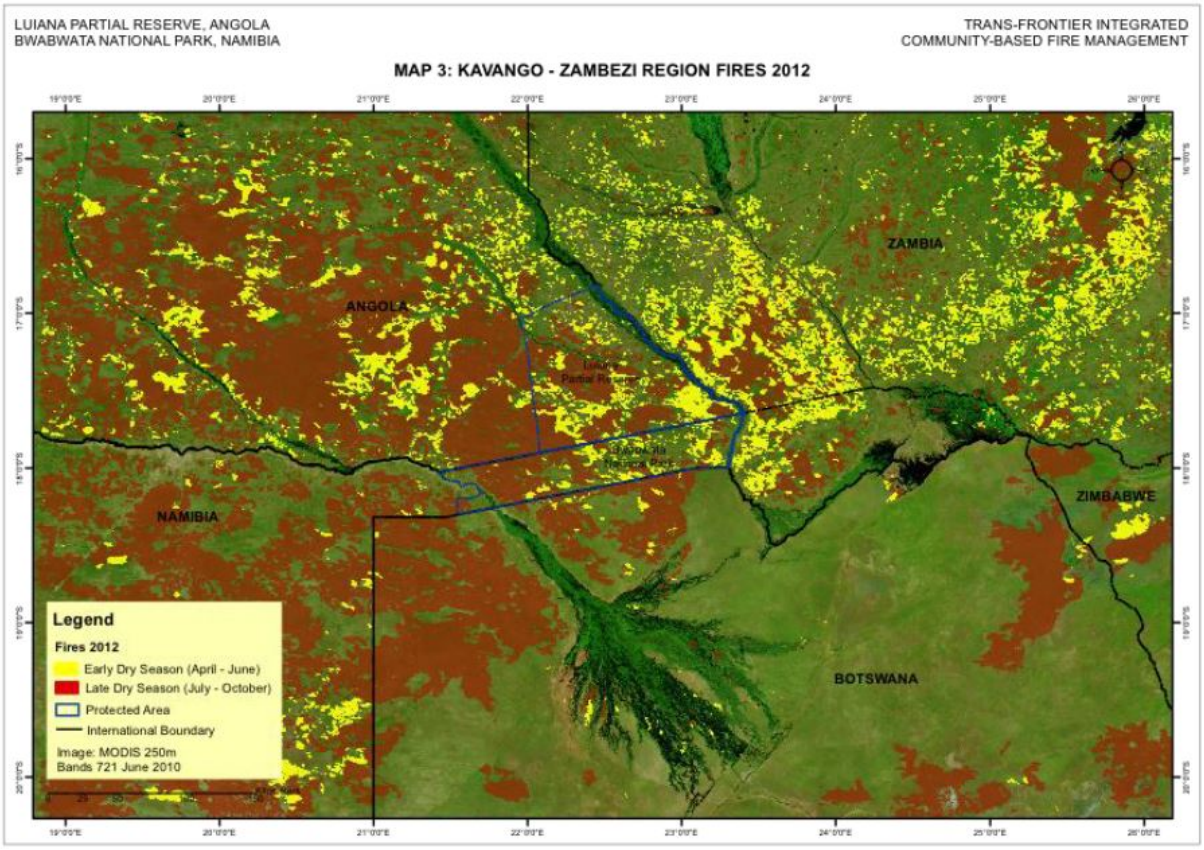


Figure 11: Fires during different seasons in and around the two parks. Source: Beaty, 321Fire. 2014. Integrated Transfrontier Fire Management – A Proposed Approach. Liuana Partial Reserve, Angola & Bwabwata National Park, Namibia

There is an immediate need to reduce fires. The most efficient means to do this is to institute a public education and information campaign to influence the timing of burning without impacting peoples need for burning. Agriculture and honey production burning can be done after initial onset of rains or literally just as a rain storm is approaching. Dry grasses/ stubble will burn soon after rain events. Dead grass and herbaceous material is called a "1-hour" fuel because it generally transitions from full moisture content to dry enough and is available to burn within approximately 1 hour. Timber over 10 cm is termed a "1000 hour fuel" due to the considerable length of time it requires to dry out to be available to burn from being at full moisture content.

Management actions

Action	Who and how	When	Indicator of success
Establish burning seasons	• Park authorities must initiate, but supported by local people. • November 1 to June 30 is "Open" (unrestricted) burning; • July 1 to October 30 is "Closed"	Initiate within year 1, and then continuous	See below

	burning. (Subject to permits).		
Conduct public awareness campaigns	Park authorities must take the iniative. Traditional leaders and other authorities must help. Messages could include slogans such as: • You can prevent wildfires • Don't burn during the closed season -when it's hot, dry, and windy. Communicate these messges via radio, pamphlets and signboards.	Initiate within year 1, and then continuous	Incidence of fires in closed season decreases by 20% each year from year 2
Create firebreaks	Utilize existing road networks as fire breaks. Reduce shrub/timber fuels within 10m on each side of the road/track. Park authorities, assisted by the road maintenance agency, to do this. Where possible, clear manually (not with machinery or chemicals) using local labour.	Start in year 1 (50kms of road), add another 50km each year.	200 kms of road verge "cleared" of bush by 2020
Transboundary cooperation	Greater involvement by park authorities and community-based organisations in the Angola/Namibia Cross-Border Fire Management programme. This can be done in partnership between ACADIR (Angola) and IRDNC (Namibia). Also, Integrated Transfrontier Fire Management should be implemented.	Continue with existing arrangements, but increase involvement gradually.	All transboundary meetings attended by senior staff, and feedback given thereafter to all park staff and relevant communities.

6.2. Combatting poaching and illegal logging

Problem statement:
Poaching over the past 30 years or more has depleted all species of wildlife in the park. Organized hunting parties poached for meat and to sell Elephant and Hippo ivory and Rhinoceros horns. Also, the availability of guns and ammunition, and lack of regulation facilitated hunting by anyone living in the area at that time.

Poaching still occurs but at much lower intensity, partly because game is now scarce. The poachers are Angolans, people from neighbouring countries, and some foreigners (non-Africans). Factors that contribute to the poaching include poverty, lack of law enforcement, lack of conservation awareness, and permeability of the international border.

The target species poached are primarily medium to large antelopes and buffalo. A lesser concern is low-intensity hunting by local communities for own consumption, but this should not be allowed to escalate.

Residents use old weapons, spears, bows and arrows, dogs and traps as hunting tools. Local hunters also commonly use fire as a hunting tool, either to drive animals out of an area or to catalyse the growth of new green grass, which attracts animals that are targeted for hunting.

Fire started by hunters often spreads to create vast burned areas, though generating meagre hunting profits. In general, traditional hunting should not pose a threat to the mammal populations so long as the human density is low, hunting is not commercialised, and the target species occur in healthy numbers.

Excessive hunting continues to represent the greatest single threat to many mammal species in the park, and it must be controlled as a matter of urgency.

Management actions

Action	Who and how	When	Indicator of success
Undertake anti poaching/illegal logging law enforcement	Park authorities must initiate, but supported by local people. (see next action) and the police. Arrest and prosecute anyone involved in illegal commercial hunting and logging. Park authority must inform people (via radio, pamphlets and signboards) that (1) this is a park (2) poaching and illegal logging is prohibited and (3) transport of bushmeat and logs/timber/wood originating from the park, to Namibia or any other country, is prohibited.	Initiate within year 1, and then continuous	Incidence of illegal hunting and logging decreases from x in 2015 to y by 2020
Develop partnerships with local communities, particularly those in remote areas with wildlife and forests.	Park authorities must take the iniative. Recognise the value of local knowledge and develop initiatives which create tangible benefits to communities in return for them helping to conserve wildlife and forests (learn from Bwabwata experience)	Initiate within year 1, and then continuous	3 formal partnership arrangements in place by 2020
Improve transboundary conservation	Angolan wildlife authorities must have greater involvement in the KAZA-TFCA. Establish Parks & Wildlife joint committee with counterparts in Namibia and Zambia - build & maintain good, regular communications and collaboration.	Continue with existing arrangements, but increase involvement gradually	All KAZA TFCA meetings attended by senior staff, and feedback given thereafter to all park staff.

6.3. Improving connectivity with neighbouring conservation areas

Problem statement
This park cannot be managed in isolation, since its habitats, wildlife and people are interlinked with those of neighbouring countries, particularly Namibia and Zambia. There is an increase in the movement of wildlife between these countries, and because of this, there is a need for more collaboration. The management actions for this issue overlap somewhat with "combatting poaching and illegal logging" (see earlier text), but there are some additional management actions required under this heading.

Management actions

Action	Who and how	When	Indicator of success
Develop partnerships with local communities, NGOs and authorities in neighbouring conservation areas.	• Angolan wildlife authorities must have greater involvement in the KAZA-TFCA. • Establish Parks & Wildlife joint committee with counterparts in Namibia and Zambia - build & maintain good, regular communications and collaboration.	Continue with existing arrangements, but increase involvement gradually	All KAZA TFCA meetings attended by senior staff, and feedback given thereafter to all park staff.
Improve transboundary natural resources management.	Park authorities must work closely with counterparts in Namibia and Zambia regarding • Game surveys • Corridor mapping • Fire management • Information exchange • Acknowledging indigenous knowledge systems Park authorities need to lobby security and aviation authorities to make ground and aerial surveys easier to undertake – especially by foreign/ neighbouring researchers.	Continue with existing arrangements, but increase involvement gradually	Increasing interaction and cooperation with neighbouring country authorities, NGOs and researchers.
Reduce barriers that prevent wildlife movement	Park authorities need to work closely with veterinary authorities and security authorities to determine whether boundary and/or veterinary fences can be removed entirely/in specific places that are important wildlife corridors.	Start in 2017	Unnecessary fences are removed.

6.4. Reducing human-wildlife conflicts

Problem statement
Human-wildlife conflicts (HWC), especially crop-raiding elephant and, to a lesser extent hippo, negatively impact local community livelihoods. Predation of livestock by hyena has also become a concern. HWC will continue to increase if cultivation and livestock numbers escalate and they occur in areas increasingly utilised by wildlife.

Management action

Action	Who and how	When	Indicator of success
Limit spread of human settlements in the park	Park authorities must initiate, but supported by other authorities. Authorities responsible for allocating land, must not allow people to move into virgin land in the "very important" and "important habitat zones". Park authority must inform people (via radio, pamphlets and signboards) that (1) this is a park and (2) moving into virgin land in the above zones is not permitted.	Initiate within year 1, and then continuous	Human settlements do not increase in these zones
Establish wildlife corridors	Park authorities, with assistance of local knowledge, should map wildlife corridors and declare these areas "out of bounds" for any new developments or settlements, other than tourism Park authority must inform people (via radio, pamphlets and signboards) that (1) this is a park and (2) moving into virgin land in the wildlife corridors is not permitted.	Initiate in year 3 – some work has already been done by the KAZA TFCA initiative – refer to this as a start.	Human settlements and other developments do not increase in these corridors.
Educate communities in methods to protect crops and livestock from predators.	Park authorities must take the iniative, but local knowledge should be sought. Obtain advice from IRDNC who have been testing various techniques in Bwabwata and eastern Zambezi region, as well as partners in Zambia.	Initiate within year 1, and then continuous	HWC decreas year-on-year
Promote conservation agriculture so that communities can improve their livelihoods without	Park authorities should request assistance from agriculture authorities to initiate a series of learning activities and pilot projects. There are many good examples of CA in Zambia and	Initiate in 2018 and then continuous	CA becomes the default agricultural practice, quickly replacing the environmentally destructive slash and

necessarily expanding their land use footprint	Namibia that could be visited.		burn practices
Limit increase in livestock numbers in the park	Angolan authorities must inform Namibian authorities that the practice of Namibian cattle entering the park, should cease	Communicate with Namibian authorities in year 1.	No Namibian cattle in the park.

6.5. Improving knowledge about biodiversity in the park

Problem statement:
Given that not much research and monitoring has taken place in the park so far, there is a need for improving knowledge about what wildlife occur where (species and numbers), how they move, trends, etc. At this stage, there is insufficient data to suggest detailed wildlife or habitat management, other than the management actions mentioned earlier. Over time, data and knowledge will increase and a clearer picture will emerge as to what other needs to be done.

Management action:

Action	Who and how	When	Indicator of success
Design and implement integrated monitoring systems for rainfall, vegetation condition and wildlife (numbers, age & sex classes and condition), making use of "Event Book" system	Park authorities must do this, with assistance from NGOs and other partners – can use road counts, aerial surveys, GIS, camera traps, spoor surveys, obtain information from local hunter-gatherers. Confer with IRDNC to get idea from their work in Bwabwata and Zambezi conservancies.	Design during 2017, compile a budget, organise a "partnership conference", and implementation thereafter - and ongoing	Annual biodiversity reports – gradually build up an inventory of knowledge.

7. Management priorities: Institutional and development

7.1. Clarifying staff structures, job descriptions and performance indicators

Problem statement:
Since the park is relatively new, there is a need to revisit the infrastructure and staff structure. Also, now that we have a first management plan, the job descriptions and performance indicators of the staff need to be aligned to the management priorities that have been identified.

Management action:

Action	Who and how	When	Indicator of success
Removal of all remaining landmines	Security officials with their local and international partners should	De-mining is already underway, and it	Zero mines by xxxxx?

from the road network.	take the lead on this, but park staff need to be involved, even if only being informed of progress.	must continue and be intensified	
Revisit the staff structure, compile outcomes-based job descriptions and attach performance indicators that will reliably measure how well staff are doing their job, and how effective their efforts are.[9]	Park authorities must do this, with assistance from senior administrators. Contact authorities in Namibia and Zambia for some ideas on what job descriptions should look like. Plan for where staff should be located throughout the park so that there is adequate coverage to enable proper management.	Revisit the structure and develop job descriptions during 2017. Plan where staff should be located for optimum efficiency and area coverage. Implement thereafter - and ongoing	Staff are clear about what is expected from them.

7.2. Developing partnerships with local communities

Problem statement
Many of the staff assigned to the park have limited knowledge about the park, and some are not even based in the park. Thus, they are possibly not in a good position to take informed decisions. By contrast, hunter-gatherer communities have lived and survived in the area for decades if not centuries, and they consequently have generations of traditional knowledge. This could be of great value to park authorities.

Management Action

Action	Who and how	When	Indicator of success
Reach out to rural hunter-gatherer communities and develop a management partnership with them.	Park authorities must take the initiative, identify suitable communities, and begin to engage them with the view of developing a mutually-beneficial partnership. Key to this partnership is understanding each Party's incentives – why they would want to be in the partnership in the first place, and what would keep them interested in the long term.	Initiate in 2017	Partnership agreements, preferably in writing or verbal.

7.3. Raising awareness about the park among residents and authorities

Problem statement
Only 20% of the people surveyed by ACADIR during 2016, are aware that they are residing inside a national park. Unless awareness about the status of the land is addressed, it will be very difficult to achieve cooperation from residents regarding compliance with laws.

Management Action

[9] Due to time and other constraints, the consultants who compiled the management plan were not able to traverse the park and do a proper staff assessment. It is therefore proposed that this task be done during the initial implementation phase of this first management plan.

Action	Who and how	When	Indicator of success
Inform residents about the fact they are residing within a park	Park authorities must initiate, but supported by NGOs, schools, churches and traditional leaders. Park authority must inform people (via radio, pamphlets and signboards) that this is a park.	Initiate within year 1, and then continuous	Knowledge about the status of the area improves significantly, reaching 80% by 2020.

7.4. Developing park-specific regulations

Problem statement
Being new, the park does not have regulations specific to itself. Whilst national laws are of course applicable in the park, there is a need to develop park regulations to address issues specific to the park. Critical issues that would need to be addressed in the regulations would include:

- Powers of an officer
- Access control (for recreation, family visitation, harvesting, conducting of business, management and/or provision of services, infrastructure development, security, scientific or educational purposes),
- Residing in parks (e.g. general citizens living in the park)
- Domestic livestock
- Signage, advertising and structures
- Tourism and concessions
- Plant and animal harvesting
- Starting and control of fires
- Prospecting and mining
- Industries
- Waste, pollution and litter
- Honorary wardens
- Transboundary protocols
- Etc.

Management Action

Action	Who and how	When	Indicator of success
Compile park regulations	Park authorities to initiate, with extensive consultations with other authorities and local communities.	Initiate in 2018 – undertake a lengthy process with the aim of producing a first draft by 2019, and final draft by 2020.	Regulations in place on the basis of consensus having been reached.

7.5. Identifying tourism potential and promoting tourism.

Problem statement
Tourism in the park is far below where it could be, given the potential (though modest) that exists. Increased tourism is needed to boost local incomes and strengthen the belief that this is a park worthy of protection and investment.

Management Action

Action	Who and how	When	Indicator of success
Identify places/areas with reasonable/high tourism potential, and compile a tourism development plan.	Park authorities should initiate this, but they should engage the services of a tourism expert/a group of tourism investors to provide advice. Government officials or local communities are usually not experts in this field. The experts must ensure there are proper consultations with local communities, whose lives may be affected (positively or negatively) in tourism increases.	Initiate in 2016, produce a plan by 2017 and implement by 2018	At least two lodges/campsites and some traversing routes are established and used by 2018.
Advertise the park, especially to local and regional markets	Park authorities should initiate this, possibly through a request for KAZA assistance. Some easy options could be inviting travel journalists (e.g. Getaway magazine) to tour the parks and then place articles in these widely read magazines. The regional (self drive) market is generally more adventurous than overseas visitors and less reliant on luxury facilities and good infrastructure.	Initiate in 2016	At least three promotional articles in regional travel magazines by end 2017.

7.6. Enabling tourism development through improved infrastructure.

Problem statement
Currently hardly anyone derives benefits from the park and there are therefore few incentives for people to support the park and conservation in general. In some cases, people may be antagonistic towards the park as the costs to them (e.g. through HWC), outweigh the benefits.

Developing and sustaining tourism in the park is essential so that people derive benefits from it. Once they see benefits, attitudes towards the park, and towards conservation in general, will likely improve. Also, one would expect reduced poaching and other forms of environmental destruction, should decrease. Moreover, local people who are benefiting will be more motivated to report illegal activities by other people. This will be very helpful from a management perspective.

Management Action

Action	Who and how	When	Indicator of success
Identify roads and bridges that will enable access to places with high tourism potential	• Park authorities should initiate this, but they should engage the services of a tourism expert/a group of tourism investors to provide advice. • Transport authorities will need to provide input for planning, costing and financing the necessary infrastructure • See 7.1 regarding the removal of landmines.	Initiate in 2016, produce a plan by 2017 and implement by 2018	• Existing roads improved • New roads and bridges constructed as planned

8. Bibliography

ACADIR and IRDNC (2014): Cross-Border Fire Management in Angola/Namibia A partnership project between ACADIR (Angola) and IRDNC (Namibia) 30 September 2014. Unpublished.

Beatty.R (2014): Liuana partial reserve, Angola & Bwabwata National Park, Namibia Integrated Transfrontier Fire Management. A proposed approach (unpublished)

Governo de Angola (Government of Angola). 2003. Diário da República, Ia Série, No 36, 9 de Maio de 2003. Governo de Angola. Luanda.

Governo de Angola. 1999. Diário da República, Ia Série, No 4, 27 de Janeiro de 1999. Governo de Angola. Luanda.

Governo de Angola. 1998. Diário da República, Ia Série, No 27, 19 de Junho de 1998. Governo de Angola. Luanda.

Governo de Angola. 1994. Lei Constitucional da República de Angola (Act No. 23/92 of 16 September). Governo de Angola. Luanda.

Governo de Portugal (Government of Portugal). 1995. Boletim Oficial de Angola, Ia Série, No 6, 9 de Fevereiro de 1955. Governo de Portugal. Lisbon.

Jones. B.T.B (2008): Legislation and Policies relating to Protected Areas, Wildlife Conservation, and Community Rights to Natural Resources in countries being partner in the Kavango Zambezi Transfrontier Conservation Area. A Review commissioned by Conservation International, in collaboration with African Wildlife Foundation, supported by the Swiss Agency for Development & Cooperation. Unpublished.

KAZA. 2006. Memorandum of Understanding concerning the establishment of the Kavango-Zambezi Transfrontier Conservation Area. KAZA Secretariat. Gaborone.

Ministério do Urbanismo e Ambiente (Ministry of Ministry of Urban Affairs and Environment). 2003. Plano Nacional de Gestão Ambiental (draft). Unpublished draft document. Ministério do Urbanismo e Ambiente. Luanda.

Ministério das Pescas e Ambiente (Ministry of Fisheries and Environment). 1999a. Lei de Bases do Ambiente e Convenções. Ministério das Pescas e Ambiente. Luanda.

Russo, V. 2007. Review of environmental policies and legislation in Angola on protected areas and wildlife conservation. Holísticos, Lda. Luanda.

Verissimo, L.M. (2008) – Guia dos Mamíferos de Médio e Grande Porte do Kuando Kubango. Okavango River Basin Management Project (IRBM), Namíbia.

9. Appendix A: Stakeholders consulted

Name	Institution/ Position	Contact (Tel)	Contact (email)
Silvi Edith	INIP	929431924	Silvigumgongano@gmail.com
Franzisko Carvalo	DNF	923603336	

Name	Institution/ Position	Contact (Tel)	Contact (email)
Roland Goetz	INBAC	939569283	rolandcedringoetz@
Oliveira Gançalies	MINAGRI-IDF	923649605	
Sango de Sa	INBAC	924175953	bgangos@gmail.com
Abias Huongo	INBAC/Director	923325668	9.1. huongoam@hotmail.com
Aslete Gorge	DNB	924238637	Askete.gorge@hotmail.com
Geoginia Manuel	DNB	912226938	mgeoginia@gmail.com
Vladimir Russo	Fundação Kissama	9394	roquerusso@nexus.ao

Name	Institution/ Position	Contact (Tel)	Contact (email)
		0 1 3 1 3	
John Mendelsohn	RAISON	2 6 4 8 1 1 4 8 2 3 8 5	raison@raison.com.na
Lauren Garzon	MINHOITRE-DAAT	9 3 3 4 3 7 2 9 3	lgarzon@segmond.ao
Sónia Marais	MINNOTUR-KAZA	9 2 2 1 2 4 6 2 7	TeresaF
Marta Zanibo	DNB/MINAMB	9 2 3 8 3 2 2 8 3	martaQuintanilha@gmail.com
Carlos Andrade	OKACOM Member	9 2 3 3 0 8 2 1 0	calucarlos@yahoo.com.br

Name	Institution/ Position	Contact (Tel)	Contact (email)
Suzana Bandeira	INBAC	933232439	
Hilaria Valerio	INBAC	997303529	hilariavalerio@hotmail.cim
Sabunto Castro	M. de Ambiente	929978203	
Franziska Loy	M. de Ambiente	923096759	
Jorge Longa	T	948629895	
Antonia Daba	MBASATA	923650505	

Name	Institution/ Position	Contact (Tel)	Contact (email)
		81	
Donald Bertdam	Dir. provincial do Urbanismo e Ambiente	968098801	
Margarita Romelia	As above	926054815	
Josė Gabriel	Dir Prov. Ord T.A.	943240514	
A	e.P P	925895198	
Ana Dar Joes	A.D.M	990796365	
Luizyada Pescool	Gaerzno Provincial	946022 2	

Name	Institution/ Position	Contact (Tel)	Contact (email)
		561	
João B Grande		933104010	
Leonardo João	I.D.F	933354021	Desamzata-vo11@gmail.com
Joachim Raquel	MI NAMB-DNB	912226738	Mjrecky@gmail.com
Chris Brook	SAREP	+26771371623	cbrooks@sarepmaun.com
Gelete Jonse	MI NAMB-DNB	924298637	Gelete.jonse@hotmail.com

Name	Institution/ Position	Contact (Tel)	Contact (email)
Suzana Bandera	INBAC/MINAMB	933232439	suzanaadelin@hotmail.com
Ngozi Votes		924142215 1	ngozivotes@gmail.com
Hilaria Valéjo	INBAC	997303529	
Mujeneo Badun	Ambiente	927872675	
Paulino B. Jarnola	Ambiente	943230905	
Domeligos Benngo		730576	

Name	Institution/ Position	Contact (Tel)	Contact (email)
		87	
Eduardo		940276006	
José	Ambiente	934777034	
Monde	M Ambiente	926690973	
Juliano	Ambiente	997849913	
Sabina Juasat	DP Combicio	923871788	Sabinakk.2009@yahoo.com
Daniel e Fiponwy	DI	9336	

Name	Institution/ Position	Contact (Tel)	Contact (email)
		023599	
Becky Alfredo		937046112	
Cristina Ferreira	Gab	976415938	
Manuel de Sousa		923225105	
Carolos Paulisio	Fossul de Angola	922103259	carlospaulino@
Manuel Heripus Jua	TPA	931374532	
Valdenir	INOTU	9	

Name	Institution/ Position	Contact (Tel)	Contact (email)
Lima		4 3 1 7 4 1 5 0	
Francesco Muende		9 2 7 1 7 3 9 7 8	