

# **GEF-SGP OP6 ZAMBEZI LANDSCAPE BASELINE ASSESSMENT REPORT**

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## Executive Summary

This GEF-SGP OP6 Zambezi Landscape Baseline Assessment report is a response to the call by the United Nations Development Programme Global Environment Facility Small Grants Programme (UNDP GEF SGP) for managing the environment and resources in Zambia. The call aims at supporting the creation of global environmental benefits and the safeguarding the global environment through community and local solutions that complements and adds value to national and global level actions.

The baseline report attempts to provide the general environmental outlook of the Zambezi Catchment referred to as Zambezi landscape. Key areas of focus included Biodiversity, International Waters, Climate Change, Land Degradation and Persistent Organic Pollutants (POPs). These were analysed in the Zambezi Landscape covering Mwinilunga in North-Western, Sioma- Nangweshi in Western and Sinazongwe and Chirundu in Southern Provinces. This coverage represents the most parts of the Zambezi river catchment which is very important for cultural, fishery, touristic and hydro power generation for Zambia. Under this study, the landscape was categorised into three parts, Upper Zambezi, Middle and Lower Zambezi Landscapes.

The baseline study findings reveal the status of the Landscape. In the upper Zambezi landscape of Mwinilunga district in North Western Province, the biodiversity is rich with thick forests, receiving high rainfall of over 1000 mm annually. There have been no significant variations in the amount of rainfall received over the past decade. Beekeeping is the one of the major livelihood activities with over 5000 beekeepers who largely practice traditional beekeeping by making hives using tree barks. This practice poses a threat to the forests as the debarked trees eventually dries up. There is need to enhance the community's capacity through training in modern beekeeping technologies and use of modern hives which use exotic tree species. This will not only prevent deforestation but sustain the capacity of the Zambezi river catchment area.

In the Middle Zambezi Landscape of Western province, the region receives medium rainfall amounts between 600mm and 1000mm. Issues of concern include deforestation, extensive illegal harvesting of Rosewood, poaching and harvesting of 'devils claw' plant, uncontrolled forest fires, over fishing, unsustainable traditional mono cropping of maize. Despite the Zambezi River being within the locality, the potential of the abundant water is not fully utilized for agriculture purposes. However, environmental conservation interventions by WWF and Kavango-Zambezi Transfrontier Conservation Area projects are being implemented through involvement of local communities Village Action Groups (VAGs) and Community Resource Boards (CRBs). Key stakeholders in the name of government Departments, Forestry, Agriculture National Parks and Wildlife have limited capacity in terms resources to train community members on sustainable utilization of the environmental resources. There appears to be uncoordinated management of forest resources, often logging permission being given by traditional leaders as opposed to the government's forestry department.

In the Lower Zambezi Landscape, most parts of the Southern Province in Sinazongwe and Chirundu receive rainfall below 400mm. This landscape is adversely affected by climate change. It is characterized by very little amount of rainfall received, late onset and poor distribution of the rain. The region has been extensively deforested and bare. Land degradation and erosion is very prevalent. Water for both domestic and wildlife is a scarce and limited resource. In search for water, human-wildlife conflicts are becoming common in the region. In adapting to effects of low rainfall received communities cultivate along the Zambezi river bank. This brings them in direct encounters with hippos and crocodiles. Efforts are made in the Lower Zambezi National Park (LZNP) by the Conservation Lower Zambezi offering Environmental Education (EE) to both pupils and communities surrounding the park.

The recommendations from the baseline study for the thematic interventions in the landscape include, improving of the capacity of key stakeholders, the community, and NGOs in the management of the environmental resources. Logistical and technical support is required, especially for government departments such as the Forest Department in monitoring and policing of use of forestry resources. Capacity building for community members in diversification on livelihood initiatives using natural resources such as beekeeping, sustainable agriculture (Conservation Farming) in adaptation to climate change effects. Training in fire management would assist in sustainable management of forest resources. Illegal logging and deforestation would be reduced by involving the local communities through community based natural resources management. International waters are currently underutilized by communities. The introduction of fish farming, vegetable gardening would be productive use of water resources. The use of POPs is not a significant threat in the landscape.

From the foregoing, Zambezi Landscape baseline survey has identified landscape challenges including deforestation, climate change effects of dry spells and drought impacting negatively on biodiversity, and human livelihoods. Lack of capacity by key players and communities in sustainable management of natural resources is a big challenge. Monitoring of these resources is not adequate and sometimes nonexistent in the entire Zambezi landscape. This poses a challenge for the sustainable utilization and management of natural resources. An inventory of resources under threat, especially tree species that have commercial value which are illegally exploited would contribute to addressing the problem.

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## List of Acronyms

CLZ	Conservation Lower Zambezi
CRB	Community Resource Board
CSO	Central Statistical Office
DSA	District Situation Analysis
GEF	Global Environment Facility
GMA	Game Management Area
GRZ	Government of Republic of Zambia
KAZA-TFCA	Kavango-Zambezi Transfrontier Conservation Area
NAPA	National Adaptation Programme of Action on Climate Change
NGO	Nongovernmental Organization
POPs	Persistent Organic Pollutants
PPCR	Pilot Project for Climate Resilience
SNDP	Sixth National Development Plan
VAG	Village Action Group
ZNFU	Zambia National Farmers Union
EBAFoS	Ecosystems Based Adaptation for Food Security

## 1.0 INTRODUCTION

The environment today is under pressure to support the population and its needs. The world population is projected to reach at least 7.5 billion people by 2020 (Shaohua and Ravallion (2012). Population growth is a major driver of continued environmental degradation facing the globe today. Approximately 1.3 billion people live in extreme poverty, mostly in South Asia and Sub-Saharan Africa. Poverty and social exclusion impact directly on the global environment given that vulnerable populations are less able to invest effectively in sustainable productive activities rather are forced to engage in highly destructive forms of natural resource depletion and sustainable resource use. These vices result into land degradation, pollution of both water and land, loss of biodiversity and above all scarcity of resources to meet the population demand. Policy change is difficult without strong citizen constituencies and environmental policies if ever passed have weak implementing powers. The impact of climate change is currently one of the underlying factors affecting key livelihoods of many people today.

This report contains a brief synthesis and interpretation of a baseline exercise carried out on the Zambezi Landscape (Figure 1) between 28 January and 8th February 2016 using a series of semi-structured interviews and field observations. The Landscape was divided into the Upper, Middle and Lower catchment areas covering districts in the north-western, western and southern provinces.

The main thematic areas addressed during the exercise were based on the Terms of Reference of the assignment.

Zambia being one of the sub-Saharan countries is not spared by challenges of environmental degradation. Despite having been blessed with the abundant of natural resources of water, arable land, rich biodiversity, wildlife, and favorable climate, these resources are threatened to be extinction if no measures are put in place. The Government of the Republic of Zambia (GRZ) has enacted policies and made tremendous effort in sustainable environmental management. The National Policy on Environment was enacted in 2010, Forest Act, Water Policy, Agriculture Policy, Vision

2030 and Revised Sixth National Development Plan (SNDP) are among attempts to effectively manage the environment and its resources.

The Global Environment Facility (GEF) corporate programme, Small Grant Project (SGP) aligns its operational phase strategies to that of the GEF, and provides a series of demonstration projects for further scaling up, replication and mainstreaming environmental management actions (GEF/C.46/13). Action at the local level by civil society, indigenous peoples and local communities is deemed a vital component of the GEF 20/20 Strategy (i.e. convening multi-stakeholder alliances to deliver global environmental benefits and contribute to UNDP's Strategic Plan and focus on sustainable development). Five GEF Operation Phases offering small grants have been implemented targeting various aspects of sustainable environmental management.

This report presents the baseline study for Operational Phase 6 (OP6). At the global level, the SGP OP6 programme goal is to “effectively support the creation of global environmental benefits and the safeguarding of the global environment through community and local solutions that complement and add value to national and global level action.” In order to achieve this, GEF 6, SGP will focus on sustaining and further scaling up its impact through more focused and strategic interventions, utilizing its network of countries to transfer lessons and successful approaches.

Under the UNDP GEF OP6 Small Grants Programme for Zambia, 6 main landscapes have been identified namely; Zambezi, Kafue, Luangwa, Chambeshi, Luapula, and Tanganyika (Figure 1).

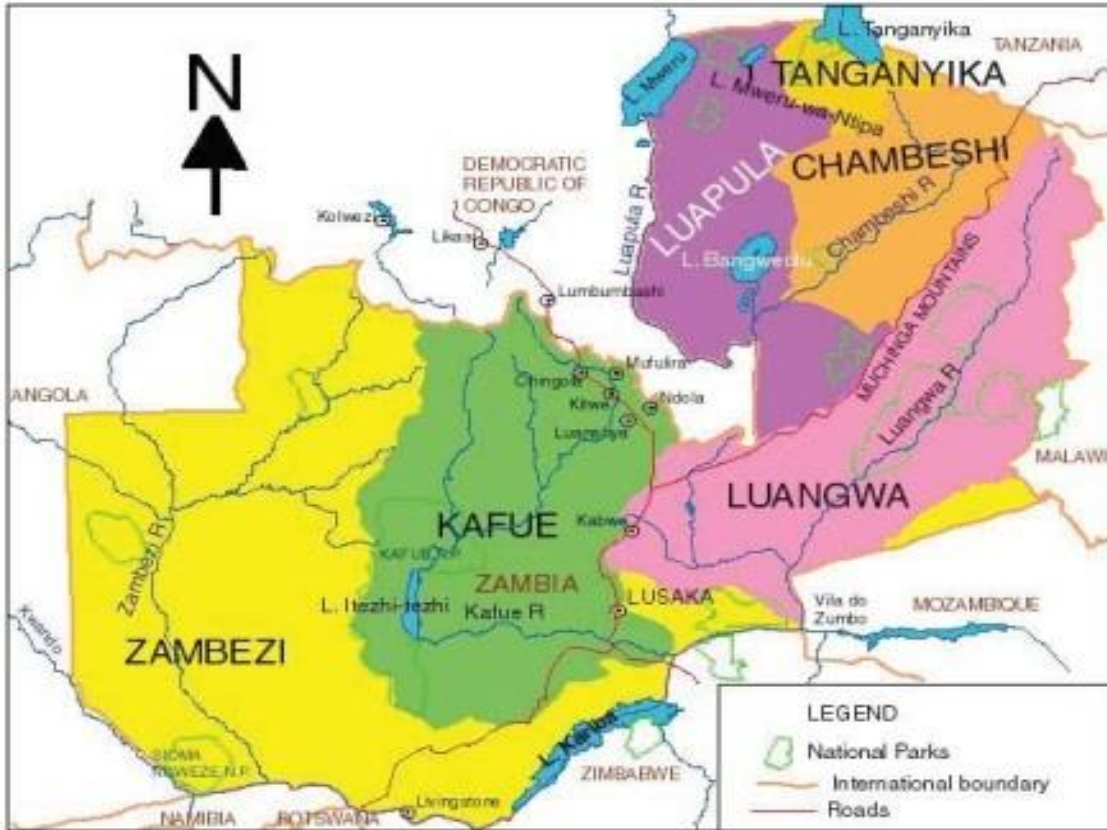


Figure 1: Map showing the main Landscapes for Zambia

However, under this UNDP GEF Small Grants Programme for Zambia the focus of activities to be implemented will be in the Zambezi landscape with the project duration for period 2014-2018.

The Zambezi Landscape covers much of the Zambezi flood plain extending from the source of the river in the North western province, through to western, southern Lusaka and Eastern Province as shown in Figure 1.

## 2.0 OBJECTIVES OF THE BASELINE SURVEY

The objective of the baseline assessment is to assist SGP National Coordinator (NC) and National Steering Committee (NSC) to:

- a) Elaborate the Zambezi landscape -wide baseline
- b) Develop Zambezi landscape strategy that will guide grant-making with typology of projects proposed, and sets of indicators for selected SGP strategic initiatives identified.



- c) Provide information about the current state of the Zambezi landscape, through consultations with local communities and stakeholders which can be used as a basis for setting goals and desired outcomes for OP6.
- d) Outline key challenges, on environmental issues, and identify the opportunities for community and CSO actions
- e) Provide background information for the development of the Zambia Country Programme Strategy Finalization

In order to achieve these objectives, the baseline focused on the following thematic areas in the Zambezi landscape namely:

1. Biodiversity
2. Climate Change
3. Land degradation
4. Use of Persistent Organic Pollutants (POPs)
5. International Waters

### **3.0 DESCRIPTION OF THE STUDY AREA**

#### ***3.1 Geographical Area of Zambezi Landscape***

The baseline exercise was undertaken in the Zambezi Landscape (which predominantly lies in the Zambezi River catchment (Figure 2). It extends from the North-western Province in Mwinilunga district where the source of the river is located in the Kalene Hills. It further covers the Western and parts of the Southern Province. The source for the Zambezi River lies in Agro – Ecological Region III receiving more than 1400 mm of rainfall annually (GRZ, 2007). The soils are very acidic due to excessive leaching as a result of high rainfall. The Sioma site falls under Agro-Ecological Region II which receives between 800 and 1000 mm of rain annually. The Chirundu/Chiawa site in the southern part of the country is located in Agro-Ecological Region I which is found in the Luangwa-Zambezi rift valley and receives less than 800 mm annual rainfall.

#### **4.0 METHODOLOGY**

The main steps involved in carrying out this research were as follows:

- i. Study and agree on Terms of Reference,
- ii. Divide the Landscape into upper, middle and lower catchment areas,
- iii. Identify towns to be visited in each of the three identified catchment areas,
- iv. Develop questions and guidelines for conducting interviews,
- v. Stakeholder mapping
- vi. Conduct interviews including follow-up with additional interviewees identified in the course of the interviews,
- vii. Conduct field visits and make direct observations,
- viii. Supplement interview data with selective review of literature,
- ix. Analysis of interview notes,
- x. Synthesis of results and drafting of report, and
- xi. Internal peer review.

#### **5.0 DATA COLLECTION METHOD**

The following section outlines the methods used for collecting data during the baseline survey of the Zambezi Landscape.

##### ***5.1 Selection of Landscape sites***

Zambezi landscape sites were categorized under the following agro ecological regions;

- a) **Upper Zambezi landscape Site – AER III:** The high rainfall region, densely forested region where the source of the Zambezi River is located. Natural resource harvesting livelihood and honey production/harvesting. Data was collected from Mwinilunga District.

- b) **Middle Zambezi landscape site – AER II:** Medium rainfall region moderate forest cover, harvesting of forestry products (logging, wildlife hunting, fishing). Data was collected from Sioma District.
- c) **Lower Zambezi Landscape site -AER III:** Low rainfall region, heavily deforested region, dry and hot. Land degradation very prominent. Data collected from Chirundu and Sinazongwe districts.

## ***5.2 Desktop Review***

1. Review of documents including the Fifth and Sixth National Development Plans; National Adaptation Programme of Action (NAPA), Zambia Policy on Environment, Water Policy, Environmental Management Act No. 12 of 2011, Climate change Acts and Plans, Zambia Vision 2030 UNDP GEF Project documents were reviewed.

## ***5.3 Key informant interviews***

These were mainly conducted with government officers from key line ministries involved in natural resources management also private sectors and Non-Governmental Organizations. These included the Forestry Department, Fisheries, National Parks and Wildlife, Zambia Environmental Management Agency, Department of Agriculture, Department of Livestock. Other key informants during the exercise also included District Commissioners.

Tradition leader through their representatives were also interviewed. Recognizing the important role teachers play in knowledge transfer at community level, they also participated in this baseline study.

Interview guide were used as a tool to obtain views on the status of the environment on key thematic themes of OP6 GEF SGP.

## ***5.4 Focus Group Discussions***

At community level, Focus Group Discussions using with community leaders and members of Village Action Groups (VAGS) and other community-based organizations with the responsibility of natural resources management. Site visits to the selected sites of Mwinilunga, Sioma, Sinazongwe and Chirundu districts.

## **6.0 LANDSCAPE BASELINE FINDINGS**

The baseline findings are based on a synthesis of issues identified related to the 5 strategic themes of the OP6 Phase. These findings highlight some of the key challenges posed by climate change and variability in the Zambezi Landscape as well as the unsustainable utilization of natural resources, livelihood activities and institutional challenges by agencies responsible for natural resource management.

## **7.0 STRUCTURE OF THE REPORT**

This report comprises three main sections, with each section covering the Upper, Middle and Lower Catchment areas of the Zambezi Landscape. In each section, subject areas of demography, location, livelihood activities and the five themes provided under the Terms of Reference were to the extent possible covered uniformly to ensure consistency. While it gives the profiles of the district it also addresses the main thematic areas addressed during the baseline study included the following:

1. Biodiversity
2. Climate Change
3. Land degradation
4. Use of Persistent Organic Pollutants (POPs)
5. International Waters

## **8.0 ZAMBEZI LANDSCAPE CATCHMENT AREAS**

This Baseline Assessment for Zambezi Landscape covers the area divided into the Upper, Middle and Lower Zambezi covering districts of north-western, western and southern provinces. The Upper Zambezi survey was done in the Mwinilunga-Kalene area of Northwestern Province, Middle Zambezi in Sioma-Nangweshi area of Western Province, and Lower Zambezi in Sinazongwe district of Southern Province and the Chirundu - Chiawa area in Lusaka Province.

## **9.0 UPPER ZAMBEZI CATCHMENT OF MWINILUNGA - KALENE**

In the Upper Zambezi, the survey was done in the Mwinilunga - Kalene area of Northwestern Province. In the upper Zambezi in addition to interviews, field visits were

also carried to various sites including; the Zambezi source for onsite observations of the ecological status of the forest, various bee keeping sites to observe and record the type of bee hives used and the response of trees that had been debarked for the purpose of making tree bark hives and special habitats such as extensive grasslands and wetlands unoccupied by people.

### ***Location***

Mwinilunga district covers an area of 20,910 Km<sup>2</sup>. It shares borders with Solwezi in the east, Mufumbwe and Kabompo to the south, Angola to the north and the Democratic Republic of Congo to the north east. The district lies within latitude 10° 50'S to 13° 10'S and within longitude 24°E to 25° 30'E (Mwinilunga District Development Plan, 2006).

Mwinilunga District recorded a population of 104,317 people in the 2010 Census of Population and Housing (CSO, 2010). It has an annual population growth rate of 1.9% between the 2000-2010 intercensal periods.

### ***Social Economic and livelihood Activities***

The major livelihood activity in Mwinilunga is subsistence agriculture. Agriculture production is mostly on small scale with cassava being the major crop grown mainly for local consumption. Other crops grown on a small scale is maize and beans. Bee keeping and honey production using traditional bark hives is an important economic activity. Forest Fruits, a private company is the major market for the honey. It operates an out-grower scheme with about 5000 beekeepers in the district. Pineapples are also grown on a large scale by the majority of small holder farmers. Traditionally the Lunda people of Mwinilunga are hunters and gatherers with little interest in agricultural activities.

The Department of Agriculture and partners such as World Vision, Zambia National Farmers Union (ZNFU) are promoting crop diversification from only cassava growing to include crops such as soya beans and maize. The area has abundant pasture land which is favourable for cattle ranching. The government through the Farmer Input Support Programme has been promoting increasing agricultural productivity. The ZNFU has been

providing loans for purchase of farm implements such as tractors, ploughs, water pumps and hammer mills through their Bunjimi Asset Plus.

### ***Land Degradation issues***

The high rainfall pattern in the upper Zambezi landscape makes the soil too acidic and less productive for crop production. The soil requires liming before any crops can be grown sustainably. According to some key informants interviewed, shifting cultivation using slash-and-burn method is the major farming technique practiced in the area. With too much rainfall regeneration of trees is faster than forest removal. Although the terrestrial and forest ecosystem appears to be intact on the upper part of the Zambezi landscape, the unsustainable use of forest resources is a source of concern. In addition to slash-and-burn agriculture, people clear the land by late burning for the purpose of hunting rodents. The making of traditional bee hive using tree barks is contributing to destruction of trees and causing deforestation and land degradation. The debarked trees dry up leaving dead trees in their wake. Forests are also used for charcoal production. Unsustainable exploitation of these forest resources may contribute to erosion, siltation and loss of biodiversity in the near future.

### ***Climate change***

The upper Zambezi landscape lying in Agro-ecological Region III predominantly receives the highest amount of rainfall in Zambia. So far the region is has not exhibited any significant effects of climate variability and climate change. Findings indicate the little variations are normal for the seasons. However, some indication observed by the community include, delays during the onset of the rains particularly during the 2015/2016 season. The rest of the seasons so far has been as expected.

Agriculture is normally at subsistence level. There are 25,620 farmers in the district. Of these 13,160 are male and 12,460 are female. There are 41 farmers practicing conservation farming. The hacterage under CF is only 40 ha. There are 17 lead farmers trained in CF. Of these there is only 1 female.

### ***International Waters***

Less impact existing on the water bodies. The source of the Zambezi River is still intact with rich and dense forest. The tributaries Lunga and Lwakela are very active and well covered with vegetation. The river crosses into Congo and Angola. Fishing activities are not significantly noticeable. Not many activities exist so far along the river. Maintaining the river catchment in order to prevent the disruption of the hydrological regime is very important.



Plate 1: Zambezi River and its source in Mwinilunga North - Western

### ***Persistent Organic Pollutants (POPs)***

The use of POPs was not immediately apparent during the survey.

### ***Biodiversity***

Mwinilunga is located in one of the highest rainfall cells in the country and as such boasts of unique biodiversity. The vegetation of Mwinilunga is exceptionally rich and contains many of woodland species. The vegetation types for which the district is especially noted are higher rainfall crytosepalum forest and the watershed plains. The canopy dominants are miombo species of the genera *Brachystegia*, *Julbernardia*, *Isoberlinia*, and *Marquesia* spp. Prominent in the under storey are species of *Monotes* and *Uapaca* spp. Interspaced in these vegetation communities are tall spired termite mounds of the termite *Macrotermes* spp. The *Julbernardia paniculata* is one of the preferred source of flowers for bees in honey production. As a result, honey harvested from the region is said to be unique and the *best* honey due to its organic character with the minimum chances of being polluted. Traditional cylindrical bark hives are used for apiaries. Tree species ring

braked for making bee hives are mainly *J. paniculata* and *Brachystegia spiciformis*. So far, Forest Fruits Company stated that they have a total of 5000 bee keepers with each keeper having an average of 200 traditional bark hives. The traditional technology of bee hive making using tree barks poses a great challenge for the forests. Beekeepers in debarking the trees to make hives eventually kill the trees.



Plate 2: Bee hives made from bark of trees

The construction of these hives is by cutting the bark of a trees to make cylindrical hives which are then stacked at the fork of trees normally with many branches. Tree species used are Kainda, Mupuchi, Mutondo and Mutanda among others. The bee hive once constructed has a life span of 8 years before it can be replaced. However, this may be a slow process contributing to deforestation. The dried tree is sometimes used for firewood. According to a community member traditional hives have a capacity to produce 20- 30 litres of honey.

Efforts have been made by both the private and public sectors to educate the community on the need to shift to conventional modern hives made of timber. However, the bee keepers argue that the modern hives are not as productive compared with the traditional ones citing the following reasons:

- That modern hives are expensive to buy or difficult to construct
- The occupancy by bees is low and bees abscond or leave the hives after the first harvest
- Modern hives are heavy and difficult to handle.
- Honey yields are low in modern hives compared with tradition hives



This is an area that requires a full research to verify the claimed challenges. Other than this, the community is too reluctant to adopt new technologies in general. Efforts by key stakeholders to promote modern hives have revealed that the community is not willing to adopt them, even when provided for free.

## **10. MID- ZAMBEZI LANDSCAPE– SIOMA**

Sioma District which was until 2013 part of Shangombo District. Sioma is relatively new as a district. It was established by an order of the President No. 3 of 2013 and consequently created by a Statutory Instrument No. 115 of 2013 as a District Council.

### **Location**

Sioma district is located in the south-western part of western province and lies on the west bank of the Zambezi River. The district shares boundaries with Sesheke in the south, Senanga in the east and Shangombo in the north. Sioma also shares an international boundary with Angola in the west (Sioma DSA, 2014).

### **Demographics**

Sioma has a population of about 5730 people according to the 2010 Census of Population and Housing (CSO, 2010).

### **Livelihood and Economic Activities**

The economy of Sioma is dominated by agriculture practiced mostly at a subsistence level. It is the most important livelihood activity in the District. Maize is a major crop, but is normally negatively affected by drought and floods. Other crops grown are sorghum, millet, rice, cassava, potatoes and beans. Livestock reared in order of importance include cattle, goats, pigs and chickens. Cattle is the major livestock under traditional husbandry. Fishing mainly artisanal is done along the Zambezi, Lueti and Kwandu rivers.

### **Biodiversity**

The district is home of the Sioma Ngwezi Park which is has a diverse range of wildlife and the Ngonye Falls. Illegal hunting of wildlife is a major challenge for the conservation of wildlife resources.

Illegal logging for Musauli tree (*Guibourtia coleosperma* - Rosewood) and Mukula (*Pterocarpus chrysothrix*) which is rampant is another major challenge in the district. Authorities from the Forestry Department and Agriculture have attributed this to many factors. One of them being that traditional leadership sometimes receives inducements from potential wood harvesters. This makes the work of the Forestry Department difficult. Further, some timber harvesters come with authority from Lusaka without prior knowledge and of the local custodians.

There are 5 National Forests in the district. But low staff numbers and limited logistical allocation such as transport in the Forest Department makes it difficult and impossible to manage these resources effectively.

The district has a Community Partnership Park for wildlife management. This model is being piloted in the Sioma area. The partnership is among government, the community and private sector in managing natural resources. This model can be applied and replicated to get sustainable benefits from the common resources for the community in other parts of the country.

### **The Kavango-Zambezi Transfrontier Conservation Area (KAZA-TFCA)**

The whole District is covered by the West Zambezi Game Management Area (GMA). It has a high diversity of wild animals which can be an important attraction for the development of tourism. Within the district is the Sioma Ngwezi National Park. This is one of the few parks in the country where giraffe occurs naturally. The other being the Luangwa valley of the northern, eastern, and central provinces. Other animals include elephant, buffalo, greater kudu, tsessebe, roan antelope, sable antelope, reedbuck, baboon, and velvet monkey. Leopard, cheetah, and hyenas are also recorded. Steinbok is present but not often seen. The park is the only place in Zambia recorded to be part of the putative range for white rhinoceros. Ostrich also occurred in this locality and was only exterminated in the mid to late 1930s. There are plans to reintroduce ostrich in this area as one way of restoring the biodiversity of the area within the KAZA Transfrontier Conservation Area. The Ngonye Falls are quite close but outside the park. Illegal hunting of wild animals as well as illegal harvesting of 'devils' claw' (*Harpagophytum procumbens*) are major challenges in the conservation of fauna and flora. 'Devil's claw' is harvested

for medicinal purposes. This plant is smuggled into Namibia before finally being exported to Europe. The harvesting for the plant has extended into the Sioma Ngwezi National Park. Stands of Zambezi teak (*Baïkea plurijuga*) are the main trees of exceptional timber value.

### **Community Based Natural Resources Management**

The KAZA project is a transboundary project in wildlife management for Namibia, Mozambique, Angola, Botswana Zimbabwe and Zambia. The Community Partnership Park Model. KAZA, is operating the Sioma National Park, the approach is based on recognizing partnership the government, private sector and the community. Out of this initiative a park headquarters for Sioma Ngwezi has been built and is fully functional. With the construction of the Kazungula Bridge and operationalization of the KAZA Transfrontier Conservation Area, the park has a great potential for tourism development The Sioma National Park has created a conservancy with the community to manage wildlife. The Community Resource Boards (CRBs) comprising village members in the surrounding area. Village Action Groups (VAGs) formed in each of the villages are responsible for monitoring and conserving natural resources. Natural resources monitored include forestry products and wildlife.



Plate 3: KAZA project areas in Sioma district in Western province

Anti-poaching patrols are carried out by game scouts trained by the National Parks and Wildlife. These are paid by the CRBs. The Worldwide Fund for Nature is supporting communities through VAGs by paying salaries to village scouts in Sioma.

Controlling deforestation - Through sensitisation of communities and traditional leaders to preserve the Rose Wood tree species which is being indiscriminately logged by the private sector who claim to have authority given by traditional leaders.

### **Climate change**

Members of the community observed that rainfall received has been on the decline for the past 3 years. Agricultural production has been most affected; especially maize productivity has drastically been reduced. Crops grown include millet, sorghum and maize. Efforts to address the challenges of climate change include the focus is on sustainable agriculture through conservation farming. Irrigated farming through dam construction, small livestock adapted to drier conditions such as goats and chickens and soil and land management are other measures being considered.

Conservation farming is being promoted in the district by training farmers in its techniques. This includes development of seed nursery for agroforestry Musangu tree (*faidherbia albida*), pot holing, and integrated farming. These interventions are undertaken under the Pilot Project for Climate Resilience (PPCR). Cashew nut production in the Mbeta area is also being promoted.

The total number of farmers in the district is 5,479. Total land cultivated under CF is only 200ha out of 14,730 of land under agricultural cultivation. There are 438 lead farmers trained in CF. Farmers practicing CF are 900 in number.

Climate change impact has reduced water levels in the water bodies, hence people, livestock and fish are competing for water.

The potential for fish production in the district is underutilized. Lagoons on the Zambezi River have potential for use for fish breeding. So far not many interventions are in place to improve on fish breeding. There has been fragmentation of habitat due drying of water sources and low water levels. The effects of climate variability has currently resulted in fragmentation of fish habitat and spawning in the Zambezi River. Lagoons, which are breeding grounds have dried up significantly. Additionally, extreme temperatures in the dry weather conditions affects the breeding of fish.

Training community members on how keep fish in cages on the Zambezi River, would be an important avenue of ensuring availability of fish protein to the community.

### **International Water**

The challenge of human and wildlife conflict is on the increase with climate change effects. Degradation of the environment is due to heavy dependence of forest cover, land degradation leading to pollution and siltation of the Zambezi. The use of pontoon contributes to pollution of water bodies. There is need to conduct a study to establish the impact of the spillage on the water bodies. Fish ban is not fully implemented on the river. The community leaders (BRE) do not recognize the fish ban and allows the local people to continue harvesting fish and other resources despite the fish ban. Additionally, on the Namibian side the fish ban is not enforced.

### **Persistent Organic Pollutants**

There was no evidence of use of POPs in Sioma. However, there was observable evidence of oil leaks at Sikuka Pontoon crossing.

### **Land degradation in Sioma**

The high poverty levels and the effects of climate variability in the district have contributed to unsustainable use of natural resources. Poor people largely depend on the environment for their livelihood. As noted deforestation by loggers and late burning of forests are among the main factors contributing to soil erosion, siltation and pollution of Zambezi River. The erratic rainfall received of late is has resulted in reduction crop yields leading to communities supplementing their livelihood with forestry products using fires when harvesting honey and cutting of trees.

## **11.0 STRATEGIC THEMATIC CHALLENGES IN THE MIDDLE ZAMBEZI LANDSCAPE**

### ***Institutional Coordination***

Several institutions with the responsibility of resources and environmental management exist. Staff from the Departments of Forestry, Agriculture, and Community Development have been deployed but often receive limited financial and logistical resources and support to perform their mandated functions. The Forestry Department at the district

levels appeared not to have updated inventory of forest resources, have no transport to reach out to communities for sensitization and awareness. The issuance licenses for timber logging and compliance is yet another challenge. Deforestation and illegal logging is on the increase around Sioma and Western Province in general. Traditional leaders have been known to allocate Rosewood trees to private individuals including Chinese nationals to harvest.

### ***Diversification of Livelihoods***

The major sources of livelihood in the region include, traditional agriculture mostly maize cultivation, livestock rearing, hunting, and fishing. Despite having the abundance water body Zambezi River, vegetable gardening is rarely undertaken. There may be need to build the capacity of the local communities in diversification of livelihood activities to respond to challenges of climate variability.

### ***Climate change and variability***

The effects of climate change have negatively affected the management of resources in the landscape. Reduced water levels for instances have led to an increase in human-wildlife conflicts. There is competition for water leading into people being attacked by elephants at water points. Further, due to poor rainfall received and crop failure on the uplands people are forced to cultivate on along the river and end up being attacked by wild animals also searching for the same water. As a coping strategy people have resorted to illegal timber logging, poaching and unsustainable fishing methods.

### ***Research on (inventory of) natural resources in the landscape***

There may be need to undertake a research to come up with inventories of timber resources, especially the species that have commercial value. Once that is done mechanisms to promote resource beneficiation of the local communities should be put in place.

### **Sustainable options for the Landscape**

- Conduct a survey/inventory of natural resources such as tree species of commercial value for timber such Rosewood, wildlife and their impact in the surrounding communities. This would help take stock of what resources, are available in the community to plan for the sustainable use of these resources.
- Bee keeping and honey production would help reduce poverty and at the same time as preserve forests resources.
- Build the capacity of the community based organizations such as CRBs and VAGs in managing local resources through training on skills in forest management, bee keeping, fish farming, and water resources management.
- Part of the proceeds from natural resources harvested in the region be used for community development projects in the community such as education, health, fish farming using fish cages, livestock production
- Conduct research and trials on domesticating the propagating of devils claw plant for sustainable supply of the plant.

### **12.0 LOWER ZAMBEZI REGION – SINAZONGWE**

The lower Zambezi catchment areas visited were Sinazongwe and Chirundu of southern and Lusaka provinces respectively.

#### ***Location***

Sinazongwe district, is located along the Zambezi River in southern Zambia. This region lies in the Agro-ecological Region I of Zambia which receives below 400mm of rainfall per year. Typically, the region is drought prone and is one of the driest part of Zambia. The region was formally the food basket for the country.

#### ***Demographics***

In the 2010 Census Sinazongwe had an estimated population of 101,617 distributed over. It has a land area of 4,860 Km<sup>2</sup> averaging 20.9 person per kilometer (CSO, 2010). Population distribution is mainly skewed towards the lake and river and few valleys with alluvial deposits which mirrors the physical characteristics of the district. Maamba is important in the district for its coal mining and Sinazeze is an important sub-centre of the district.

### **Livelihoods and Economic Activities**

Agriculture and fishing are the dominant livelihood activities in the district. Fishing on Lake Kariba by both commercial and artisanal fishers for Kapenta (*Limnothrissa miodon*) and Tiger Fish (*Hydrocynus vittatus*) and breams (*Tilapia* spp). Currently there is an estimated 1300 Kapenta fishing rigs on the Lake which based on oral information far exceeds its ecological capacity. Fish catches have been declining due to overfishing especially due to bad fishing practices.

Agriculture is mainly practiced at subsistence level. Crops grown in district include maize, sorghum, millet, beans and cowpeas. There are 17,240 farmers in the district (10,696 males and 5,796 females). Food insecurity is high and caused by recurrent droughts which frequently hit the valley (DSA, 2005). Efforts to mitigate this have been undertaken through the introduction of drought tolerant crops such as improved sorghum and millet varieties. Currently the Zambia Agricultural Research Institute (ZARI) is implementing an Ecosystem-Based Adaptation for Food Security (EBAFoS) project in the district aimed at promoting these crops to improve food and nutritional security. This project is responding to climate change induced food security challenges in Zambia's region I, by introducing, disseminating and promoting the upscaling of a new improved sorghum variety – the Sorghum Open Pollinated Variety (SOPVs), and cultivating it using ecological approaches, specifically conservation agriculture techniques (EBAFOS, 2016)

Livestock production is an important economic activity in the district. Animals reared include cattle and small ruminants mainly goats and to a lesser extent sheep. Because of the dry conditions pastures are very poor, which contributes the poor state of the animals particularly in the dry season (ZCRS, 2003).

### **Biodiversity**

The district is rich in animal biodiversity mainly is found on Chete and Sekula Islands of Lake Kariba. Animals found on these Islands include hippo, buffalo, elephant, eland, kudu, impala, zebra, common waterbuck and bushbuck. However, poaching activities are high and the fish spawning grounds around these islands are also threatened by illegal fishing activities. The islands are also important spawning areas. On the main land there



is a high incidence of human-wildlife conflicts, especially as humans compete for space and fish with crocodiles and when livestock is taken to the lake for water or the practice.

Major agricultural activities included maize cultivation, and livestock, mostly cattle. Currently, with the advent of climate change and variability the region has been the worst hit in terms of erratic rainfall distribution. This has adversely affected the biodiversity, increased demand for water, land degradation and use persistent organic pollutants and climate change.

### **Climate change**

The region is the lowest rainfall receiving area. The effects of climate change are being felt through reduced rainfall received, including the distribution within the season. Extreme temperature variations are experienced in the area. Climatic conditions have affected the varieties of biodiversity, fisheries, wildlife, vegetation and major sources of water streams have dried up.

The most evident climate change effect is on the availability of water sources. Extreme low water levels in the Zambezi River and the Lake Kariba in particular. The low water levels in rivers and streams has resulted in increased competition and demand for water for wildlife and human activities. The failure of crop production due to erratic and poor rainfall patterns has made most of the community members result to alternative livelihood sources such as fishing and game hunting in the national park. Additionally, the drying of pasture for livestock has caused reduced food for wildlife and livestock. This has resulted in animals grazing in fields along the river and also wildlife such as crocodiles and hippos attacking people as they come to draw water or tend their fields along the rivers.

Further, other alternative sources of livelihoods have been the use of forests for wood fuel and cutting trees for charcoal production.

### **Land Degradation**

Being the old stage of the Zambezi lying in the lower level of the country erosion is predominant feature in the rainy season. The bare and dry conditions also increases

chances of erosion. Gully erosion and the erosion of stream and river banks is a common sight.



Plate 4: Gully erosion in Sinazongwe Area of Lower Zambezi

### **Persistent Organic Pollutants**

In order to increase food production in the changing climate, communities have been adopting sustainable agriculture and conservation farming. Today the use of herbicides in land preparations has been on the increase. The challenge is in the use of the disposal of empty containers. In most cases these end up being reused or indiscriminately disposed polluting both water and land.

### **International waters**

The Zambezi being the shared water body with Zimbabwe is faced with the challenge of overfishing from the Zambian side. On the other side of Zambezi River, the Lake Kariba and river shore is a national park with only lodges. Currently fishing is the major activity in the Zambezi River. The challenge is from the Zambian side with an estimated figure of more than 1200 Kapenta fishing rigs. These use fossil fuels with high possibility of spillages and leakages onto the water body

## **13.0 LOWER ZAMBEZI - CHIRUNDU**

### ***Location***

Chirundu is located in the lower catchment of the Zambezi basin. The lower Zambezi area in Chirundu is similar to Sinazongwe, is composed of the old stage of the Zambezi characterized by slow flow of the river with an undulating flat topography. This region is

climatically in Agro-Ecological Zone I receiving the minimum rainfall of less than 400mm. The weather conditions are usually hot and dry. The area has very limited vegetation cover comprising of the baobab. The socioeconomic status of the community is mainly agriculture and livestock production in particular.

### ***Livelihood and Economic Activities***

Agriculture and livestock production are important livelihood and economic activities.

Tourism is an important economic sector in the district. Crops grown include maize and sorghum. There are a number of established commercial banana plantations.

### **Climate change effects**

This region is also among the drought prone areas in Zambia. The situation which can be attributed to massive deforestation due to land clearing for crop production grazing land for livestock production. Decreased rainfall received has adversely affected the agriculture crop production and livestock production. There are 5,179 farmers in the district. There are 128 lead farmers trained in CF and 1,726 farmers practice conservation farming. The total hacterage under CF is 2,676 out of a total of 8,018 land under agricultural cultivation. The communities have adapted to climate change effects through rearing of goats. Goats do not require much water for their growth hence well suited for the region as opposed to cattle.

Humans and wildlife in the area depend on the Zambezi Rivers as the major source of water. The low levels of water in the Zambezi has caused conflict with people residing in the area in search for water. Cases of people being attacked by crocodiles have become common.

The hot conditions also suspected to be contributing to low fish breeding in the water bodies. This requires some research to ascertain this. Fish stocks have reduced drastically a fact which can be attributed to increased indirect pressure caused by poor crop production caused by poor rainfall distribution. People have resorted to fishing and poaching as an alternative livelihood strategy. If no sustainable livelihood interventions are developed, environmental challenges of human-wildlife conflict, overfishing, deforestation and poor land management will even worsen the situation.

In the health sector, the area has higher prevalence of malaria. The situation which have been attributed to high temperature being conducive for mosquito parasite breeding.

### **Biodiversity**

The lower Zambezi Landscape provides Zambia with the best locations for tourist attraction spots. The Lower Zambezi National Park and the Chiawa Game Management Area (GMA) and Siavonga Open provides a variety flora and fauna. The park is habitat to a variety of wildlife including elephants, hippos, impalas Kudu, and warthogs among others. Various tree species are also protected in these protect areas. The park in particular is habitat to a variety of wild animals including elephant, hippo, impala, kudu, and warthog among others.

As described under climate change effects. Biodiversity is negatively affected. Limited rainfall received couple with poor distribution affects the vegetation which is pasture for both wildlife and domesticated livestock. Human settlements and unsustainable livelihood activities including; overfishing, poaching, deforestation and land degradation have negatively contributed to the loss of biodiversity in the area through habitat fragmentation and resource depletion.

### **Conservation Lower Zambezi**

This is a non-governmental Organisation operating under the auspices of lodge owners in the Lower Zambezi and Chiawa Game Management Area (GMA). Major activities implemented include providing Environmental Education knowledge and skills to school going pupils on wildlife and environmental management in schools in the Lower Zambezi National Park catchment. Additionally, CLZ EE Unit also trains teachers and community members on issues relating to human animal conflicts poaching, early burning. The Operations department of CLZ conducts anti-poaching patrols using an aircraft.

### **14.0 Recommendation for Sustainable Environmental Landscape Management.**

The impact of climate change and variability effects of the Zambezi Landscape is visible in all OP6 landscape themes of the Zambia. This will require innovative approaches of addressing adapting to climate change and variability through livelihood diversification.

The co-management of natural resources is an important aspect of sustainable landscape management. This can be achieved through the creation of community structures such as Community Based Resource Boards (CRBs) and Village Action Groups (VAGs) as was found in Sioma. These structures were created under the auspices of the now defunct Zambia Wildlife Authority to address challenges associated with resource depletion and degradation. Currently these are in place in game management areas. Their major roles include protecting wildlife by employing village scouts, community sensitisation against overfishing and bad fishing habits. Bee keeping projects as a way of conserving forests as well as providing an alternative livelihood to the majority who would have resorted to deforestation and poaching.

## 15.0 Thematic Components for Zambezi Landscape Strategy

### UPPER ZAMBEZI LANDSCAPE- North Western Province

Thematic	Baseline Analysis of Landscape	SGP OP6 Strategic Initiatives	Proposed Implementation modalities
<b>Climate change</b>	<ul style="list-style-type: none"> <li>▪ No significant changes in rainfall received, slight delays in onset observed at times but normal</li> <li>▪ Low adoption of climate smart agro ecology i.e.</li> <li>▪ 41 farmers practicing CF and 17 lead farmers trained in CF</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increase innovative climate-smart agro-ecology; Community landscape conservation by creation of awareness on threats of climate change due to; deforestation by shifting cultivation and debarking of trees for making beehives used in beekeeping.</li> <li>▪ Increase number of farmers practicing CF in the district to 300 by 2018.</li> <li>▪ Increase the number of sensitization and training of lead farmers to 50 in the district by 2018</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increase awareness through capacity building/ training through partnerships with ministry of agriculture</li> <li>▪ Collaborate with department of agriculture, NGOs and other institutions</li> <li>▪ Strengthen community based structures in villages</li> </ul>
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>▪ Low participation of the community in the landscape conservation</li> <li>▪ Plausible loss of species which are selectively debarked for making bee hives, habitat fragmentation and associated loss of biodiversity, late fires</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increase community landscape conservation through:</li> <li>▪ Conservation initiatives of tree species e.g. Brachystegia and Julbernardia spp through:</li> </ul>	<ul style="list-style-type: none"> <li>▪ Capacity Training for lead farmers/bee keepers and extension officers</li> <li>▪ Institutional coordination by CSOs and government</li> <li>▪ Field research on species debarked, response after debarking and other uses of debarked trees</li> </ul>

	<ul style="list-style-type: none"> <li>▪ The forest at the source of Zambezi river still relatively intact</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increased bee keeping activities could preserve forest cover.</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Currently deforestation not significant, only for local energy consumption, but impacts of late fires on trees visible</li> </ul>	<ul style="list-style-type: none"> <li>▪ Community participation in saw milling for rose wood at local level</li> <li>▪ Tree planting and nursery for afforestation of indigenous tree species.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Capacity building in beekeeping and tree planting</li> <li>▪ Promote establishment of community Game Ranching and Fish Farming for protein and diversified income.</li> <li>▪ Promote possibility of community wildlife conservancy to be introduced in the area. The Chitunta Plains an Important Bird Area (IBA) could form part of this conservancy. The boundaries of the forest at the source of the Zambezi can be extended, wild animals introduced and tourist facilities developed.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Deforestation through illegal</li> </ul>	<ul style="list-style-type: none"> <li>▪ Unsustainable harvesting of</li> </ul>	<ul style="list-style-type: none"> <li>▪ Establishment of indigenous tree</li> </ul>
	<ul style="list-style-type: none"> <li>▪ logging of timber for</li> </ul>	<ul style="list-style-type: none"> <li>▪ timber likely to increase if</li> </ul>	<ul style="list-style-type: none"> <li>▪ nurseries and planting of commercial</li> </ul>
	<ul style="list-style-type: none"> <li>▪ commercial purposes</li> </ul>	<ul style="list-style-type: none"> <li>▪ unchecked</li> </ul>	<ul style="list-style-type: none"> <li>▪ woodlots</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Agriculture mostly pineapple production flourishing</li> <li>▪ Bee keeping out grower scheme by Forest Fruits booming</li> </ul>	<ul style="list-style-type: none"> <li>▪ Loss of trees due to debarking of trees for making bee hives</li> </ul>	<ul style="list-style-type: none"> <li>▪ Introduce modern hives and discourage use of tree barks</li> <li>▪ Capacity building &amp; Institutional coordination of Agriculture and Forest Departments</li> </ul>		
<b>International Water</b>	<ul style="list-style-type: none"> <li>▪ No significant challenges in the shared Zambezi river with Congo DRC and Angola</li> </ul>	<ul style="list-style-type: none"> <li>▪ Need to utilize the potential of the water resource</li> </ul>	<ul style="list-style-type: none"> <li>▪ Innovations and capacity building on water usage projects such as aquaculture, vegetable gardening etc. Promote tourism through local projects</li> </ul>		
<b>Sustainable land management/degradation</b>	<ul style="list-style-type: none"> <li>▪ Low innovative climate-smart agro-ecology; Community landscape conservation</li> <li>▪ Land very wet and highly leached soils</li> <li>▪ Monocropping of maize</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)</li> <li>▪ practice of good soil husbandry, ripping.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increased awareness of fire management in protecting soils and forests</li> <li>▪ Develop Community Based Fire Management Plans</li> <li>▪ Capacity building on use of modern agricultural methods and preventing shifting cultivation.</li> </ul>		
<b>POPs</b>	<ul style="list-style-type: none"> <li>▪ No significant sign of use of POPs</li> </ul>	Awareness of the potential dangers of POPs	<ul style="list-style-type: none"> <li>▪ Community sensitization on dangers of POPs</li> </ul>		
<b>MID ZAMBEZI LANDSCAPE</b>					
<b>Thematic</b>	<b>Baseline /Landscape</b>	<b>Analysis</b>	<b>SGP OP6 Strategic Initiatives</b>	<b>Proposed modalities</b>	<b>Implementation</b>



<b>Climate change</b>	<ul style="list-style-type: none"> <li>▪ Significant climate change variation observed delays commencement of rain season</li> <li>▪ Dry spells common</li> <li>▪ 900 farmers practicing CF and 438 lead farmers trained in CF</li> <li>▪ Total hectarage cultivated 14,730. Only 200 ha under CF</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adverse weather conditions likely to worsen especially prolonged dry spells</li> <li>▪ Increase number of farmers practicing CF in the district to 2000 by 2018.</li> <li>▪ Increase the number of sensitization and training of lead farmers to 900 in the district by 2018</li> <li>▪ Increase the hacterage under CF to 1000 ha</li> </ul>	<ul style="list-style-type: none"> <li>▪ Localize early warning information to be used at community level coordination</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Maize, rice cultivation affected negatively and negative perception on adoption of conservation farming (CF)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Contribution to global knowledge management platforms</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increase on demonstration plots to motivate small scale farmers on adopting CF</li> <li>▪ Partnership with stakeholders</li> </ul>
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>▪ High rate of loss of plant species such Harpagophytum procumbens ('Devil's Claw')</li> </ul>	<ul style="list-style-type: none"> <li>▪ Unsustainable harvesting <i>Harpagophytum procumbens</i> could lead to extinction of this plant</li> </ul>	<ul style="list-style-type: none"> <li>▪ Exploring possibility of cultivating the plant to forestall high demands on the wild species.</li> </ul>
<b>Sustainable land management/degradati on</b>	<ul style="list-style-type: none"> <li>▪ Forest fires destroying forests resulting in poor growth of pasture for livestock and wildlife Village Action Groups (VAG) established with</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous land cover removal increased erosion, result in human animal conflict. Wildlife invading cultivated field crop fields.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Build capacity of Village Action Groups on sustainable management of natural resources in the landscape</li> </ul>

	support from KAZA and WWF in Sioma		
	<ul style="list-style-type: none"> <li>▪ Increase in logging for indigenous rose wood permitted by local traditional leadership</li> <li>▪ Over exploitation of devils' claw (<i>Harpagophytum procumbens</i>) and illegal exports to neighbouring countries</li> <li>▪ Forest reserves not managed Forest Department limited capacity to monitor reserves</li> </ul>	<ul style="list-style-type: none"> <li>▪ Decrease in forest cover leading to land degradation, loss of soil cover.</li> <li>▪ Increased cases of encroachment by local community members</li> <li>▪ Plausible loss of devils' claw</li> </ul>	<ul style="list-style-type: none"> <li>▪ Village Action Groups need to trained on sustainable management of natural resources in the landscape</li> <li>▪ Inventory of the devils' claw and research on the possibility of propagating the species</li> </ul>
<b>International Water</b>	<ul style="list-style-type: none"> <li>▪ Water scarce for both livestock and wildlife , increased competition for water for both human and wildlife</li> </ul>	<ul style="list-style-type: none"> <li>▪ Promotion of collective management of trans-boundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services</li> </ul>	<ul style="list-style-type: none"> <li>▪ Coordination of water and river management strategies of the Zambezi river</li> <li>▪ Bore hole drilling and water harvesting techniques at local level</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Extensive use of the Lake Kariba water body</li> </ul>	<ul style="list-style-type: none"> <li>▪ Unsustainable fishing practices included numbers of Kapenta rigs exceeding the carrying capacity of the lake.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Harmonization of regulations relating to sustainable use of resources on the lake.</li> </ul>

<b>LOWER ZAMBEZI LANDSCAPE - SOUTHERN PROVINCE</b>				
<b>Thematic</b>	<b>Baseline</b>	<b>Analysis</b>	<b>SGP OP6 Strategic Initiatives</b>	<b>Proposed Implementation modalities</b>
	<b>/Landscape theme</b>			
<b>Climate change</b>	<ul style="list-style-type: none"> <li>▪ Low rainfall less 400mm (AER I) hot and dry, droughts frequent</li> </ul> <p><b>Chirundu District</b></p> <ul style="list-style-type: none"> <li>▪ Total number of farmers 5179; 1726 farmers practicing CF and 128 lead farmers trained in CF</li> <li>▪ Total cultivated hectarage 8018; 2676 ha under CF</li> </ul> <p><b>Sinazongwe District</b></p> <ul style="list-style-type: none"> <li>▪ Total number of farmers 17240; farmers practicing CF and 0 lead farmers trained in CF</li> </ul>	<ul style="list-style-type: none"> <li>▪ Create CSO-Government dialogue platforms</li> <li>▪ 3000 Farmers practicing CF by 2018</li> <li>▪ 300 lead farmers trained in CF</li> <li>▪ 3500 Ha under CF</li> </ul> <ul style="list-style-type: none"> <li>• 1000 farmers practicing CF and 50 lead farmers trained in CF</li> <li>▪ 5000ha under CF by 2018</li> </ul>	<ul style="list-style-type: none"> <li>▪ Use and dissemination of Early warning system in place need to be enhanced through localization of interventions</li> <li>▪ Water harvesting projects interventions need to be implemented</li> <li>▪ Collaborate with department of agriculture</li> </ul>	
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>▪ Energy access co-benefits</li> <li>▪ Heavily deforested landscape particularly Rosewood with few trees standing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Support to transformational shifts towards a low-emission and resilient development path through creation of woodlots of indigenous and exotic</li> </ul>	<ul style="list-style-type: none"> <li>▪ Introduce permits managed by local officers from the Forest Department and traditional leadership</li> <li>▪ Tree planting/including community woodlots</li> </ul>	

	<ul style="list-style-type: none"> <li>▪ Limited capacity for Forest Department to monitor the forest reserves and capacity to conserve the forest</li> </ul>		
	<ul style="list-style-type: none"> <li>▪ Livestock and wildlife badly affected by low water resulting into high incidences of Human-wildlife conflict</li> </ul>	<ul style="list-style-type: none"> <li>▪ Likely to worsen with anticipated increasing effects climate change</li> </ul>	<ul style="list-style-type: none"> <li>▪ Introduce boreholes in the parks to water animals</li> <li>▪ on customary land (open area) and for wild animals in Game Management Areas</li> <li>▪ Implement land use plan</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Fish stocks in the Kariba Dam declining suspected due to over fishing, high temperature and low water levels</li> <li>▪ <i>Chete and Sekula</i> islands heavily poached due to absence of resident law enforcement staff. Fish spawning grounds around the islands equally illegally exploited</li> <li>▪ . Breeding of crocodiles in the wild uncertain due to increasing temperatures.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Business as usual for fishermen risking further drop in fish and Kapenta catches</li> <li>▪ No resident law enforcement staff on the islands and no tour operator</li> <li>▪ No research done on effects of temperature in wild populations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conduct research on the impact of high temperature on fish breeding</li> <li>▪ Involve private sector to develop tourist facilities on the islands</li> <li>▪ Conduct research on effects of increasing temperature on sex ratios in the wild.</li> <li>▪ Establishment of a Joint Research Centre between Conservation Lower Zambezi (CLZ) (and other NGOs) and Mulungushi University (and other Academic institutions). The centre would provide capacity building on all community based natural resources management, including, conservation of biodiversity, land management,</li> </ul>

			<p>climate change adaptation strategies livelihoods etc.</p> <ul style="list-style-type: none"> <li>▪ Increased policing of islands to prevent incursions by illegal settlers near to these island sanctuaries.</li> <li>▪ Consider gazettement of the other islands illegally used by fishermen as sanctuaries to promote fish spawning and development of tourism</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Unsustainable fishing of Kapenta and Tiger fish on Lake Kariba</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduce overfishing on Lake Kariba for Kapenta fishing due to overstocking of rigs on the lake</li> </ul>	<ul style="list-style-type: none"> <li>▪ Limiting the number of Kapenta rigs to fish on the lake. Promotion of fish cages and aquaculture.</li> </ul>
<b>Land degradation /Sustainable</b>	<ul style="list-style-type: none"> <li>▪ Low innovative climate-smart agro-ecology; Community landscape conservation due to poor rainfall received</li> <li>▪ Gully erosion and river/stream bank erosion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduce land degradation through good land husbandry practices e.g. smart agriculture.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Soil management practices introduced including seeding of stream/riverbanks with grass and other structural works in worst affected areas</li> </ul>
<b>Persistent Organic Pollutants (POPs)</b>	<ul style="list-style-type: none"> <li>▪ The use of chemicals is not significant as people there are not farmers but in future chemicals will be in use.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Future use of chemical may affect the classification of Honey produced in the areas as 'organic'</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sensitization of farmers and communities on the possibility of use of pesticides harming the honey production in the district.</li> <li>▪ Effective implementation of Local to global chemicals coalitions on POPs</li> </ul>

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