

Ministry of Environment & Natural Resources Management

Republic of Zimbabwe



Zimbabwe's Fourth National Report  
To the Convention on Biological Diversity

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## Table of Contents

Executive Summary: .....	VII
List of Abbreviations: .....	XVI
<b>CHAPTER 1</b> .....	<b>1</b>
<b>1.0 Overview of Biodiversity Status, Trends and threats in zimbabwe</b> .....	<b>1</b>
1.1 Introduction: .....	1
1.2 Ecosystems Approach.....	1
1.3 Ecoregions of Zimbabwe .....	10
1.4 Zimbabwe Rich Biodiversity .....	20
1.5 The Status and trends of Zimbabwe Biodiversity.....	21
1.5.1 Forest biodiversity .....	21
1.5.2. wildlife Biodiversity.....	25
1.5.3 Aquatic biodiversity .....	31
1.5.4 The Status of Agro biodiversity .....	38
1.6 Threats to Biodiversity and Underlying Drivers.....	47
1.6.1 Deforestation and land degradation.....	47
1.6.2 Wildfires .....	47
1.6.3 Loss of habitat.....	48
1.6.5 Mining and Road Construction Activities: .....	48
1.6.6. Climate Change:.....	48
1.6.7 Invasive Alien Species: .....	49
1.6.8 Pollution: .....	49
1.6.9.Land Use Conflicts:.....	50
<b>CHAPTER II</b> .....	<b>51</b>
<b>2.0 Current Status of National Biodiversity Strategies and Actions</b> .....	<b>51</b>
2.1 Zimbabwe National Biodiversity strategy and Action Plan .....	51
<b>CHAPTER III</b> .....	<b>58</b>
<b>3.0 Mainstreaming Biodiversity into National, Regional and International Level</b> .....	<b>58</b>

3.1 National Frameworks for mainstreaming biodiversity.....	58
3.2 SECTORAL POLICIES .....	60
3.2.1 Wildlife Based Land Reform Policy .....	60
3.2.2 Forest Based Land Reform Policy.....	61
3.2.3 Draft National Agricultural Policy .....	61
3.2.4 National Energy Policy .....	61
3.2.5 Water and Sanitation Sector Policy .....	61
3.2.6 Environment Education Policy .....	61
3.3 Cross-Sectoral Programmes and Strategies .....	61
3.3.1 The Integrated Conservation Plan for the Fast Track Land Reform Programme .....	61
3.3.2 National Fire Protection Strategy .....	62
3.3.3 poverty reduction programmes.....	62
3.4 Cross-Sectoral Projects and Programmes .....	62
3.5 Regional cooperation and transboundary initiatives .....	62
<b>CHAPTER IV .....</b>	<b>64</b>
<b>4.0 Progress Towards the 2010 TARGETS, Conclusion and Recommendations.....</b>	<b>64</b>
<b>4.1 Progress Towards Meeting the 2010 Biodiversity Targets.....</b>	<b>64</b>
<b>4.2 Challenges, Obstacles Encountered And Lessons Learnt In Achieving the 2010 Biodiversity Targets.....</b>	<b>72</b>
4.2.1 Challenges in achieving the 2010 Targets.....	72
4.2.2 Obstacles Encountered .....	72
4.2.3 Lessons Learnt.....	72
4.2.4 Future Priorities.....	73
<b>4.5 Conclusions.....</b>	<b>73</b>
REFERENCES: .....	75
annex ii: list of participants attending the validation workshop .....	79
Annex III: IUCN Categories of Protected Areas.....	80
ANNEX IV: Population of some of the common mammals in zimbabwe (1998).....	81
ANNEX V: Major invasive alien woody species in Zimbabwe, their purpose of introduction, ecosystem invaded and their degree of invasiveness. ....	83
Annex VI: Food Composition Table For Indigenous Vegetables From Africa (Per 100g Edible Portion) .....	84
ANNEX VII: dams in the catchment areas.....	85

Annex VIII: Invasive plant and insect species found in Zimbabwe. ....	88
annex IX: Threatened Medicinal Plant Species in selected district in zimbabwe .....	89
ANNEX X: the mean composition (% abundance) of the fish community in lake kariba in 1968-72, 1974-75 and 2006 .....	90
ANNEX XI: ENVIRONMENT DATA SETS .....	91
ANNEX XII: ENVIRONMENTAL CONVENTIONS TO WHICH ZIMBABWE IS SIGNATORY .....	92

## LIST OF FIGURES

Figure 1: Eco-regions of Zimbabwe .....	10
Figure 2.1: Hwange National Park .....	13
Figure 3.1Gonarezhou National Park.....	17
Figure 4.1: Chimanimani National Park.....	20
Figure 5.1: Vegetation Classification in Zimbabwe.....	22
Figure 6: zimbabwe woody cover 1992 and 2008 .....	25
<b>FIGURE 7: ZIMBABWE NATIONAL PARKS AND WILDLIFE ESTATES .....</b>	<b>26</b>
Figure 8: Important Bird Areas in Zimbabwe.....	30
Figure 9: Wetlands of Zimbabwe.....	32
Figure 10: River Systems of Zimbabwe.....	33
Figure 11: fish species in lake harvest aquaculture .....	35
Figure 12: fresh water sardine ,kapenta ( <i>Limnothrissa miodon</i> ) from lake kariba.....	35
Figure 13: Nile crocodiles at their habitat .....	36
Figure 14:Hippopotamus amphibious outside their normal habitat.....	38
Figure 15:Amaranthus spinosus (Mowa).....	44
Figure 16.1: Yield trends for some crops grown in Zimbabwe for the years 2000-2008.....	45
Figure 17: uncontrolled fire in zimbabwe forests.....	48
Figure 18:Water Hyacinth In Lake Chivero .....	50

## LIST OF TABLES

Table 1 The Main Characteristics of Zimbabwe’s Eco-regions .....	10
table 2.1 GAZETTED FOREST AREAS IN ZIMBABWE .....	23
Table 3.1 national parks and other protected areas .....	24
Table 4.1: Diversity in mammals species in Zimbabwe .....	26
Table 5: EXAMPLES OF SOME WILDLIFE SPECIES OF ZIMBABWE ON THE IUCN RED LIST OF THREATENED SPECIES ..	27
Table 6.1: Approximate number of elephants in Zimbabwe in 2006 .....	28
Table 7.1: population for black and white rhinos as at 31/12/08 .....	28
Table 8.1: Catchment State of Major Dams as at 12/11/2010 .....	34
Table 9: Aerial survey estimates of Density and CV for crocodiles .....	37
Table 10: Aerial survey estimates of Density and CV for hippopotamus .....	38
Table 11: The Status Of Land Redistribution Into A1 And A2 Models As A Result Of The Fast Track Land Reform Programme.....	39
Table 12.1: Summary of Pulses found in Zimbabwe.....	43
Table 13 national livestock numbers (thousands) .....	46
Table 14: Areas destroyed by Fire .....	47
Table 15.1: Zimbabwe Biodiversity Strategy Action Plan .....	53

## EXECUTIVE SUMMARY:

Zimbabwe is endowed with a rich diversity of life forms. At species level, the country supports an estimated 4,440 vascular plant species, 214 of which are endemic, 672 bird species, 450 of which breed in Zimbabwe, though none are strictly endemic, 196 mammal species, 156 reptile species, 57 species of amphibians, 132 fish species. The diversity of microorganisms has not been adequately documented. Attention has however been on strains of Rhizobia (nitrogen fixation bacteria) with about 540 local and exotic lines being kept by the Ministry of Agriculture, Mechanization and Irrigation Development at the Grasslands Research Station.

Studying component parts of Zimbabwe's ecosystems has contributed to an understanding of the nation's biological and physical resources and its diversity. However, this sectoral, piece-by-piece approach has led to incomplete and sometimes misleading views. To address this challenge the country has adopted the Ecosystem Land Classification Approach.

Vincent and Thomas developed Zimbabwe's early work that formed the basis for the ecosystems approach in 1960. In 1998 the first state of the environment report presented a detailed land classification based on the Ecosystems Land Classification. The Ecosystem Land Classification Approach presents the country into five ecoregions.

### The Main Characteristics of Zimbabwe's Eco-regions

ECOREGION	CORRESPONDING NATURAL REGION	ALTITUDE (M)	MEAN ANNUAL RAINFALL (mm)	DOMINANT VEGETATION TYPE
Kalahari	IV and V	1030	560	<i>Colophospermum mopane</i> and <i>Baikiea</i>
Central	II and III	1300	620	<i>Brachystegia spiciformis-julbernadia globiflora</i>
Zambezi	IV	1080	650	<i>Colophospermum mopane</i>
Save Limpopo	IV and V	687	400	Tree Savanna, <i>Acacia</i>
Eastern Highlands	I	1500	740	<i>Themeda-exotheca</i> <i>loudetia</i> grasslands and <i>btachystegia spiciformis, julbernadia globiflora</i> woodlands

Source: State of the Environment Report 1998

In 2000 the Conference of the Parties on the Conventional on Biological Diversity (CBD) identified the ecosystem approach as the primary framework for the implementation of the Convention. The approach is a strategy for the management of land, water and living resources that promotes biodiversity conservation and sustainable use in an equitable way.

## Overall State of Biodiversity

Zimbabwe is well endowed with forests and woodlands covering 53 percent of the land area, a further 13 percent is covered by bushlands while, 0.3 percent of the area is under commercial plantations. Over a quarter of the woodland area is found on State Lands namely National Parks, Wildlife Reserves and Forest Reserves.

In 2000, estimates indicated that Zimbabwe had a well-established exotic plantation forest base covering some 155 853 ha. About 90% of the plantations are located in the Eastern Highlands. About 71% of the planted area is under softwoods, (pines), 13 percent under hardwoods (eucalyptus) and 16% under the wattle.

Zimbabwe has abundant and diverse wildlife resources consisting of hundreds or thousands of species of mammals, birds, reptile, butterflies, amphibians and invertebrates. Whilst very little is known on the status of insects and microorganisms.

About 175 species of mammals are found in Zimbabwe. The diversity of mammal species in Zimbabwe has not changed since the last State of the Environment Report of 1998. However there is a general decrease in the populations of most economically important large mammal species such as rhino, buffalo, antelope and lion.

According to the IUCN Red Data List of Threatened Species in Zimbabwe, amongst the mammals the endangered species are black rhinoceros, wild dog, whilst the vulnerable species include the brown hyena, the cheetah, the white rhinoceros, the hippopotamus, the lion and the African elephant.

Over 650 species of birds occur in Zimbabwe. Total bird numbers fluctuate within and across years due to intra-Africa and Palaeartic migrations. On a local scale, such migrations are due to variations in temperature, rainfall and drought among other factors. There is a general decline in certain bird species because of loss of habitat. The Swinnerton's Robin, Lesser Kestrel, Wattled Crane, Black-cheeked Lovebird are said to be vulnerable,

The diversity of Zimbabwe's aquatic flora and fauna is directly related to the type and distribution of its wetlands (areas that are permanently or temporarily covered with flowing or stagnant water). These wetlands include floodplains, riparian wetlands, dambos, pans, swamps and artificial impoundments.

Of the 122 fish species found in Zimbabwe, only a few commercially and biologically important ones have been monitored and are known. Fish species diversity and population in some of the major water bodies of the country are on the decline. Reasons for this includes, over-fishing, water pollution, drying of water bodies and the introduction of invasive alien species.



Aquaculture production is carried out for subsistence and commercial purposes. Subsistence aquaculture is carried out at household level. It is limited to a few pond-based enterprises where it provides a cheap source of protein for domestic consumption. Indigenous species such as Mozambique Tilapia (*Oreochromis mossambicus*), the Red-Breasted Tilapia (*Tilapia rendalii*), the Green-headed Tilapia (*Oreochromis macrochir*), the Kariba Bream (*Oreochromis mortimeri*) and Sharp tooth Catfish (*Clarias gariepinus*) are utilized. Annual production from subsistence aquaculture is estimated to be 900 tonnes. Commercial aquaculture production is based on the Nile Tilapia, (*Oreochromis niloticus*) and the rainbow trout (*Oncorhynchus mykiss*), and is estimated to produce approximately 1600 tons per annum mainly from a farm on Lake Kariba.

It is estimated that Zimbabwe has about 6 000 indigenous plant species representing approximately 1 500 genera and 200 families. Of the species found in the country, about 500 are known to be of use in traditional medicine; around 230 are endemic while about 500 are listed as under threat of extinction.

Cultivated crops including small grains, cereals, grain legumes, roots and tubers, indigenous and exotic vegetables and horticultural crops cover almost a third of Zimbabwe. Due to its temperate and sub-tropical climate, the country produces a wide variety of fruit such as apples, pears, peaches, plums, apricots, nectarines, grapes, strawberry, and kiwi. Other fruits and agricultural products include oranges, nartjies, lemons, bananas, litchis, mangoes, sugarcane, and coffee.

Domesticated animals in Zimbabwe can be divided into the following categories: large herbivores, comprising of cattle and a few equines, small ruminants consisting of goats and sheep, and non ruminants comprised of pigs, poultry and rabbits.

There has been considerable infusion of exotic germplasm into some of the animal species raised by Zimbabwean farmers, especially in the large-scale commercial sector. Some indigenous cattle have been crossed with exotic breeds to improve dairying and beef production potential.

Whilst indigenous goats have been crossbred with the Boer goat for improved meat production and the Saanen goat for higher milk yields.

### **Threats to Biodiversity and Underlying Drivers**

Humans' activities have remained the major threats to ecosystems in Zimbabwe. However in the past decade the impacts of climate change (frequency of devastating droughts and floods) have increased the natural threats to biodiversity.

- Deforestation and land degradation

Excessive harvesting for both domestic and commercial use, as well as conversion of forest areas to agricultural land causes the threat of deforestation in forest reserves. Habitat destruction mostly affects *mosses* and *hydrophilous orchids* and *ferns* whose habitats have continued to be destroyed

by drought, cultivation and fire. The opening up of forests for agricultural expansion is the major reason for loss of forest biodiversity and has resulted in a 12% increase of agricultural land. The growth of the tobacco industry has also increased the demand for fuel wood for tobacco curing.

Rapid deforestation in communal areas and other human settlements has also led to a drastic drop in populations of the medicinal plant species. Estimates indicate that the country has over 500 plants with medicinal value. A number of these medicinal plants face possible extinction due to over exploitation.

- Wildfires

The frequent occurrence of wildfires throughout the country now stands out as one of the major threats to biodiversity. The problem is mainly pronounced during the dry season when the temperatures are high and the vegetation is flammable. The occurrence of wildfires has impacted negatively on the grazing land for both domestic and wildlife species. Fires have also destroyed large tracts of commercial timber especially in the Eastern Highlands of the country. Lost of human lives as a result of wildfires has also been recorded.

- Loss of habitat

Human encroachment, fragmentation of ecosystems, logging, mining and agriculture pose threats to ecosystems in the wildlife estate. The loss of habitat (drying up of rivers and surface waters, degraded land) cover has impacted negatively on aquatic life, terrestrial biodiversity and productivity of both livestock and crops.

- Mining and Road Construction Activities:

Mining activities have become a major threat to biodiversity. Open cast methods involve stripping large pieces of land to remove the soil, which disturbs the natural environment surrounding the mines. It removes vegetation and takes away land that could be used for agriculture.

Road construction, which involves the opening up, of new land has also impacted negatively of biodiversity. Large tracts of land are opened in remote areas, which are hosts to various species of wildlife. This has resulted in the fragmentation of ecosystems and habitats, obstructing migratory routes to breeding and feeding grounds used by wildlife.

- Climate Change:

Although the impacts of climate change and biodiversity have not been fully studied in Zimbabwe, evidence on the ground shows a decline of agro biodiversity species after droughts and floods. A number of crop species are known to be extinct due the devastating impacts of droughts and floods. The drying up of wetlands and other water bodies during the drought years have had negatively impacts on the aquatic biodiversity..

- Invasive Alien Species:

Invasive alien species (IAS) have affected native biodiversity in almost every type of ecosystem throughout the country. As one of the greatest drivers of biodiversity loss, they pose a threat to ecosystem integrity and function and therefore, to human well-being. While only a small percentage of organisms transported to new environments become invasive, their negative impacts on food security, plant, animal and human health and economic development can be extensive and substantial.

- Pollution:

Pollution of water is exacerbated by direct discharge of raw municipal sewerage into public streams, frequent sewer bursts in some urban centers and untreated effluent from industries and mining. The major pollution indicator is proliferation of aquatic invasive alien species such as water hyacinth as a result of excessive eutrophication.

### **Zimbabwe National Biodiversity Strategy and Action Plan**

In 1998 the Government of Zimbabwe, in close consultation with key stakeholders developed the Zimbabwe Biodiversity Strategy and Action Plan. The plan was based on identified unmet needs within the context of the CBD. These include:

- The absence of comprehensive and elaborate biodiversity inventory and monitoring programmes.
- Inadequate incentives for some local communities and individuals to undertake biodiversity conservation and sustainable use initiatives in both protected and non-protected areas.
- Inadequate environmental awareness, education and training at various stakeholder levels.
- Limited appreciation of the importance and contribution of biodiversity to the national economy and to local communities by policy makers.
- Inadequate, conflicting and poorly enforced pieces of legislation that tend to adversely affect biodiversity conservation and sustainable use.
- A limited financial base and institutional capacity to facilitate the formulation, implementation and monitoring of biodiversity projects at the local level.
- Inadequate affordable alternatives to reduce the reliance on natural resources at the local level.
- Inappropriate research and extension approaches in biodiversity conservation and sustainable use.

Based on the identified needs the country developed a framework strategy plan. The plan however lacked clear activities, a budget and an institutional structure. The economic challenges that faced the country from 2000, impacted negatively on the further development and elaboration of the

National Biodiversity Strategic Plan. Thus the plan lacked budgetary support from Government, the private sector, non-state actors, and international development partners.

Despite these challenges the country managed to achieve some milestones in biodiversity implementation including, the establishment of a biodiversity inventory and monitoring program, promotion of Incentives for local communities and individuals to undertake biodiversity conservation and Sustainable use, expansion of the protected areas under the transfrontier parks, creation of awareness on the Importance and contribution of biodiversity to the national economy, strengthen policies and legislation to enhance biodiversity conservation and sustainable utilization and benefit sharing (regulation for access and benefit sharing 2009), creation of alternative livelihoods that reduce direct dependency of natural resources, development of appropriate research and extension approaches to biodiversity conservation and sustainable use.

### **Mainstreaming Biodiversity into National, Regional and International Level**

The economic survival of various productive sectors and of the people depending on those sectors for their livelihoods is intrinsically connected to the conservation use of biodiversity. Mainstreaming of biodiversity into national, regional and international development strategies and frameworks entails the articulation of maximizing the benefits of biodiversity and minimizing its loss through all productive sectors such as agriculture, fisheries, forestry, tourism and mining. Mainstreaming also relates to biodiversity consideration in poverty reduction plans and national sustainable development plans.

Current national and regional development plans for Zimbabwe have made limited achievements in mainstreaming biodiversity. Despite this challenge, Zimbabwe's pioneering work on the ecosystems approach has contributed to an integrated approach to biodiversity management.

### **Progress Towards Meeting the 2010 Biodiversity Targets**

The Global 2010 Biodiversity Action Plan sets out eleven goals for the conservation, sustainable use and equitable sharing of benefits arising out of the use of genetic resources. Zimbabwe has contributed significantly over the past ten years in towards meeting the 2010 biodiversity targets. However, the country encountered challenges during implementation as elaborated in Chapter II.

#### *Goal 1: Promote the conservation of the biological diversity of ecosystems, habitats and biomes*

The country has identified areas of particular importance for biodiversity conservation with over 832,662 hectares under gazetted forests and 5,403,500 million hectares under national parks, safari conservancies and other protected areas. In 2010 UNESCO designated 44000 km<sup>2</sup> in the Zambezi Valley as a Biosphere zone.

*Goal 2: Promote the conservation of species diversity*

Efforts have been made to restore agro-biodiversity on selected food crops (maize, sorghum, millet). Farmers' landraces have been promoted through community seed banks and collaboration in situ conservation (communities) ex situ collaboration (national gene banks). National inventories of threatened species both animal and plants have been undertaken and strategies to protect the threatened species are being developed.

*Goal 3: Promote the conservation of genetic diversity*

Progress has been made towards conserving genetic diversity through in situ and ex situ actions. However the promotion of monoculture, cash cropping further threaten genetic diversity.

*Goal 4: Promote sustainable use and consumption*

There are a significant number of registered varieties of plants and food agriculture, but only a few are in use. Evidence of increased identification and use of indigenous vegetables have been noted. Collection of plants for medicinal purposes continues to threaten plant biodiversity. Implementation of CITES on wildlife fauna has reduced the level of biodiversity loss.

*Goal 5: Pressures from habitat loss, land use change and degradation, and unsustainable water use reduced*

Expansion of agricultural land continues to threaten biodiversity. However, the introduction of the Wildlife and forest based land reform, reforestation, the implementation of national fire strategy and the integrated water resource management minimizes the level of biodiversity loss.

*Goal 6: Control threats from invasive alien species*

No new invasive species have been identified. Progress has been made in clearing major water bodies of the water hyacinth. Lack of effective management plans on the eradication of the terrestrial invasive species (lantana camara and the wattle) continues to be a challenge. The country continues to collaborate with regional and international partners on the invasive species programme.

*Goal 7: Address challenges to biodiversity from climate change, and pollution*

Limited action has been undertaken to mainstream biodiversity conservation through climate change adaptation. However progress has been made to introduce drought tolerant varieties in drought prone areas of the country. Reduction on rain fed agriculture through expansion of irrigation facilities is in progress.

*Goal 8: Maintain capacity of ecosystems to deliver goods and services and support livelihoods*

Ecosystems management of land and water is being promoted through integrated land management. The identification of water catchment areas and establishment of water catchment councils have greatly improved integrated water resources management concept. Gazetted forests provide habitat for plant and wildlife species, which, are important for sustaining livelihoods (health, food and shelter).

*Goal 9: Maintain socio-cultural diversity of indigenous and local communities*

There is a decline in traditional knowledge and rights among communities. Efforts to empower local communities through the recognition of their rights have increased through the introduction of the access and benefit sharing regulations. The amendment of the seed laws that recognize the farmers' right to conserve, save, and market local seed is a major achievement.

*Goal 10: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources*

The adoption of the access and benefit sharing regulation under the Environmental Management Act will ensure the fair and equitable sharing of benefits arising out of the use of genetic resources. The establishment of the Medical Traditional Practitioners Council and enactment of the Traditional Leadership Act further enhances the access and benefit sharing arrangements between the communities and other stakeholders.

*Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention.*

Due to the limited partnership between the international development partners and the country, Zimbabwe has not benefited on commitments made by developed countries under the Convention, in accordance with its article 20, paragraph 4, which provides financial, human, scientific, technical and technological capacity to implement the Convention.

## **Future Priorities**

- Revise and update the National Biodiversity Strategic Plan based on the Post 2010 Global Biodiversity Strategy.
- Mainstreaming biodiversity programs into national development strategies and plans
- Enhancing Ecosystems Approach in biodiversity management.
- Strengthening the data collection methods on biodiversity through the development of appropriate biodiversity indicators.
- Establish an effective biodiversity monitoring and reporting system at the local, national and regional level.

- Identify regional and international partners for technical assistance in the review and development of the post 2010 National Biodiversity Strategy Action Plan.
- Strengthen the Links with Other Multilateral Environment Conventions.
- Strengthen national institutions to coordinate biodiversity programmes at the local, regional and international levels.
- Develop a strong scientific base for research and development of biodiversity programmes. Involvement of academic universities and other academic institutions are a key priority.

## LIST OF ABBREVIATIONS:

ABS	Access to Benefit Sharing
AGRITEX	Agricultural Technical and Extension Services
AIAS	African Institute on Agrarian Studies
ARDA	Agricultural Rural Development Authority
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBD	Convention on Biological Diversity
CBDC	Community Biodiversity Development and Conservation
CBI	Crop Breeding Institute
CBO	Community Based Organization
CFU	Commercial Farmers Union
CITES	Convention on International Trade on Endangered Species
CPA	Civil Protection Act
CSM	Convention On Migratory Species
CSO	Central Statistical Office
CTDT	Community Technology Development Trust
DDMC	District Drought Management Committee
ECL	Ecological Land Classification
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMA	Environmental Management Agency
EMP	Environmental Management Plan
FAO	Food and Agricultural Organization
FTLRP	Fast Track Land Reform Programme
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GIS	Geographical Information Systems
GRBI	Genetic Resources and Biotechnology Institute
IAS	Invasive Alien Species
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IES	Institute of Environmental Studies
IITA	International Institute for Tropical Agriculture
IPGRI	International Plant Genetics Resources Institute
IUCN	International Union for the Conservation of Nature
IWRMS	Integrated Water Resources Management
LEAP	Local Environmental Action Planning
MDG	Millennium Development Goals
MEA	Multilateral Environmental Agreement
MEA	Multilateral Environmental Agreements
MOU	Memorandum of Understanding
NBA	National Biotechnology Authority of Zimbabwe
NEAP	National Environmental Action Plan
NETCAB	IUCN Regional Networking & Capacity Building Initiative



NGO	Non Governmental Organization
NPGRC	National Plant Genetic Resources Committee
NPPO	National Plant Protection Organization
NR	Natural Regions
OPV	Open Pollinated Varieties
PAs	Protected Areas
PWMA	Parks Wildlife Management Authority
RDC	Rural District Council
TFCA	Transfrontier Conservation Area
TMPC	Traditional Medical Practitioners Council
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
WWF	World Wide Fund
ZINATHA	Zimbabwe National Traditional Healers Association
ZINWA	Zimbabwe National Water Authority

# CHAPTER 1

## 1.0 OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS IN ZIMBABWE

### 1.1 INTRODUCTION:

The climate and edaphically conditions of Zimbabwe support a varied range of flora and fauna that play a critical role in the social, economic and ecological well being of the country. Zimbabwe is a land locked country covering some 39 million hectares. Its neighbours are South Africa in the south, Mozambique in the east and northeast, Zambia in the north and Botswana in the southwest. The country lies between 15 degrees 40 c and 22 degrees 30 c in the South and 25 degrees 33 05 E latitudes and is bounded by the Zambezi River in the north and the Limpopo River in the south.

Eighty percent of the country is above 600m, while the remainder is below this height. An outstanding feature of the country's landscape is the central plateau known as the Highveld that is about 650 km long and 30 km wide. On either side of this is the middleveld, which is between 600 and 1200 m above sea level. The lowveld is below 600 m and consist of a narrow strip in the Zambezi Valley and a broader tract between the Limpopo and the Save Rivers.

Rainfall is the major climatic factor that influences the performance of sectors such as agriculture, forestry, wildlife and aquatic life in Zimbabwe. The rain season stretches from November to March, while the dry season is between May and August.

Studying component parts of Zimbabwe's ecosystems has contributed to an understanding of the nation's biological and physical resources and its diversity. However, this sectoral, piece-by-piece approach has led to incomplete and sometimes misleading views. To address this challenge the country has adopted the Ecosystem Land Classification Approach as presented in the first state of the environment report published in 1998.

### 1.2 ECOSYSTEMS APPROACH

The Ecosystems Approach is widely recognized as the key framework for implementing the Convention on Biological Diversity (CBD). The approach is a strategy for the management of land, water and living resources that promotes biodiversity conservation and sustainable use in an equitable way. The ecosystem approach is a framework for holistic decision-making and action. The natural units, which make up the environment, are called ecological zones, or "ecozones". An ecozone is a large natural unit, controlled by a set of common processes, mostly climate, and is dominated by life forms with similar physical adaptations to these processes.

Vincent and Thomas developed Zimbabwe's early work that formed the basis for the ecosystems approach in 1960. This system was designed to provide a spatial framework for agricultural production based on soil potential and rainfall reliability patterns. Zimbabwe is one of the few countries in the developing world that has been implementing an ecosystems approach in environmental management.

In 2000 the Conference of the Parties on the Convention on Biological Diversity (CBD) identified the ecosystem approach as the primary framework for the implementation of the Convention. The ecosystem approach applies 12 principles (see box 1).

#### **BOX 1: THE ECOSYSTEMS APPROACH**

**Principles**

1. The objectives of management of land, water and living resources are a matter of societal choice.
2. Management should be decentralized to the lowest appropriate level.
3. Ecosystem managers should consider the effects (actual and potential) of their activities on adjacent and other ecosystems.
4. Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:
  - a) Reduce those market distortions that adversely affect biological diversity;
  - b) Align incentives to promote biodiversity conservation and sustainable use;
  - c) Internalize costs and benefits in the given ecosystem to the extent feasible.
5. Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8. Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9. Management must recognize that change is inevitable.
10. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
11. The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovation and practices.
12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Points of operational guidance

1. Focus on the relationships and processes within ecosystems
2. Enhance benefit-sharing
3. Use adaptive management practices
4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralization to the lowest level, as appropriate
5. Ensure intersectoral cooperation

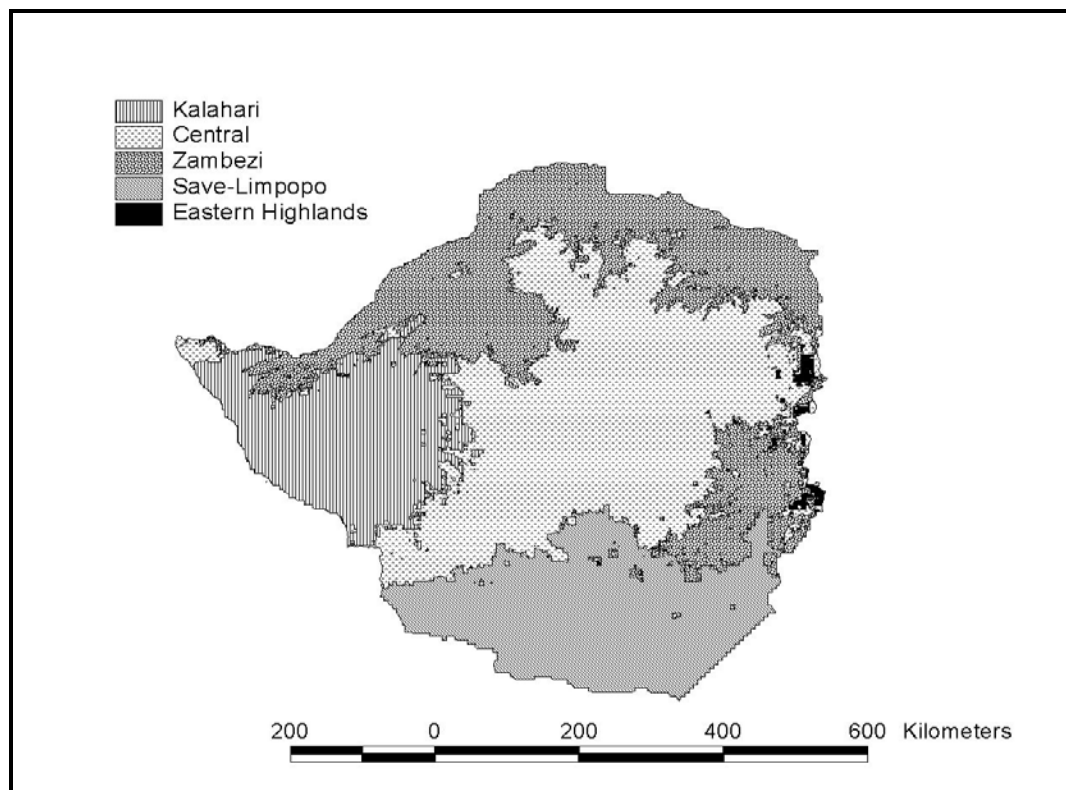
Taken from Smith and Maltby (2003)

Source: CBD Technical Series No. 23

### 1.3 ECOREGIONS OF ZIMBABWE

The Ecosystem Land Classification Approach presents the country into five ecoregions. ( Figure 1)

**FIGURE 1: ECO-REGIONS OF ZIMBABWE**



Source: State of the Environment Report 1998.

**TABLE 1 THE MAIN CHARACTERISTICS OF ZIMBABWE'S ECO-REGIONS**

ECOREGION	CORRESPONDING NATURAL REGION	ALTITUDE (M)	MEAN ANNUAL RAINFALL (mm)	DOMINANT VEGETATION TYPE
Kalahari	IV and V	1030	560	<i>Colophospermum mopane</i> and <i>Baikiea</i>
Central	II and III	1300	620	<i>Brachystegia spiciformis-julbernadia globiflora</i>
Zambezi	IV	1080	650	<i>Colophospermum mopane</i>
Save Limpopo	IV and V	687	400	Tree Savanna, <i>Acacia</i>
Eastern Highlands	I	1500	740	<i>Themeda-exotheca loudetia</i> grasslands and <i>btachystegia spiciformis, julbernadia globiflora</i> woodlands

Source: State of the Environment Report 1998

### **Kalahari: 46,891 sq km (12 percent of Zimbabwe's land area)**

**The Kalahari ecoregion**, which is bounded by Botswana on the west and the central ecoregion on all other fronts, is the second smallest ecoregion after the Eastern Highlands. The climate of the Kalahari ecoregion is characterized by seasonal rainfall and with high temperatures during the wet season and low temperature values during the dry season. The physical character of this ecoregion has led to a flora – fauna complex that has given the region a distinct biological setting. The ecoregion supports two main vegetation types woodlands and grasslands. It supports a distinct variety of fauna.

The woodlands of the Kalahari ecoregion are sometimes referred to as the dry forest. It is a dense forest characterized by a number of species that hardly occur outside this area. These include the *Baikiaea plurijuga* (Zambezi teak), *Ricinodendron rautanenii* (Umgoma), *Guibourtia coleosperma* (False Mopane) and the shrubs *Paropsia brazzeana* (Umdlampofu) and *Combretum molle* (Umbhondo). Among these are a number of other trees of the Highveld such as *Brachystegia spiciformis* (Msasa), *Pterocarpus angolensis* (Mukwa) and species of *Strychnos mellodora* (monkey oranges). The rivers are flanked by a strip of riverine woodland that verges into forests in some areas, with species such as *Acacia albida* (Apple–ring Acacia), *ficus* species (figs), *Garcinia* and *Diospyros mespiliformis* (Ebony).

The grasslands are scattered on seasonally waterlogged places like drainage lines and pans. On the margins are found suffrutescent species such as *Lansea edulis* (mutsambatsi) and *Parinari capensis* (muhachapasi) while various trees and shrubs occur in clumps on better-drained pockets and on termite's mounds.

The fish fauna endemic to the warm waters that characterize this ecoregion include: Lung fish, Root Bottelneus, Bottle Nose, Tiger Fish, Kafue Pike, Chessa, Large-scale Yellow fish, Manyame Mud sucker, Vundu, Barbel, Silver Barbel, Electric Catfish, Eels, several species of bream and tilapia and spiny eel.

The Kalahari ecoregion has good populations of most indigenous mammals. African Elephant and Giraffe are common, while Greater Kudu, Impala, Common Waterbuck, Burchell's Zebra, Lion, Leopard, and spotted hyena are plentiful. Also present are Black and White Rhinoceros, Gemsbok, buffalo, Cheetah and Wild Dog.



Giraffe in the Kalahari Ecoregion



African Elephant a common sight in the Kalahari Ecoregion



Lion



Buffalo herd

About 420 species of birds have been recorded in the Hwange region, with several being special to the western part of the country and this ecoregion (Solomon and Williams 1991). The Red-billed Francolin is restricted to the Kalahari sands, while Bradfield's Hornbill is found in the teak woodlands. Red-eyed Bulbul is common in the drier areas of this ecoregion, but normally not found elsewhere in Zimbabwe. Crimson-breasted Shrike, Greater Flamingo, Pink-backed and white pelican, Black winged Pranticole and Lesser Jacana and others are associated with this ecoregion, normally being found in some western areas of the continent.

The physical and biological character of the Kalahari ecoregion has influenced human activities such as game and cattle ranching. The eco-region's soils support a good number of agricultural crops, including drought tolerant grains, sorghum, pumpkins, watermelons and millet for subsistence.

The Kalahari eco-region has been an important timber belt since the 1890s, supporting several sawmills. However most have closed down as the harvestable timber species dropped to uneconomic levels. Timber exploitation has been focused on species like the *Baikiaea plurijuga* (Zambezi Teak), *Pterocarpus angolensis* (Mukwa) and the *Afzelia quanzensis* (Pod Mahogany).

Sport hunting and photographic safaris have become the main source of revenue. Also thriving in this ecoregion now are village woodcarving industries whose impacts have not been extensively quantified nor qualified. Hwange National Park, at 14,651 sq. km, covers about 31 percent of the ecoregion, providing sufficient representation and protection of the ecoregion. The park is an important source of revenue through wildlife tourism.



**FIGURE 2.1: HWANGE NATIONAL PARK**

Forestry and wildlife management have proven to be the best activities for this fragile ecoregion.

**Central: 195,379 sq km (50 percent of Zimbabwe)**

**The Central ecoregion** includes areas that are usually referred to as the highveld and the central watershed. It is a broad, high altitude area centered along a northeast trending ridge, stretching from south west of the country and encompassing most of the major urban areas (Bulawayo, Gweru, Kwekwe, Harare and Bindura) in the Great Dyke. The Great Dyke is a topographical feature between 3-11 km wide with northeast trend that stretches for over 500 km across the country. It is a host to a number of minerals including platinum, gold, nickel, copper, chrome and asbestos. The ecoregion has the largest platinum deposits in the world after South Africa.

The ecoregion is the country's breadbasket supporting the nation's agriculture from cattle ranching in the southwest to intensive crop production and dairy farming to the northeast. It is the most industrialized, with many manufacturing and mining activities.

Mean annual rainfall for the ecoregion ranges from 700-1000 mm with a 20-35 percent coefficient of variation. The rainfall tends to decline towards the Zambezi and the Save-Limpopo ecoregions but increasing towards the eastern highlands. Mean annual temperature ranges from 17.5 degrees Celsius in the eastern highlands to 20 degrees Celsius towards the Zambezi and Save-Limpopo ecoregions.

The dominant vegetation is dry Zambezian miombo woodland. Over most of the region thatching grass is most common with spear grass common in the drier areas. This general pattern is interrupted in several areas by the physical and chemical properties of the soils and the incidence of frost. For example, the serpentine-derived soils on the Great Dyke support grasslands and are unfavorable for the growth of woody species because of high concentrations of nickel and an excess of magnesium over calcium.

Other influential elements in the ecoregion are the termite mounds, which offer a drier and nutrient rich habitat, attracting species that are more characteristic of the neighboring north and south ecoregions. Common species on the termite mounds are Long Pod Cassia and Diamond-leaved Euclea. Along the rivers the vegetation is dense woodland of moisture-loving species like Sycamore Fig, Mubvuguta (*Croton megalobotrys*) and Apple-ring Acacia (*Acacia albida*).

The fish fauna common to the Central ecoregion include the Red-breasted bream, Melanopleura Tilapia, Eels, Mozambique Barbel, Large-scale Yellowfish and Cornish Jack. These thrive in moderately warm waters of this ecoregion.

Large populations of animals in the Central ecoregion are mainly found in the Matobo National Park. Of the 189 mammalian species indigenous to Zimbabwe, 88 have been recorded in the Matobo Hill. Impala, Grimm's Duiker, Southern Reedbuck, Steenbok, Bush pig, Bushbuck and



Warthog occur throughout the park. The ecoregion has the highest density of leopard, which preys on the abundant populations of Rock Hyrax, Chacma Baboons, monkeys and other smaller animals.

Bird life is diverse in this ecoregion due to its size and variety of habitat and natural features. The variety of woodlands, grasslands, savanna, scrub, rocky outcrops, urban areas, dams and rivers provide habitat for many of the country's estimated 673 species of birds. About 300 bird species have been recorded in the Matobo National Park, including 40 species of raptors such as the Black Eagles which has the highest densities recorded anywhere in Africa. Some 415 species of birds have been recorded in the Victoria Falls area. Lake Chivero near Harare has had about 450 species (Fishpool and Evans 2001). The large number of dams in this ecoregion provides habitat for many water birds, particularly during breeding and migration seasons. Similarly the expansive grasslands provide habitat for the pipits, longclaws, and larks among many others.

The ecoregion has the country's largest commercial farming sector, supporting crops such as tobacco, maize and wheat. Cattle ranching tend to be practiced in the drier parts of the region to the west and to the south.

The region also supports the communal farming sector, particularly in maize and livestock production. Farmers in this sector tend to keep larger numbers of small ruminants (goats, sheep) in low altitude and drier parts of the region. In the higher rainfall areas of the ecoregion, maize production increases.

Manufacturing is a principal activity in the big cities of Bulawayo, Kwekwe, Gweru, Kadoma and Harare. Tourism is also an important economic activity, with wildlife-based tourism mainly concentrated in Matobo National Park.

### **Zambezi: 62,521 sq km (16 percent of Zimbabwe)**

The Zambezi ecoregion is the most northerly ecoregion in Zimbabwe and the third largest. Its boundaries are Zambia in the north, Mozambique in the east and the central ecoregion to the south. Most of the southern boundary follows the Zambezi escarpment that extends over 500km from the Chizarira Hills. South of Lake Kariba, the drainage basins of Sengwa, Ume and Sanyati Rivers merge to form a large embayment into the central region.

Low rainfall, high temperatures and high evaporation rates characterize this eco-region. The soils over much of the extreme north of the region are sodic and specialized vegetation communities adapted to the highly mineralized soils are found here.

The vegetation of the Zambezi ecoregion is diverse with *Colophospermum mopane* (known as mopane) being predominant on sodic soils. Along the Zambezi River in the extreme north of the ecoregion the alluvium riparian communities consist of *Trichelia emetica* (Natal mahogany), *Kigelia Africana* (Sausage tree), *Lonchocarpus capassa* (Rain tree) and the highly productive *Faidherbia*

*albida* (Apple ring tree) which produces nutritious pods fed on by most wild herbivores found along the Zambezi River. Inland away from the river there are pockets of ecologically important dry forests known as *Xylia torreana* forests. These forests consist of *Commiphera* spp., *Acacia* spp., *Sterculia* spp, and Baobab. On the higher ground *Brachestegia spiciformis*, *B. Boehmii* and *Julbernardia globiflora* occur.

Over 10,500km<sup>2</sup> of this ecoregion falls under the Parks and Wild Life Management Authority and is set aside for the conservation of flora and fauna. Eco-tourism in the form of consumptive and non-consumptive tourism is a major economic activity. The ecoregion has a high diversity of large wildlife and the highest diversity of fish species including lung fish, root bottlenose, bottlenose, tiger fish, Kafue perch, chessa, vundu, barbel including the electric barbel, bream spp, tilapia, eels and electric catfish. There is unrestricted movement of wildlife north across the Zambezi River into Zambia and east to Mozambique.

The ecoregion also has the highest densities of hippo and Nile crocodile in the Zambezi River (thirty-three hippo per kilometre of river and six adult crocodiles per kilometre of river). The impoundment caused by Lake Kariba has affected the natural flooding regime of the Zambezi downstream causing some changes in the riparian vegetation dynamics.

Aerial census surveys show that the elephant population is in excess of 10,000 and the buffalo population is in excess of 3,500. Much of the area falling under the Parks and Wild Life Management Authority has World Heritage status due to the diversity of the wildlife and the spectacular scenery in the area.

The ecoregion also has a diverse bird population that includes about 400 species. In Lake Kariba area, large numbers of Grey-headed Gulls and White-winged Terns are associated with the Kapenta fishing boats. The African Fish-eagle is common along the Kariba shoreline, while the less common African Skimmer is associated with open stretches of water for feeding and sandbanks for roosting along the Zambezi River. Southern Carmie Bee-eater, Lillian's Lovebird, Meyer's Parrot, Crested Guinea fowl and several species of hornbill are found in this ecoregion.

Outside of the conservation area, cotton farming is a lucrative activity. The ecoregion is drought-prone and the production of drought-resistant small grains (sorghum and millet) has been encouraged. Other economic activities associated with this ecoregion include coal mining, and the exploitation of fish especially in Lake Kariba. Harvesting of mopane wood for personal use by local people takes place.

### **Save-Limpopo: 78,151 sq km (20 percent of Zimbabwe)**

The Save Limpopo eco- region lies in the south and southeastern part of Zimbabwe and is the second largest in the country. The central ecoregion boundaries are to the north, Mozambique to the east, South Africa to the south and Botswana to the west.

The Save-Rundi and Limpopo basins drain this ecoregion. The southward flowing Save River forms a northerly extension of the ecoregion parallel to the Eastern Highlands. Gonarezhou National Park, which is 5,000 km<sup>2</sup> in extent, comprises 6.4% of the ecoregion. The South-east Lowveld has been designated a “Tourism Development Zone’ and Gonarezhou National Park is seen as the engine driving tourism in the area. The park is part of the Great Limpopo Transfrontier Conservation Area together with Limpopo National Park (Mozambique) and Kruger National Park (South Africa). The region has a rich wildlife resource and besides the Gonarezhou National Park, three large conservancies (Save Valley, Chiredzi River and Buby River and Bubiana Conservancies) set aside for wildlife are found in the area. The total area of these conservancies is 9,060km<sup>2</sup>. The area of this conservation area (including Gonarezhou) is 14060km<sup>2</sup> in extent and comprises 17.9% of the ecoregion. Plans are underway to open a wildlife corridor between Gonarezhou National Park and the conservancies so that there is unrestricted movement of wildlife between the Gonarezhou National Park and Conservancies. There are also plans to open up a wildlife corridor between Kruger and Limpopo National Parks with Gonarezhou.



**FIGURE 3.1 GONAREZHOU NATIONAL PARK**

Aerial censuses carried out show that elephant numbers in Gonarezhou have increased from 7,000 in 2007 to 9,000 in 2009 (an annual growth rate of nearly 6%). This survey was carried out in conjunction with Frankfurt Zoological Society. All other species including buffalo showed static growth but no declines. The general area holds good populations of lions, wild dog, spotted hyena and leopard, however in Gonarezhou National Park the lion population is at a low density. Cheetahs continue to occur in low densities. Other mammals present in good numbers are Cape buffalo, Impala, Greater Kudu, Giraffe, Burchell's Zebra and Hippopotamus. There are also populations of Cape Eland, Sable, Reedbuck and the Nile crocodile.

Vegetation is varied depending on soil type. Large areas of sodic soils are covered by *Colophospermum mopane* (Mopane) woodland whilst the deeper sandy soils have very diverse woodland and good grasslands. Riparian woodland along the major Rivers (Runde, Save and Mwenezi Rivers) is dense and is characterized by closed canopy woodland consisting of *Cordyla Africana* (wild mango), *Kigelia Africana* (sausage tree), *Xanthocercis zambeziaca* and various combretum spp.

The fish species that occur in this ecoregion include: Lung Fish, Cornish Jack, Bottle Nose, Tiger Fish, Chessa, Condrington Yellowfish, Manyame Labeo, Mudsucker, Mozambique Barbel, Eels and Bream.

More than 400 species of birds occur in Gonarezhou National Park, including many raptors with a large breeding population of Lapper-faced Vultures. The Chilojo Cliffs are renowned for Peregrine and Lanner Falcons. The presence of water pans support large numbers of water birds such as Spur-winged Goose, and White-winged Ducks. Brown headed Parrot is distinctive for this ecoregion. Mottled and Bohm's Spinetails are found here in association with Baobab trees, while the grasslands and open woodlands support the Ground Kori and Hornbill Bustard among many other species.

Apart from tourism in the ecoregion large areas have been set aside for sugar-cane farming, water being sent by canals from upland dams. New dams such as the Tokwe-Mukosi (1,802,600 (10<sup>3</sup>m<sup>3</sup>)) and Kondo Dams (1,230,000 (10<sup>3</sup>m<sup>3</sup>)) will improve water supplies in this ecoregion. The sugarcane industry provides jobs for local inhabitants. Other irrigated crops grown by large-scale and small-scale farmers are cotton, winter wheat, beans and citrus fruits. Dry land crops are of drought resistant small grains such as sorghum and millet. Apart from tourism, the ecoregion is dominated by large and small-scale cropping under irrigation. The larger plantations of sugar cane, winter wheat, cotton, beans and citrus fruits are centered on Chiredzi, Triangle and Hippo Valley and Mkwazine. The water used for irrigation is imported from the Central ecoregion (Lake Mutirikwi). Dams such as Manyuchi in Mwenezi, have been constructed to boost water supplies for irrigation.

Run-off of nitrogenous fertilizers from the sugarcane industry into the main rivers (Chiredzi, Save and Runde Rivers) is of major concern. Parks and Wildlife personnel together with the University of

Zimbabwe carry out regular river-condition assessments and siltation of the major rivers is also of concern.

### **Eastern Highlands** 7,815 sq km (2% of Zimbabwe)

The Eastern Highlands ecoregion occupies the central portion of the country's eastern boundary with Mozambique, forming a narrow belt of mountainous country with a north-south orientation along the border. The belt extends for about 250km and covers 7,815 sq km or about 2 percent of the country. The ecoregion gets its name from the hills and mountains, collectively called the Eastern Highlands. They run from Nyanga in the north to Chimanimani in the south.

The physical setting of the ecoregion favours plant growth, making it the richest in plant diversity. More than 1000 plant species are found with about 60 being endemic. The vegetation is mainly moist forest and upland grassland. The forests of the Eastern Highlands can be divided into three types based on altitude: high altitude, medium altitude and low-altitude forests.

**High altitude forest**, between 1,500 – 1,900 m, is a single storey forest and is sometimes referred to as the moist montane forest. It is found as relics on the Himalayas Range and in parts of the Chimanimani Range. The characteristic tree species are Yellowwood and African Cedar, which occur on drainage lines of rain shadow areas and on eastern windward slopes. Other plant species occurring on these mountains show a close affinity with eastern and southern African flora. Examples of some of these include some species of Helichrysum, Heather, Sugar Bush and Aloe.

**Medium altitude forest**, between 1,100 – 1,500 m. Chirinda forest (950 ha) represents the largest protected area of this ecoregion. Smaller pockets are found in the Honde Valley and on the Chimanimani and Himalayas ranges.

**Low-altitude forest, between 350-700 m** is sometimes referred to as the lowland rainforest. It covers about 170 ha, comprising Makurupini Forest, Haroni and Rusitu Forest Reserves. Small pockets also occur on the lower slopes of Nyangani at Pungwe Bridge.

Few fish species occur in this ecoregion and the common ones include: Silver Barbel, Eels and Melanopleura Tilapia. The ecoregion is blessed with some rare mammals associated with the rough terrain such as the Blue Duiker and Samango Monkey.

There are over 490 species of birds in the Eastern Highlands ecoregion. Some of the species are range-restricted and these include, Swynnerton's Robin, Chirinda Apalis (endemic), Robert's Prinia (Fishpool and Evans 2001).



Figure 4.1: Chimanimani National Park

The ecoregion is extremely popular as a holiday area for both local and overseas visitors because of its impressive scenery. Nyanga and Chimanimani National Parks and Vumba Mountains, which are the major tourist attraction, encompass over 64 percent of the land area in the ecoregion.

Agriculture has been practiced in this ecoregion for hundreds of years. Local people have practiced terracing as a landscape adaptation method because of the steep slopes that characterize this area. Today the ecoregion is characterized by diverse agricultural activities, ranging from the production of horticultural crops to dairy farming in Chipinge. The ecoregion is covered in most parts with plantations of tea, coffee, exotic forests (pine for timber and wattle for tanning hides) and horticultural crops (apples, peaches, pears, bananas, yams). Trout fish farming is also practiced in the ecoregion. There is a decline in large-scale dairy commercial farming after the fast track land reform in 2002. This is as result of redistribution of land to small- scale farmers.

#### 1.4 ZIMBABWE RICH BIODIVERSITY

Zimbabwe is endowed with a rich diversity of life forms. At species level, the country supports an estimated 4,440 vascular plant species, 214 of which are endemic, 672 bird species, 450 of which breed in Zimbabwe, though none are strictly endemic, 196 mammal species, 156 reptile species, 57

species of amphibians, 132 fish species and uncounted numbers of species in other groups.(State of Environment Report 1998).

The diversity of microorganisms has not been adequately documented. Attention has however been on strains of Rhizobia (nitrogen fixation bacteria) with about 540 local and exotic lines being kept by the Ministry of Agriculture, Mechanization and Irrigation Development at the Grasslands Research Station.

At the broader level, there are 25 recognized main vegetation types and a wide diversity of landscape features of both scientific and aesthetic importance. Considerable genetic diversity is also apparent in the varieties of form, colour and behaviour of many of these species, though that diversity still remains to be comprehensively documented.

Zimbabwe's high level of biodiversity has its basis on the country's diverse climatic and geological and vegetation formations.

## 1.5 THE STATUS AND TRENDS OF ZIMBABWE BIODIVERSITY

### 1.5.1 FOREST BIODIVERSITY

Zimbabwe is well endowed with forests and woodlands covering 53 percent of the land area, a further 13 percent is covered by bush lands while, and 0.3 percent of the area is under commercial plantations. Over a quarter of the woodland area is found on State Lands namely National Parks, Wildlife Reserves and Forest Reserves. Many people in the communal lands rely heavily on woodland resources for food, furniture and timber for construction.

Zimbabwe is dominated by three phyto-geographic regions called the Flora Zambeziaca, Afromontane and Cape Floristic (Beentje 1996).

**The Flora Zambeziaca** region is the richest in terms of species and dominates most of Zimbabwe. The phyto-region has about 8,500 plant species of which 4,600 are endemic (White 1983). Most tree species in the phyto-region are economically importance and are used for timber, poles, firewood, fruit and medicine. It is a complex phyto-geographic region dominated by the miombo woodlands, mopane, teak, acacia and terminalia/combretum. (figure4.1)

*Miombo woodlands* have diverse uses, including watershed protection, provision of soil fertility (leaf litter), grazing and browsing, firewood, fruit, mushrooms, caterpillars and timber.

*The teak woodland*, which is exclusive to Kalahari sands, is predominantly found in the demarcated forests of western Zimbabwe and parts of the Hwange National Park. The woodland has a long history of management for commercial timber exploitation, wildlife use, cattle grazing and water catchments.

*Mopane woodlands* are widespread in Zimbabwe and are often associated with low altitude and hot areas with sodic or alluvial soils.

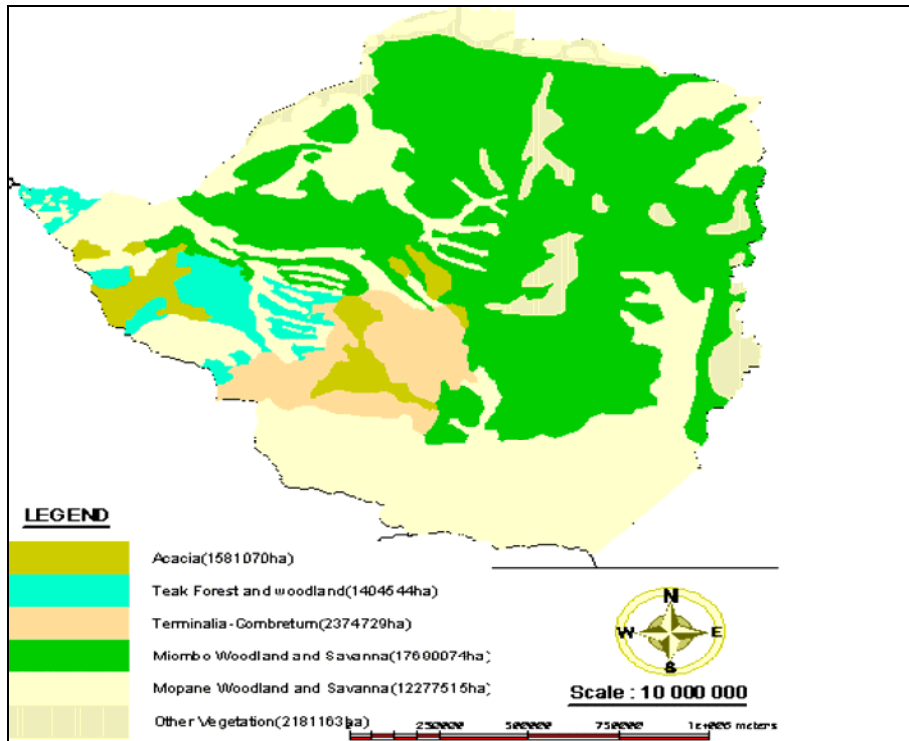


Figure 5.1: Vegetation Classification in Zimbabwe

*Acacia woodlands* occupy large tracts of land especially in the dry areas, and grow on eutrophic soils. The acacia woodlands are associated with a number of tree and grass species, and are important in pastoral systems as the trees provide browse (leaves, flowers and pods) and grasses used for grazing.

The *Terminalia/Combretum woodlands* are often found as tree-shrub combinations. The woodlands provide firewood, poles for construction and making tools. Combretum is an important component of this woodland type and provides similar products as terminalia. However this woodland has been severely cut and most of the existing vegetation is secondary.

**The Afromontane phyto-region** is localized in the Eastern Highlands, mainly on the windward side of mountains along Mozambique. There are about 740 vascular plant species found in this phyto-region. The main factors controlling species distribution and composition in this phyto-region are altitude, moisture availability, human disturbances, soil type and topography. A number of these forests are being threatened by plantation forest development, agricultural expansion and invasion by alien species such as jacaranda and wattle. The Eastern Highlands



form part of the Afromontane region and has the largest level of endemism, notably in the Chimanimani Mountains, Nyanga area and Chirinda Forest.

**Exotic plantation** In 2000, estimates indicated that Zimbabwe had a well-established exotic plantation forest base covering some 155 853 ha. About 90% of the plantations are located in the Eastern Highlands. About 71% of the planted area is under softwoods, (pines), 13 percent under hardwoods (eucalyptus) and 16% under the wattle. With respect to plantation ownership pattern, about 42% belong to the State, 54% to private companies and the remainder to small private growers who include cooperatives. The presence of this exotic forest biodiversity has made it possible for Zimbabwe to develop a forestry industry. Conservation of exotic forests biodiversity in Zimbabwe therefore provides genes for infusion in the breeding populations and contributes to global forest diversity conservation.

Zimbabwe has set aside 2% of the country (832,662 ha) as protected forest. Tables 2.1 and 3.1 show gazetted forest areas and national parks and other protected areas.

**TABLE 2.1 GAZETTED FOREST AREAS IN ZIMBABWE**

<b>Name of forest</b>	<b>Area (ha)</b>
Chesa	14,250
Insenze	35,200
Insenze Extension	8,400
Umguzo	32,200
Gwaai	144,230
Ngamo	102,900
Mbembesi	55,100
Lake Alice	39,000
Gwampa	47,000
Mzola	67,200
Sukumi	54,400
Kazuma	24,000
Fuller	23,300
Panda-Masui	35,500
Kavira	28,200
Sijarira	25,600
Molo	2,900
Umzibane	2,471
Mvutu	2,100
Mafungabusi	82,000
Ungwe	567
Mudzongwe	1,420
Grants	2,509
Batley	2,215
<b>Total (22)</b>	<b>832,662</b>

Source: Zimbabwe Environmental Statistics 2010

**TABLE 3.1 NATIONAL PARKS AND OTHER PROTECTED AREAS**

<b>NATIONAL PARKS</b>	<b>Area (000 ha)</b>
Chimanimani	17.1
Chizarira	191.0
Gonarezhou	505.3
Hwange	1,465.1
Kazuma Pan	31.3
Mana Pools	219.6
Matopos	42.4
Matusadona	140.7
Nyanga	47.2
Victoria Falls	2.3
Zambezi	56.0
<b>Subtotal</b>	<b>2,703.8</b>
Other Protected Areas	
Safari Areas	2,367.0
Recreational Parks	308.6
Botanical Reserves	7.0
Botanical Gardens	0.5
Sanctuaries	18.6
<b>Subtotal</b>	<b>2,701.7</b>
<b>Grand Total</b>	<b>5,403.5</b>

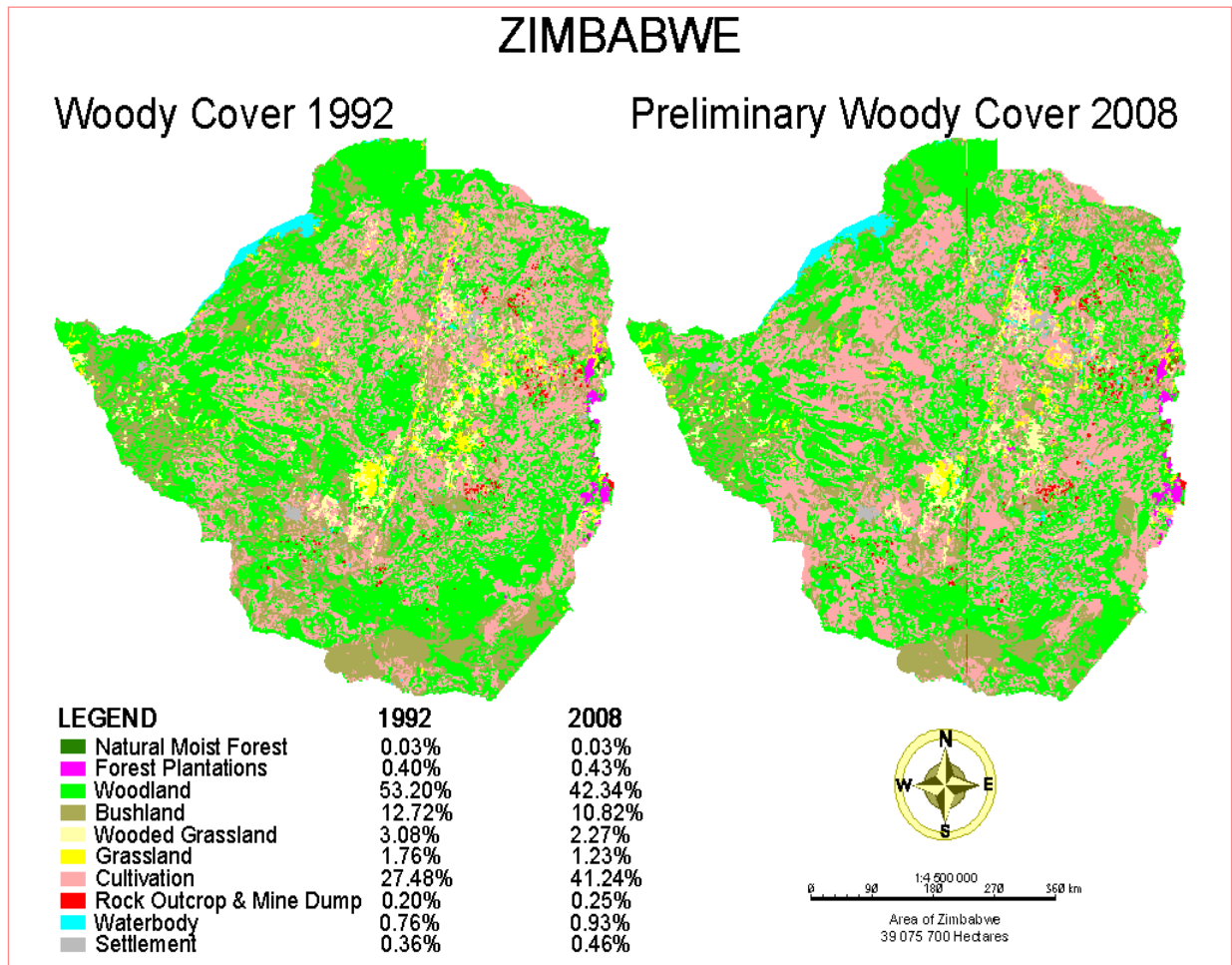
### **Trends in the forestry biodiversity**

The proportion of total land area covered by forest has been falling significantly, estimated to be 330 000 hectares per year (Forestry Commission, December 2010). Figure 6 shows the changes in woody cover areas for 1992 and 2008. The major changes to the country's forestry biodiversity is a result of a decline in woodland cover from 53% in 1992 to 42.34% in 2008 and expansion of crop-cultivated land from 27.48% in 1992 to 41.24% in 2008. .

Other causes to the decline in forest/wood cover include: population pressure in communal areas, effects of fires, collection of non timber products for medicinal purposes, commercial timber and tobacco curing. Attempts to reduce deforestation have been proposed by the Forestry Commission through promulgation of the following regulations i.e. the Tobacco Wood Energy Regulations, Plantation Timber Industry Regulations, Firewood Trading

Regulations, and the Movement of Timber Regulations. These regulations have not been gazetted resulting in continued high rate of deforestation.

**FIGURE 6: ZIMBABWE WOODY COVER 1992 AND 2008**



Source: Forestry Commission

### 1.5.2. WILDLIFE BIODIVERSITY

Zimbabwe has abundant and diverse wildlife resources consisting of hundreds or thousands of species of mammals, birds, reptile, butterflies, amphibians and invertebrates.

#### *Mammals*

About 175 species of mammals are found in Zimbabwe and belong to 12 orders (table 4.1). The orders with large numbers of species in the country are the Chiroptera (51 species), the Rodentia (40 species), the Carnivora (31 species), the Artiodactyls (26 species) and the Insectivora (16 species). The implementation of an adaptive, decentralized and participatory management system

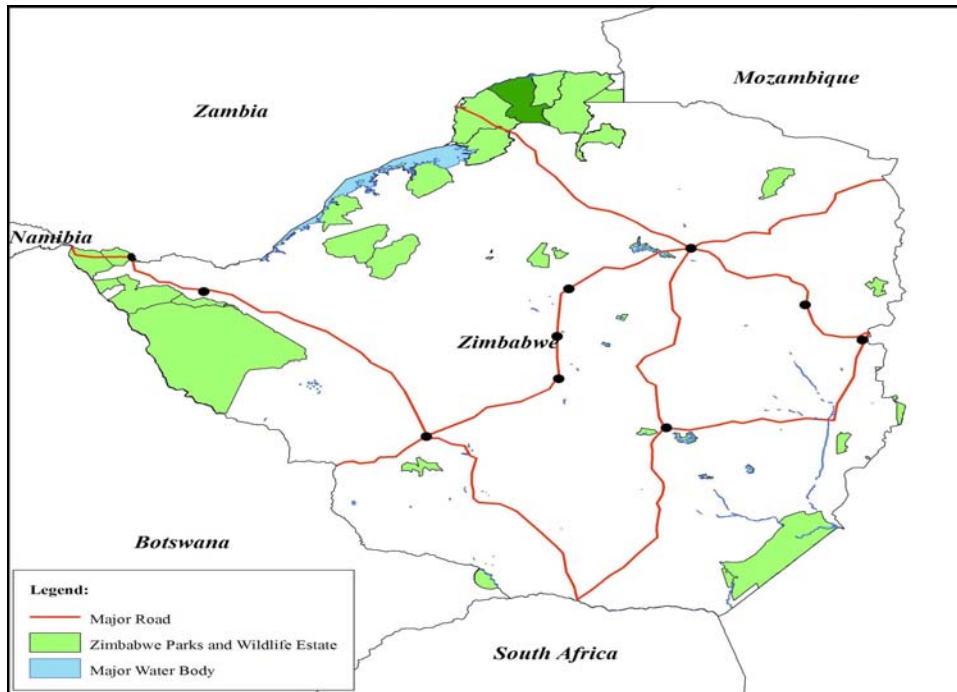
allows government to effectively run the Parks and Wildlife estates; local communities to manage the CAMPFIRE programme; and commercial farmers to run conservancies/game ranches..

**TABLE 4.1: DIVERSITY IN MAMMALS SPECIES IN ZIMBABWE**

Diversity in mammals Order (example of species in the order)	No. of species in Zimbabwe
Insectivora (hedgehogs, shrews, moles)	16
Chiroptera (bats)	51
Primates (monkeys, baboons, bushbabies)	5
Pholidota (pangolin)	1
Logomorpha (hares, rabbits, rock rabbits)	2
Rodentia (squirrels, rats, porcupine)	40
Carnivora (jackals, foxes, wild dog, otters, civets, genets, mongooses, hyenas, cats)	31
Tubulidentata (aardvark)	1
Proboscidae (elephant)	1
Hyracoidae (hyrax)	1
Artiodactyls (hippopotamus, warthog, giraffe, antelopes, gazelles, buffalos)	26
Perissodactyla	4

Source: State of the Environment Report, 1998

**FIGURE 7: ZIMBABWE NATIONAL PARKS AND WILDLIFE ESTATES**



The diversity of mammal species in Zimbabwe has not changed since the last State of the Environment Report of 1998. However there is a general decrease in the populations of most economically important large mammal species such as rhino, buffalo, antelope and lion.

According to the IUCN Red Data List of Threatened Species in Zimbabwe, amongst the mammals the endangered species are black rhinoceros, wild dog, whilst the vulnerable species include the brown hyena, the cheetah, the white rhinoceros, the hippopotamus, the lion and the African elephant.

**TABLE 5: EXAMPLES OF SOME WILDLIFE SPECIES OF ZIMBABWE ON THE IUCN RED LIST OF THREATENED SPECIES**

FAMILY	SCIENTIFIC NAME	COMMON NAME	IUCN CATEGORY
Manidae	Manis teminckii (Smutsia teminckii)	Pangolin	LC
Muridae	Aethomys silindensis	Silinda Rock Rat	DD
Hystriidae	Hystrix cristata	Crested Porcupine	LC
Canidae	Lycaon pictus	African Wild Dog	EN
Lutrinae	Mellivora capensis	Honey Badger	LC
Viveridae	Civettictis civetta	African civet	LC
Hyaenidae	Hyaena brunnea	Brown Hyaena	NT
	Proteles cristata	Aardwolf	LC
Felidae	Acinonyx jubatus	Cheetah	V
	Panthera leo	Lion	V
	Panthera pardus	Leopard	NT
	Felis silvestris	Wild Cat	LC
	Caracal caracal	Caracal	LC
Elephantidae	Loxodonta Africana	African Elephant	V
Rhinocerotidae	Ceratotherium simum	White Rhinoceros	NT
	Diceros bicornis	Black Rhinoceros	CE
Hippopotamidae	Hippopotamus amphibius	Common Hippopotamus	V
Bovidae	Hippotragus equines	Roan Antelope	LC
	Hippotragus niger	Sable Antelope	LC
	Kobus ellipsiprymnus	Waterbuck	LC
	Sylvicapra grimmia	Common Duiker	LC
	Syncerus caffer	African Buffalo	LC
	Tragelaphus angasii	Nyala	LC
	Tragelaphus oryx	Common Eland	LC
	Tragelaphus scriptus	Bushbuck	LC
	Tragelaphus strepsiceros	Greater Kudu	LC
Muscicapidae	Swinnertonia swinnertoni	Swinnerton's Robin	V
Falconidae	Falco naumanni	Lesser Kestrel	V
Gruidae	Grus carunculatus	Wattled Crane	V
Psittacidae	Agarponis nigrigenis	Black-cheeked Lovebird	V
Crocodylidae	Crocodylus niloticus	Nile Crocodile	LC

**IUCN Category:**

DD – Data deficient; LC – Least Concern; NT – Near Threatened; V – Vulnerable; EN – Endangered; CE – Critically Endangered

Source: 'The IUCN Red List of Threatened Species; Version 2010.4'

**TABLE 6.1: APPROXIMATE NUMBER OF ELEPHANTS IN ZIMBABWE IN 2006**

	<b>Parks &amp; Wildlife Estates</b>	<b>Communal Lands</b>	<b>Forest Areas</b>	<b>Private land</b>	<b>Total</b>
Northwest Matebeleland	19618	3110	2344	0	25072
Sebungwe	5842	9500	270		15612
Zambezi valley	13371	3756	0	0	17127
Gonarezhou	5126	221	2700	3484	11531
Other areas not regularly surveyed	800	13200	0	2500	16500
	<b>44757</b>	<b>29787</b>	<b>5314</b>	<b>5984</b>	<b>85842</b>

Source: Department of National Parks & Wildlife Management: *Elephant Census in Zimbabwe* Dunham and Mackie et al (2006 a and b)

**TABLE 7.1: POPULATION FOR BLACK AND WHITE RHINOS AS AT 31/12/08**

<b>Land Tenure</b>	<b>Area</b>	<b>No. of Black Rhinos</b>	<b>No. of White Rhinos</b>
State land	Matusadona	14	-
	Matopos	14	50
	Sinamatella	34	6
	Chipinge	30	-
	Main Camp & FC	-	32
	Mcllwaine	-	29
	Kyle	-	27
	Nyamaneche	-	5
Private land	Save	115	30
	Bubye	126	40
	Bubiana	60	-
	Bubiana (Drummond)	38	-
	Iwaba	-	-
	Midlands	13	-
	Chiredzi	9	-
	Malilangwe	59	72
	Imire	4	-
	Chipangali	2	-
	Stanley & Livingstone	3	-
	Eldorado	-	5
	Thetford	-	8
<b>Grand Total</b>		<b>521</b>	<b>304</b>

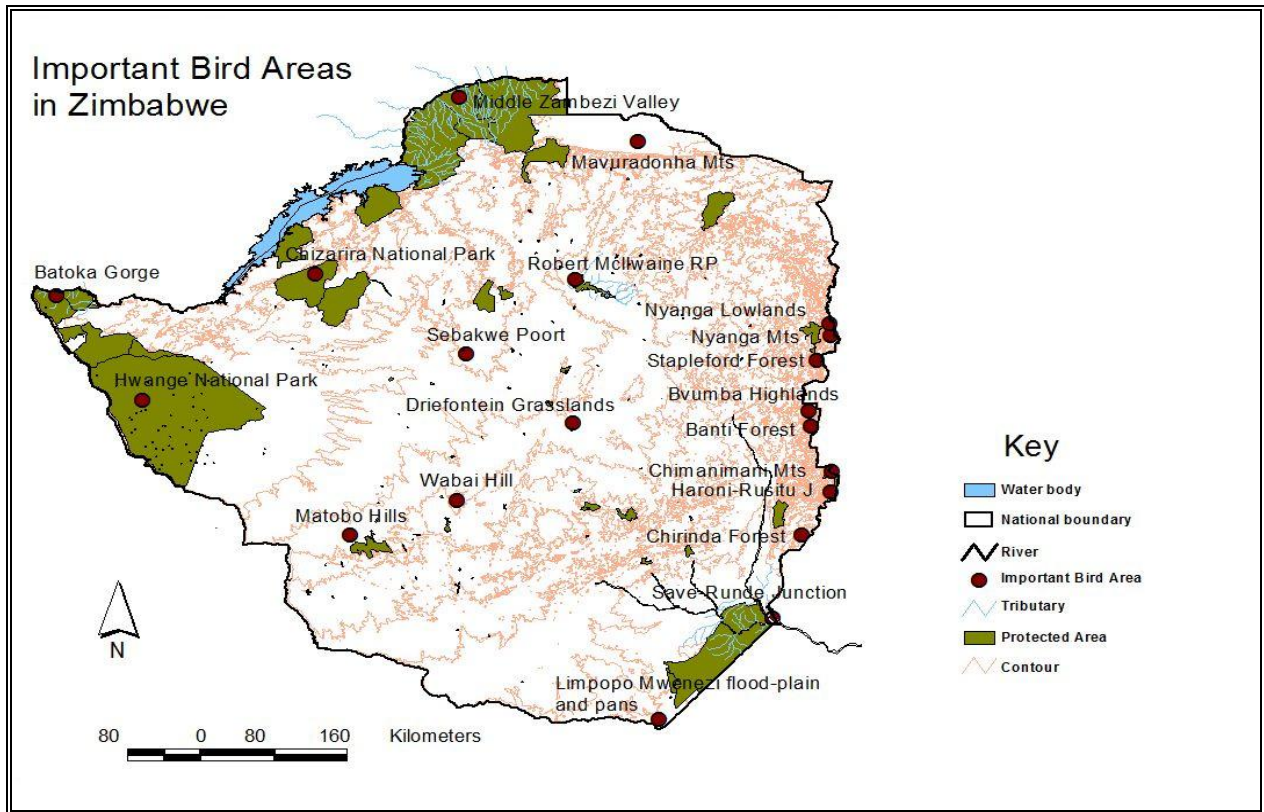
Source: ZIMSTATS 2010

## Birds



Over 650 species of birds occur in Zimbabwe. Total bird numbers fluctuate within and across years due to intra-Africa and Palearctic migrations. On a local scale, such migrations are due to variations in temperature, rainfall and drought among other factors. There is a general decline in certain bird species because of loss of habitat. Figure 7 depicts the main bird areas located in the country, commonly referred to as Important Bird Areas (IBAs).

**FIGURE 8: IMPORTANT BIRD AREAS IN ZIMBABWE**



Source: Birdlife Zimbabwe

Important Bird Areas (IBAs) are essential and suitable habitats for the conservation of breeding, wintering and/or migrating birds of the world. Currently there are eleven identified IBAs in the country. The eleven IBAs/PAs are Nyanga Mountains, Stapleford Forest, Chimanimani Mountains, Chirinda Forest, Hwange National Park, Chizarira National Park, Batoka Gorge, Middle Zambezi Valley, Robert Mcllwaine Recreational Park, Matobo Hills and Save-Runde junction and Driefontein Grasslands.

According to the IUCN criteria two waterbird species are classified as endangered in Zimbabwe, Madagascar Pond Heron (*Ardeola idea*) and the White-winged Flufftail (*Sarothura ayresi*). These two species are however migrants that are rarely recorded in this country. One species that needs attention is the Wattled Crane, a vulnerable (VU) species that is concentrated in the Driefontein Grasslands, an Important Bird Area. Wetlands are important breeding and foraging ground for bird species such as the Streaky-breasted Flufftail (*Sarothura boehmi*), the Striped Crake (*Aenigmatolimnas marginalis*), Spotted Crake (*Porzana porzana*) – a non-breeding migrant from Europe, the Grass Owl (*Tyto capensis*) and the Pinkthroated Longclaw (*Macronyx capensis*), among others.



### *Reptiles and amphibians*

About 163 species of reptiles occur in Zimbabwe. The Python sebae (African Rock Python) is the most commonly known species that is endangered. The population for reptiles has not been monitored on a regular basis hence it is difficult to discern population trends. Only the Nile crocodile has been extensively studied due to its economic importance. Snakes have the highest number of species (61) that have been studied. There is only one known species of crocodiles.

Seventy-two taxa amphibians (anurans) are currently recognized in Zimbabwe, though new species are being identified from time to time. Seven are currently listed endemic, five of which are montane species from the Eastern Highlands.

### ***Insects***

Zimbabwe still lacks a systematic inventorying and monitoring system for insect species. However, indications are that the country has a rich diversity of insects and all the 29 orders have been reported. Most collections are of beetles, where 128 genera have been recorded in the carabid family alone. Other insect species that have received considerable attention in the country include butterflies, moths, grasshoppers, locusts, termites, true bugs, tsetse flies and mosquitoes.

### **Trends in wildlife biodiversity**

Notwithstanding the establishment of the four intensive protection zones, the White and Black Rhinoceros numbers are decreasing due to increased cases of poaching in private conservancies and national parks. The population of cats and Sable Antelope are on the increase while Cape buffalo has been decreasing.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has played a significant role in the conservation and protection of various wildlife species in the country. Through adherence to CITES rules and regulations, Zimbabwe has managed to maintain a reasonable system of wildlife management albeit a constrained budgetary provision and comparatively low revenues from the wildlife sector.

#### **1.5.3 AQUATIC BIODIVERSITY**

The diversity of Zimbabwe's aquatic flora and fauna is directly related to the type and distribution of its wetlands (areas that are permanently or temporarily covered with flowing or stagnant water). These wetlands include floodplains, riparian wetlands, dambos, pans, swamps and artificial impoundments. (Figure 7)

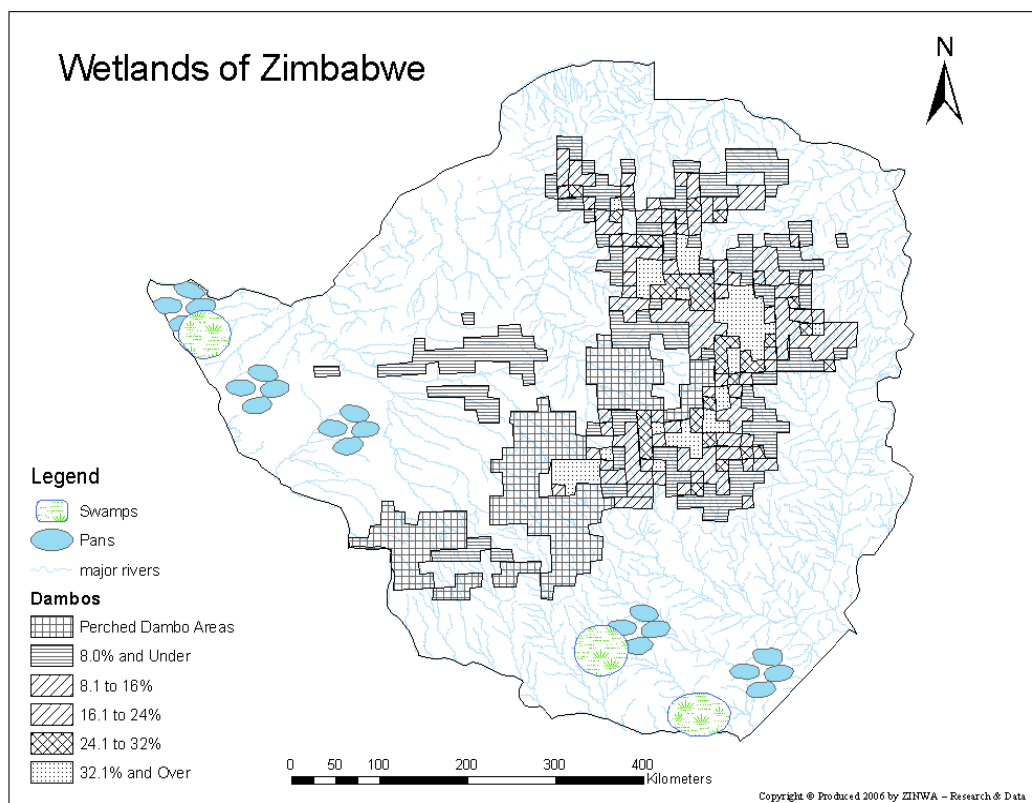


Figure 9: Wetlands of Zimbabwe

Source: *Research and Data, Zimbabwe National Water Authority (2006).*

Floodplains are confined to the mid Zambezi Valley around Mana Pools National Park and the Save-Runde River confluence in the southeastern part of the country. These wetlands are an important center of aquatic biodiversity as they provide a range of unique habitats. However, the extent of the floodplain below the Kariba Dam has been decreasing due to changes in discharge patterns while the Save-Runde floodplain still provides the physical base for the lowveld sugar industry.

The drainage system in Zimbabwe was subdivided in 2000 into the following river systems with each system being managed by a catchment council: Gwayi, Sanyati, Manyame, Mazowe, Save, Runde and Umzingwane (Figure 8). The Gwayi Catchment comprises rivers located on the northwestern part of Zimbabwe, and draining mainly into the Zambezi River. Major rivers occurring within this catchment are Shangani, Bembezi, Mguza, and Upper Gwayi. Nata River, which drains into the Mkgadikgadi Pans occurring in Botswana, is part of the Gwayi Catchment.

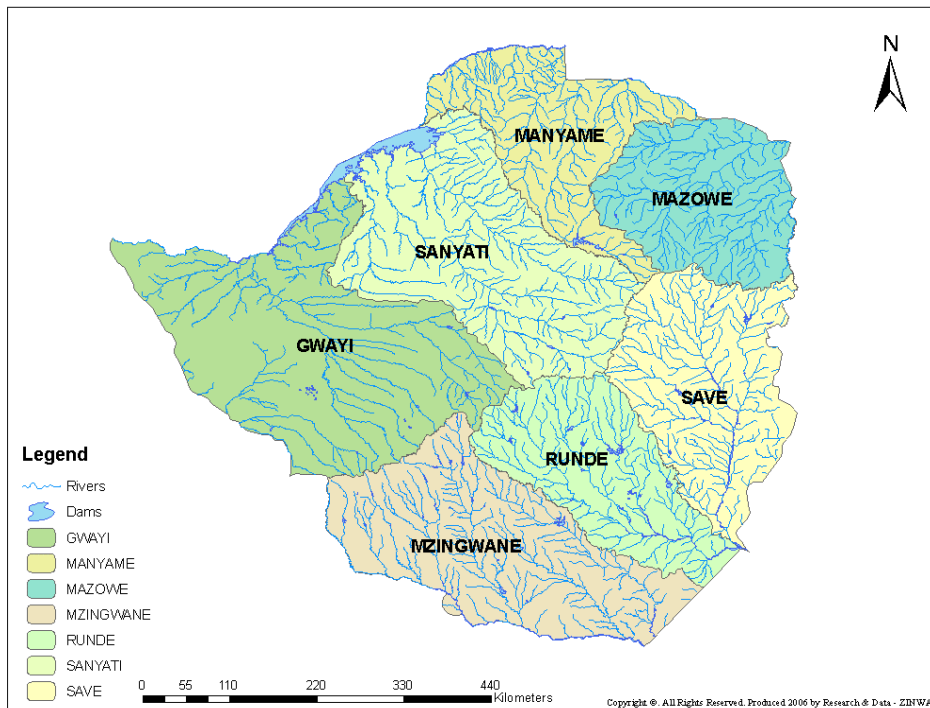
The Sanyati Catchment consists mainly of land drained by the Zivagwe, Munyati, Muzvezve, and Mupfure River. Munyati and Mupfure Rivers join to form the Sanyati River, which drains into Lake Kariba. The Manyame Catchment drains into the Zambezi River downstream of Lake Kariba, and is made up by of areas drained by the Angwa, Manyame, and Musengezi Rivers. The

Mazowe Catchment drains the northeastern part of the country, and the major sub-basins are Nyadiri, Ruya, Rwenya, and Mazowe. This catchment includes the northern part of the Eastern Highlands drained by the Nyangombe and Gairezi Rivers.

Save Catchment drains the southeastern part of the country with Devure, Nyazvidzi, Upper Save, Macheke, Rusape, and Odzi Rivers being the major rivers. This catchment includes the Pungwe and Budzi Rivers that drain into Mozambique from the Eastern Highlands. The Runde Catchment comprises areas drained by the Runde, Tokwe, Mutirikwi, and Chiredzi Rivers. The Runde River joins the Save River just before the latter river exists from Zimbabwe.

The Mzingwane Catchment is made up of rivers that drain into the Limpopo River with the Shashe, Mzingwane, Bubi, and Mwenzi being the major rivers.

Figure 10: River Systems of Zimbabwe.



(Source: Data and Research Department, ZINWA)

The ecosystems functioning are heavily influenced by the overall drainage system in the country. Table 9.1 indicates the net storage capacity and present capacity of the major dams in the seven water catchment areas. These figures should be viewed in the context of the current levels of high siltation found in most of the water bodies throughout the country. The status of major dams in all

the water catchment areas as of November 2010 as shown on Annex might not be a good indication on the water availability situation throughout the country.

**TABLE 8.1: CATCHMENT STATE OF MAJOR DAMS AS AT 12/11/2010**

Catchment	Net capacity (10 <sup>6</sup> m <sup>3</sup> )	Present capacity (10 <sup>6</sup> m <sup>3</sup> )	Percent full
Gwayi	80.7	46.6	57.7
Manyame	1,281.4	1,074.8	83.9
Mazowe	248.6	207.6	83.5
Mzingwane	1,082.9	675.5	62.4
Runde	2,247.3	1,286.3	57.2
Sanyati	440.5	244.0	55.4
Save	771.8	597.3	77.4
Totals	6,153.2	4,132.1	67.2

Source: Zimbabwe National Water Authority, 2010

Information on the aquatic life is limited due to absence of a monitoring system by the Department of National Parks and Wildlife. Of major economic importance to aquatic biodiversity conservation are the fish genetic resources, the crocodile and the hippopotamus and to a lesser extent reptiles and ducks.

### **Fisheries**

Of the 122 fish species found in Zimbabwe, only a few commercially and biologically important ones have been monitored and are known. The fish population has been monitored at Kariba, Mutirikwi, and Darwendale dams. Fish species diversity and population in some of the major water bodies of the country are on the decline. Reasons for this includes, over-fishing, water pollution, drying of water bodies and the introduction of invasive alien species.

Aquaculture production is carried out for subsistence and commercial purposes. Subsistence aquaculture is carried out at household level. It is limited to a few pond-based enterprises where it provides a cheap source of protein for domestic consumption. Indigenous species such as Mozambique Tilapia (*Oreochromis mossambicus*), the Red-Breasted Tilapia (*Tilapia rendalii*), the Green-headed Tilapia (*Oreochromis macrochir*), the Kariba Bream (*Oreochromis mortimeri*) and Sharptooth Catfish (*Clarias gariepinus*) are utilized. Annual production from subsistence aquaculture is estimated to be 900 tonnes. Commercial aquaculture production is based on the Nile Tilapia, (*Oreochromis niloticus*) and the rainbow trout (*Oncorhynchus mykiss*), and is estimated to produce approximately 1600 tons per annum mainly from a farm on Lake Kariba.

**FIGURE 11: FISH SPECIES IN LAKE HARVEST AQUACULTURE**



Nile tilapia (*Oreochromis niloticus*)



Rainbow trout; average length: 51 - 76 cm (*Onykorhynchus mykiss*)

Fishery management in Zimbabwe is guided through the provision of the Parks and Wildlife Act. A fishery policy that embodies participatory approaches has not yet been formulated. As such there is limited involvement and participation by communities and stakeholders in fisheries management. It is the sole responsibility of the Parks and Wildlife Management Authority to manage the fishery resources. This causes conflicts of interests among fishers and resource managers. Enabling policies and legislation that involve fishers in a participatory management process are still to be instituted.

**FIGURE 12: FRESH WATER SARDINE ,KAPENTA (*LIMNOTHRISSA MIODON*) FROM LAKE KARIBA**



The biggest commercial catches in Lake Kariba are from the freshwater sardin, kapenta (*Limnothrissa miodon*), which is often dried in the sun

## **Populations of Nile crocodile and hippopotamus in the Zambezi heartland**

The Zambezi Heartland, situated in the middle Zambezi between Lake Kariba and Lake Cahora Bassa is a biologically important area that harbours rich biodiversity, including crocodiles and hippopotamus.

### **Crocodiles**

The Nile crocodile occurs in many rivers and large dams in Zimbabwe. The highest density and population of crocodiles is in the Kanyemba – Rukomechi stratum. The protected areas of Lower Zambezi National Park and Mana Pools National Park characterize this. The difference in density of crocodiles found throughout the country reflects the degree of protection and amount of human (artisanal fishing) activity in a particular area. Crocodile farming has now become an important economic activity in two ecozones, the Zambezi Valley next to the Kariba dam and the Lowveld.



**FIGURE 13: NILE CROCODILES AT THEIR HABITAT**

**TABLE 9: AERIAL SURVEY ESTIMATES OF DENSITY AND CV FOR CROCODILES**

	<b>Cahora Bassa N &amp; S banks</b>	<b>Kanyemba - Rukomechi</b>	<b>Rukomechi – Nyamumba</b>	<b>Lake Kariba</b>	<b>Combined strata</b>
Surveyed distance (km)	313	199	139	88	738
Sections	115	74	48	28	
Average Density (crocs per bank km)	1.31	3.15	0.45	2.44	
Population Estimate (adult crocodiles)	410	627	63	215	1312
Coefficient of Variation	18.1%	15.3%	32.2%	45.1%	11.9%

Source: African Wildlife Foundation

### **Hippopotamus**

The density and population of hippopotamus is also greatest in the Kanyemba – Rukomechi area (in the Zambezi Valley). The density of hippo is significantly lower in surface water bodies than that found in the river sections, reflecting their preference for riverine habitat.



**FIGURE 14:HIPPOPOTAMUS AMPHIBIOUS OUTSIDE THEIR NORMAL HABITAT**

Table 10 presents the results of an aerial survey undertaken by the African Wildlife Foundation in four locations of the country. The highest population of hippos was recorded in the Kanyemba – Rukomechi Area. Lake Kariba recorded the least number of hippos.

**TABLE 10: AERIAL SURVEY ESTIMATES OF DENSITY AND CV FOR HIPPOPOTAMUS**

	<b>Cahora Bassa N &amp; S banks</b>	<b>Kanyemba - Rukomechi</b>	<b>Rukomechi – Nyamumba</b>	<b>Lake Kariba</b>	<b>Combined strata</b>
Surveyed distance (km)	313	199	139	88	738
Sections	115	74	48	28	
Average Density (hippo per bank km)	1.5	15.0	4.8	1.6	
Population Estimate (adult hippopotamus)	473	2987	667	141	4254
Coefficient of Variation	17.1%	11.9%	19.6%	109.9%	9.8%

Source: African Wildlife Foundation 2009

#### 1.5.4 THE STATUS OF AGRO BIODIVERSITY



Agriculture is the cornerstone of the Zimbabwean economy and about 60% of the economically active population depends on it for food and employment. Women play an important role in agriculture and it is estimated that 70 % of smallholder farmers are women. The agricultural sector accounts for about 11-14% of the country's gross domestic product (GDP), 60% of the raw materials required by the manufacturing industry and 40% of total export earnings according to the Industrial Development Corporation.

Prior to 2000, the agrarian structure in Zimbabwe was characterized by the coexistence of four different land tenure systems namely communal areas, resettlement areas, large-scale commercial and small-scale commercial farms. This classification was determined by factors such as agro-ecological aspects, farm sizes, crop and livestock production systems and levels of technology use.

The government of Zimbabwe embarked on a Fast Track Land Reform Program (FTLRP) from 2000, which, resulted in thousands of hectares of land being unalienated by the state using the Land Acquisition Act. Two farm models were adopted, namely A1 and A2 (table 5). The A1 model farms are based on the village concept, with shared residential and grazing areas, but separate farming areas. A2 farms are much larger and are expected to engage in commercial farming.

**TABLE 11: The Status Of Land Redistribution Into A1 And A2 Models As A Result Of The Fast Track Land Reform Programme**

Province	A1 resettlement			A2 resettlement		
	No of farms	Area (ha)	Beneficiaries	No. of farms	Area (ha)	Beneficiaries
Manicaland	240	215,427	11,921	211	102,215	1,040
Mashonaland Central	340	568,197	14,939	319	259,489	2,243
Mashonaland East	446	437,269	26,027	370	314,233	4,512
Mashonaland West	772	811,033	25,501	665	873,111	4,269
Masvingo	219	750,563	26,400	166	341,000	1,160
Matabeleland North	263	520,214	8,311	142	259,659	230
Matabeleland South	226	383,140	9,839	145	288,324	574
Midlands	240	451,242	17,760	262	243,611	828
Total	2,740	4,137,085	140,698	2,280	2,681,642	14,856

Source: Ministry of Lands, Land Reform and Resettlement, 2006

It is estimated that Zimbabwe has about 6 000 indigenous plant species representing approximately 1 500 genera and 200 families. Of the species found in the country, about 500 are known to be of use in traditional medicine; around 230 are endemic while about 500 are listed as under threat of extinction. The largest family is that of the grasses (Poaceae) with about 600 representatives, followed by the Papilionoidea (the pea family) with about 520 members. The other large groups are the Cypraceae (sedges), Euphorbiaceae and Rubiaceae that each consists of over 200 members.

Exotic or introduced plant species number approximately 1 500. Families with the largest representation in this group are Fabaceae. (200 spp) Poaceae (114 spp), Asteraceae (103 spp) and Myrtaceae (77 spp).

Cultivated crops including small grains, cereals, grain legumes, roots and tubers, indigenous and exotic vegetables and horticultural crops cover almost a third of Zimbabwe. Due to its temperate and sub-tropical climate, the country produces a wide variety of fruit such as apples, pears, peaches, plums, apricots, nectarines, grapes, strawberry, and kiwi. Other fruits and agricultural products include oranges, nartjies, lemons, bananas, litchis, mangoes, sugarcane, and coffee.

### 1. Grains and Cereals

#### Maize

Maize is the main staple food of the country and accounts for some 47% of total calorie intake. It is grown in most parts of the country. Information available from the national Genetic Resources and Biotechnology Institute (formerly Gene bank, GRBI) shows that there are over 30 landraces collected from various parts of the country, 28 accessions being used in population improvement programmes, 34 accessions from crosses of Mexican varieties with local material, and more than 124 accessions of inbred lines and exotic breeding lines.



A Zimbabwean Farmer carrying home her maize harvest

Crop	Type	No. Of Varieties on market	Delisted Varieties	Total
Maize	White Hybrids	80	15	95
Maize	Yellow Hybrids	18	6	24
Maize	OPV (open pollinated varieties)	8	-	8
Total		106	21	

Source: Zimbabwe National Report on Plant Genetic Resources 2009

#### Wheat

Wheat is considered as the second most important cereal crop in Zimbabwe. There are over 1000 accessions available. These lines originated from countries such as Mexico, China, South Africa, United Kingdom, and Canada and represent wide genetic diversity for traits such as height, maturing period, stress tolerance and yield. There are currently 16 pure lines of wheat varieties, which are mostly grown during the winter season under irrigation.

#### Sorghum

In parts of Zimbabwe, many indigenous varieties of sorghum are still grown with up to 13 in some regions. Approximately 2000 accessions of landraces have been collected and there are about 1378 Zimbabwean sorghum accessions at the International Research Institute for Semi-arid Tropics (ICRISAT) (Biodiversity International/ICRISAT). Morphological and agronomical traits such as seed colour, seed shape and size, plant height and taste have been used to differentiate approximately 830 of these accessions whilst GRBI holds germplasm collected since 1982 that has not been characterized. Five races of sorghum, specifically bicolor, guinea, kafir, duvra and caudatum, are

found in Zimbabwe but their diversity and occurrence has only been partially determined.



<b>Crop</b>	<b>Type</b>	<b>No. Of Varieties on market</b>	<b>Delisted Varieties</b>	<b>Total</b>
Sorghum	OPV	5	1	6
Sorghum	Hybrid	3	-	3
<b>Grand Total</b>		<b>8</b>	<b>1</b>	<b>9</b>

Source: Zimbabwe National Report on Plant Genetic Resources 2009

The table below summarizes the diversity of other registered crop varieties.

<b>Crop</b>	<b>Type</b>	<b>No. Of Varieties on market</b>	<b>Delisted Varieties</b>	<b>Total</b>
Bambara	Pure lines	2	-	2
Barley	Pure lines	8	-	8
Beans	Pure lines	6	2	8
Cowpeas	Pure lines	5	1	6
Finger-millet	OPV	2	-	2
Groundnuts	Pure lines	9	-	9
Pasture Grasses	Pure lines	11	-	11
Pasture Legumes	Pure lines	9	-	9
Potatoes	Pure lines	8	-	8
Soyabeans	Hybrid	15	6	21
Sunflower	Hybrid	9	2	11
<b>Grand Total</b>		<b>84</b>	<b>11</b>	<b>95</b>

Source: Zimbabwe National Report on Plant Genetic Resources 2009

## 2. Industrial and Horticultural Crops

The horticultural crops in Zimbabwe can conveniently be classified into 6 groups; temperate fruits, tropical fruits, leaf vegetables, fruit vegetables, roots and tuber and flowers. In this broad group are minor crops such as sunflower (*Helianthus annuus* – 800 exotic lines and 1440 locally bred), castor bean (*Ricinus communis*. 85 accessions) and coffee (*Coffea arabica* 133 accessions with 6 wild species). Sugarcane (660 accessions) is grown in the Southeastern lowveld parts of the country in NR IV and V.

**Flowers:** Most flowers for export are grown in green houses within the highveld and in close proximity to airports. The main flowers grown for export include roses, asters, solidagos, bulperium, hypericum and protea.

**Tobacco:** Tobacco (*Nicotiana spp*) is a major cash crop in Zimbabwe and is mostly grown in NR I-III. There are over 500 varieties, and approximately 80 known landraces of the flue-cured or Virginia variety. In addition there are some 102 varieties of Burley and about 91 varieties of Oriental variety.

**Cotton:** Another important cash crop in Zimbabwe is cotton (*Gossypium herbaceum*), which is mostly grown in the north and northeastern areas of the country. There are over 2500 accessions currently available.

### Jatropha

The oil plant *Jatropha curcas* (L) (Jatropha) or physic nut is a multipurpose and drought tolerant large shrub or small tree. In Zimbabwe, the plant has gained national importance and is currently being promoted as a multi purpose crop including the production of biodiesel and organic fertilizer.

### Temperate fruits

These are grown mainly in the cool eastern highlands of Zimbabwe that covers Nyanga, Chimanimani and Chipinge Districts. The pomes fruits at the Horticulture Research Institute (HRI) comprise apples and pears (40 and 20 cultivars respectively); stone fruits are peaches (15 cultivars), apricots (10 cultivars), plums (5 cultivars), and nectarines (4 cultivars). Kiwi has also been introduced and is maintained and propagated for sale at Nyanga.

### Other fruits

These are grown in the warmer districts that cover most of the country. They include mangoes, oranges, lemons, nartjies, litchis, bananas, avocados, pineapples, strawberries, blueberries and grapes.

### Leaf Vegetables

There is a wide diversity of leaf vegetables of temperate origin. These are mainly brassicas, cabbage (*Brassica oleracea* var *capita*), rape (*Brassica napus*), tsunga (*Brassica juncea*, mustard rape) and covo (*Brassica oleracea*).

### Fruit Vegetables

Most of the fruit vegetables cultivated in the country are exotic and of tropical origin. These include butternut (*Cucurbita moschata*), pumpkin (*Cucurbita maxima*), melons (*Citrullus lanatus*), cucumbers (*Cucumis sativus*), tomatoes (*Lycopersicon esculentum*), okra (*Abelmosclus esculentus*), egg plant (*Solanum macrocarpon*) and pepper (*Capsicum annum*).

### Roots and Tubers

These comprise crops of tropical origin like cassava (*Manihot esculenta*) and sweet potato (*Ipomoea batatas*) and those of temperate origin, Irish potato (*Solanum tuberosum*), carrots, and radish. The growing and consumption of cassava is still very localized and efforts are being made to popularize the production of the crop through national campaigns and extension support.

Although the country has over 30 varieties of sweet potato, only 15 varieties are currently under use through small-scale production. Potential exists for the commercialization of the crop for both the domestic and export market.

### Pulses and Oilseeds

Zimbabwe has a rich diversity of pulses including groundnuts (*Arachis hypogea*), cowpeas (*Vigna unguiculata*), soyabeans, bambaranuts (*Vigna subterranean*) and field/common beans (*Phaseolus vulgaris*) (Table 13.1). Diversity between pulses is clearly seen in seed size, colour, growth habits cooking duration, reaction to both abiotic and biotic stresses, and adaptation to different production environment (mono-cropping vs. intercropping). Cowpea has diversity in use since both leaves and grain are generally consumed, but in some cases only the grain is eaten. Bambara nuts are diverse in seed colour, shape and tolerance to biotic stresses.

**TABLE 12.1: SUMMARY OF PULSES FOUND IN ZIMBABWE**

Crop	Accessions	Status of use
Bambaranut	90	Grown mainly in rural areas
Bean	1100	Focus on breeding for disease resistance
Cowpea	150	Drought tolerant
Groundnut	2400	Mostly from the USA, local characterization not done
Soyabean	5000 exotic lines, 1240 locally developed lines	Very few local lines. Dominant oilseed crop in Zimbabwe
Sunflower	800 exotic lines, 1440 locally bred	Grown mainly for oil production

Source: Zimbabwe National Report on Plant Genetic Resources 2009

### Grasses and Forage Species

There are several key institutions in Zimbabwe that carry out research and promote the development of forages. Department of Research and Specialist Services (DRSS) and Agritex are the

key institutions promoting the development of grasses and forage species. DR&SS has a mandate to conduct research on sustainable livestock production from rangeland and pastures, while Agritex provides technical advice on livestock and crop production to farmers. There are approximately 80 pasture grasses held by Henderson Research Institute and 250 legume and grass accessions at Grasslands Research Institute.

## State of Wild Plants Harvested for Food Production

### Mushrooms

Wild mushrooms occur in abundance mainly in the miombo woodlands during the rainy season. Of these, about 50-60 species are eaten in Zimbabwe with species such as *Cantharellus cibarius*, *C. pseudocibarius*, *Amanita zambiana* and *Termitomyces spp* contributing substantially to household food security when in season.

### Wild Fruit and Vegetables

There are around 25 fruit species but the most common ones include *Uapaca kirkiana* (muzhanje), *Ziziphus mauritiana* (musau), a naturalized plant, *Azanza garkeana* (mutowe) and *Adansonia digitata* (muwuyyu); and *Berchemia discolor* (umnyi), *Mimusops zeyheri* (umbumbulu) and *Vitex payos* (cumtshwankela) in Matebeleland.

Leaf vegetables of tropical origin are mainly the indigenous vegetable like muboora (*Cucurbita pepo*), nyemba (*Vigna unguiculata*), nyevhe (*Cleome spp*), mowa (*Amaranthus spp*). These number about 50 (Table A2, Appendices) and are mainly enjoyed during the rainy season when they spring up from the soil seed bank.



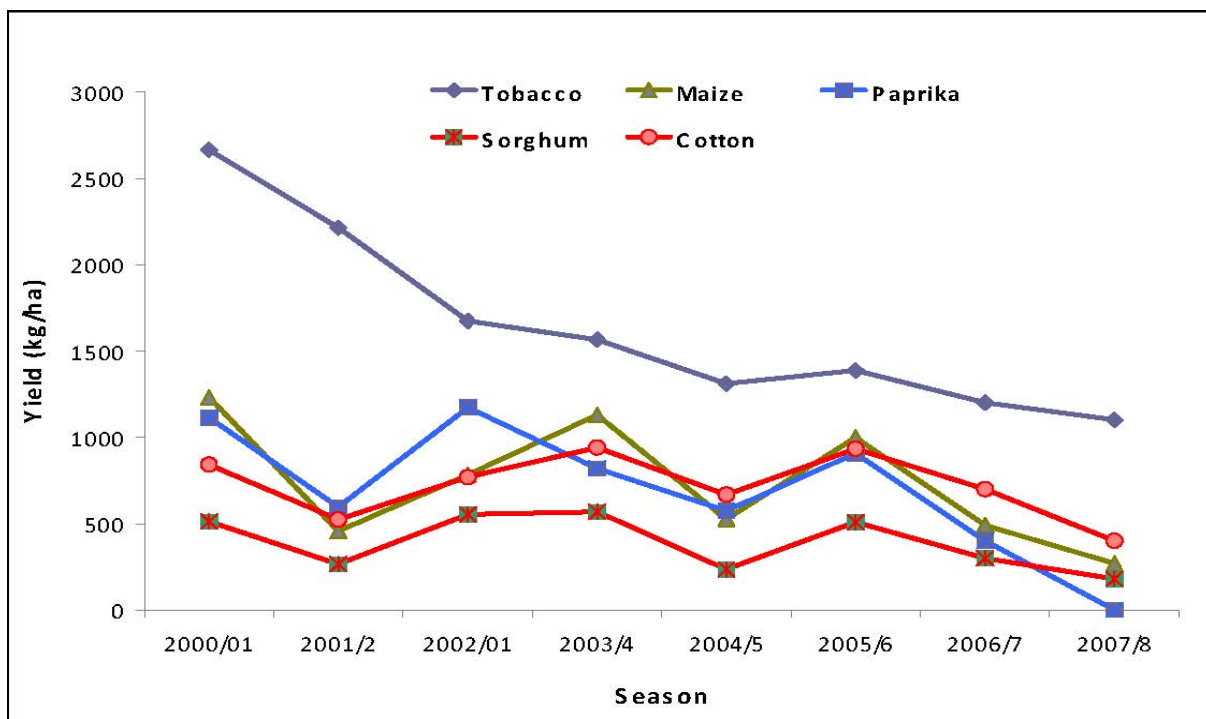
FIGURE 15:AMARANTHUS SPINOSUS (MOWA)

## Trends in Plant Genetic Resources for Food and Agriculture.

Whilst there is no study undertaken to determine the trends in diversity on plant genetic resources for food and agriculture, the introduction of hybrid seed on crops like maize has significantly reduced the levels of species diversity on the crop. For the past twenty years the Government of Zimbabwe has promoted the use of hybrid seed against local landraces. This policy resulted in increased production of maize, but reduced diversity of varieties planted. Most of the farmer varieties are now extinct and can only be found in ex situ collections. Information on the diversity trends on other crops has not been fully understood.

Figure 11.1 shows the yield trend from 2000 to 2008 for some of the crops grown in Zimbabwe according.

**FIGURE 16.1: YIELD TRENDS FOR SOME CROPS GROWN IN ZIMBABWE FOR THE YEARS 2000-2008**



Source: Zimbabwe National Report on Plant Genetic Resources 2009

There is no evidence so far that links crop and species diversity to yields and production. However farmers who practice multi cropping face a lower risk of total crop failure during periods of droughts and outbreak of certain pests and diseases.

## Animal genetic diversity

The conservation and sustainable use of animal genetic resources, and the fair and equitable sharing of the benefits from their use, are a national concern. Promoting the broader use of

livestock biodiversity can contribute to improved human health and nutrition, and expand opportunities for livelihood diversification and income generation. (FAO, (2007) Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration,)

Domesticated animals in Zimbabwe can be divided into the following categories: large herbivores, comprising of cattle and a few equines, small ruminants consisting of goats and sheep, and non ruminants comprised of pigs, poultry and rabbits.

There has been considerable infusion of exotic germplasm into some of the animal species raised by Zimbabwean farmers, especially in the large-scale commercial sector. Some indigenous cattle have been crossed with exotic breeds to improve dairying and beef production potential.

Whilst indigenous goats have been crossbred with the Boer goat for improved meat production and the Saanen goat for higher milk yields.

On pigs, only exotics such as the landrace, Large White and Duroc are bred for porkers and baconers. En Limited work has been undertaken on the potential of local breeds of pigs in genetic improvement of the current commercial breeds. Progress has been made on improving the genetic make up of sheep, the Blackhead Persian, which is indigenous to Southern Africa has been cross-bred with the exotic Merino types for meat production.

The commercial poultry industry relies heavily on exotic breeds while indigenous poultry breeds are non-commercial and are kept on free range in the small-holder farming sector.

### **Trends in Livestock Production**

The current beef herd stands at 5 221 720 as of end of season 2009/2010. Table 13 indicates a steady increase of all the categories of livestock from 2005 to 2009. The highest increase in livestock numbers is in the sheep category ( increasing from 415 901 in 2005 to 1 867 680 in 2009).

**TABLE 13 NATIONAL LIVESTOCK NUMBERS (THOUSANDS)**

<i>Year</i>	<i>Cattle</i>	<i>Sheep</i>	<i>Goats</i>	<i>Horses</i>	<i>Donkeys</i>	<i>Pigs</i>
2005	4,987,411	415,901	3,268,718	1,454	401,569	167,775
2006	5,048,218	413,871	3,124,187	1,097	523,868	188,863
2007	5,050,650	391,982	3,334,224	1,348	402,691	182,796
2008	5,255,011	405,033	3,210,102	1,456	517,249	207,967
2009	5 221 720	1,867,680	4,172,812	2,564	492,166	291,263

Source: *Agritex, Crop & Livestock assessment report April 2010*



## 1.6 THREATS TO BIODIVERSITY AND UNDERLYING DRIVERS

Humans' activities have remained the major threats to ecosystems in Zimbabwe. However in the past decade the impacts of climate change (frequency of devastating droughts and floods) have increased the natural threats to biodiversity.

### 1.6.1 DEFORESTATION AND LAND DEGRADATION

Excessive harvesting for both domestic and commercial use, as well as conversion of forest areas to agricultural land causes the threat of deforestation in forest reserves. Habitat destruction mostly affects *mosses* and *hydrophilous orchids* and *ferns* whose habitats have continued to be destroyed by drought, cultivation and fire. The opening up of forests for agricultural expansion is the major reason for loss of forest biodiversity and has resulted in a 12% increase of agricultural land. The growth of the tobacco industry has also increased the demand for fuel wood for tobacco curing.

Rapid deforestation in communal areas and other human settlements has also led to a drastic drop in populations of the medicinal plant species. Estimates indicate that the country has over 500 plants with medicinal value. A number of these medicinal plants face possible extinction due to over exploitation. (Annex VI)

### 1.6.2 WILDFIRES

The frequent occurrence of wildfires throughout the country now stands out as one of the major threats to biodiversity. The problem is mainly pronounced during the dry season when the temperatures are high and the vegetation is flammable. The occurrence of wildfires has impacted negatively on the grazing land for both domestic and wildlife species. Fires have also destroyed large tracts of commercial timber especially in the Eastern Highlands of the country. Lost of human lives as a result of wildfires has also been recorded.

(Table 14) shows the hectarage lost by fires in 2009.

**TABLE 14: AREAS DESTROYED BY FIRE**

Forest plantations	93 166 ha
Woodland	403 309 ha
Bushland	163 151 ha
Grazing land	131 477 ha
Arable land	154 744 ha

Source: Environmental Management Agency (2009)



**FIGURE 17: UNCONTROLLED FIRE IN ZIMBABWE FORESTS**

### 1.6.3 LOSS OF HABITAT

Human encroachment, fragmentation of ecosystems, logging, mining and agriculture pose threats to ecosystems in the wildlife estate. The loss of habitat (drying up of rivers and surface waters, degraded land) cover has impacted negatively on aquatic life, terrestrial biodiversity and productivity of both livestock and crops.

### 1.6.5 MINING AND ROAD CONSTRUCTION ACTIVITIES:

Mining activities have become a major threat to biodiversity. Open cast methods involve stripping large pieces of land to remove the soil, which disturbs the natural environment surrounding the mines. It removes vegetation and takes away land that could be used for agriculture.

Road construction, which involves the opening up, of new land has also impacted negatively of biodiversity. Large tracts of land are opened in remote areas, which are hosts to various species of wildlife. This has resulted in the fragmentation of ecosystems and habitats, obstructing migratory routes to breeding and feeding grounds used by wildlife.

### 1.6.6. CLIMATE CHANGE:

Although the impacts of climate change and biodiversity have not been fully studied in Zimbabwe, evidence on the ground shows a decline of agro biodiversity species after droughts and floods. A number of crop species are known to be extinct due the devastating impacts of droughts and

floods. The drying up of wetlands and other water bodies during the drought years have had negatively impacts on the aquatic biodiversity..

#### 1.6.7 INVASIVE ALIEN SPECIES:

Invasive alien species (IAS) have affected native biodiversity in almost every type of ecosystem throughout the country. As one of the greatest drivers of biodiversity loss, they pose a threat to ecosystem integrity and function and therefore, to human well-being. While only a small percentage of organisms transported to new environments become invasive, their negative impacts on food security, plant, animal and human health and economic development can be extensive and substantial.

Invasive alien species also exacerbate poverty and threaten sustainable development through their impact on agriculture, forestry, fisheries, human health and on wild biodiversity, which is often a basis of livelihoods of people in developing countries.

With regard to agriculture biodiversity, the biggest threat is the introduction of genetically modified varieties some of which can completely replaced local varieties and landraces, whilst others can become super weeds as they outperform other crops in growth habits and resistance to chemical weed control. A classic example of threats to biodiversity is the reported deaths of fish and the proliferation of the water hyacinth in the Lake Chivero and other water bodies throughout the country.

#### 1.6.8 POLLUTION:

Pollution caused by wide scale application of pesticides and herbicides to protect crops and control pests, such as tsetse flies disrupt natural food chains and negatively impact biodiversity. Widespread use of pesticides is a threat to wildlife, ecosystem structure and function, and human health. Of great concern are the organ chlorine pesticides that are taken by living organisms from water. They are very stable in the environment, and because of their persistence they can accumulate in fish, birds and other animals in ascending trophic levels in food chain.

Pollution of water is exacerbated by direct discharge of raw municipal sewerage into public streams, frequent sewer bursts in some urban centers and untreated effluent from industries and mining. The major pollution indicator is proliferation of aquatic invasive alien species such as water hyacinth as a result of excessive eutrophication.

**FIGURE 18:Water Hyacinth In Lake Chivero**



The invasion of inland waters by water hyacinth in Zimbabwe is now quite widespread.

#### 1.6.9.LAND USE CONFLICTS:

Human encroachment, fragmentation of ecosystems, logging, mining and agriculture pose threats to ecosystems in the wildlife estate. The recent discovery of mine deposits both base and precious metals have become a major challenge to the sustainable management of biodiversity throughout the country. The opening up of large pieces of land for coal mining in the Zambezi Valley poses a great threat to fragile ecosystem of the ecoregion. Equally chrome mining and its associated pollution of the water bodies is likely to cause a decline in the country's aquatic systems.

The proliferation of illegal gold panning activities has resulted in serious damage to aquatic fauna and riverine ecosystems. The use of cyanide and mercury for gold processing has caused pollution to water bodies. Gold panning is also contributing to the siltation of rivers and reservoirs thus reducing the volume of water a dam can hold.

## CHAPTER II

### 2.0 CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTIONS

Zimbabwe is a signatory to the United Nations Convention on Biological Diversity and accordingly, has obligations to implement the provisions of that convention. Article 6 of the CBD requires that all contracting partners develop national strategies, plans or programmes for the conservation and sustainable use of biodiversity. The convention stated objectives are the conservation of biological diversity, and the sustainable use of its components, coupled with the equitable sharing of the resources.

#### 2.1 ZIMBABWE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

In 1998 the Government of Zimbabwe, in close consultation with key stakeholders developed the Zimbabwe Biodiversity Strategy and Action Plan. The plan was based on identified unmet needs within the context of the CBD. These include:

- The absence of comprehensive and elaborate biodiversity inventory and monitoring programmes.
- Inadequate incentives for some local communities and individuals to undertake biodiversity conservation and sustainable use initiatives in both protected and non-protected areas.
- Inadequate environmental awareness, education and training at various stakeholder levels.
- Limited appreciation of the importance and contribution of biodiversity to the national economy and to local communities by policy makers.
- Inadequate, conflicting and poorly enforced pieces of legislation that tend to adversely affect biodiversity conservation and sustainable use.
- A limited financial base and institutional capacity to facilitate the formulation, implementation and monitoring of biodiversity projects at the local level.
- Inadequate affordable alternatives to reduce the reliance on natural resources at the local level.
- Inappropriate research and extension approaches in biodiversity conservation and sustainable use.

Based on the identified needs the country developed a framework strategy plan. The plan however lacked clear activities, a budget and an institutional structure. The economic challenges that faced the country from 2000, impacted negatively on the further development and elaboration of the National Biodiversity Strategic Plan. Thus the plan lacked budgetary support from Government, the private sector, non-state actors, and international development partners. Despite these challenges the country managed to achieve some milestones in biodiversity implementation. These include the following:

- Establishment of a Biodiversity Inventory and Monitoring Program
- Promotion of Incentives for Local Communities and individuals to undertake biodiversity Conservation and Sustainable Use
- Creation of Awareness on the Importance and contribution of biodiversity to the national economy
- Strengthen policies and legislation to enhance biodiversity conservation and sustainable utilization and benefit sharing (regulation for access and benefit sharing 2009)
- Creation of alternative livelihoods that reduce direct dependency of natural resources
- Development of appropriate research and extension approaches to biodiversity conservation and sustainable use.

The Global Environmental Facility, UNEP, UNDP are amongst the few institutions that supported the implementation of the National Biodiversity Strategy Action Plan.

Table 15.1 presents a summary of progress in the implementation of the Framework Action Plan. Please note that this summary was developed outside a clear monitoring system. The National Biodiversity Action Plan lacked clearly defined activities, national targets and implementation calendar and supportive resources.

**TABLE 15.1: Zimbabwe Biodiversity Strategy Action Plan**

Strategy	Progress to date
<p><b>Strategy 1</b></p> <p><b>Establish comprehensive and elaborate biodiversity inventory and monitoring programs</b></p>	<p><b>Progress</b></p> <ul style="list-style-type: none"> <li>• National aerial surveys for large mammals carried out in 2006 with aerial surveys for specific areas in 2008, 2009 and 2010 for Hwange Gonarezhou and Zambezi Valley respectively</li> <li>• Vegetation surveys in the Gonarezhou National Park undertaken in 2010</li> <li>• Lion surveys for the Zambezi Valley &amp; Mana Pools done in 2009 and Gonarezhou in 2010</li> <li>• Surveys for threatened species of wild dogs, leopard, Rhino undertaken in 2008</li> <li>• A database of lions in captivity has been developed and is being finalized</li> <li>• A database on mammals, hunting quotas and hunt returns (TR2 forms) and Monitoring of Illegal Killing of Elephants (MIKE) database, Rhino database has been established</li> <li>• Survey report on populations of Hippos and crocodiles on the Lower Zambezi Valley was undertaken in 2009.)</li> <li>• Ongoing monitoring of fish and other aquatic species at L. Chivero and Manyame, L. Mutirikwi, Nyanga Dams and Lake Kariba</li> <li>• Protected Areas/Important Bird Areas (IBA) monitoring- 12 IBAs are being monitored (11 in PAs and 1 unprotected area) -National IBA and Status reports produced in 2008 and 2009.</li> <li>• World Biodiversity (WBDB) database created for inputting IBA data</li> <li>• Surveys for threatened bird species e.g. Blue Swallows in the Eastern Highlands, Swynnerton’s Robin in EH, Wattled and Grey Crowned Cranes in the Driefontein Grasslands and Surveys for the Black Eagle in Matobo National Park, Surveys for Waterbirds Robert Mcllwaine Recreational Park (L.Chivero and Manyame), South-East Lowveld and Matabeleland (Hwange NP) &amp; other water bodies</li> <li>• Produced Species Action Plans for the Wattled Crane and Blue Swallows</li> <li>• Produced threatened plants of Zimbabwe- 2002 and published endemic plants of Zimbabwe book - 2002</li> <li>• Checklist of aquatic plants of Zimbabwe produced in 2008</li> <li>• Assessment of endemic plants of Zimbabwe in the Eastern Highlands (Nyanga NP, Chimanimani &amp; Vumba)</li> <li>• A database of all Zimbabwe’s plant collections has been established</li> <li>• Scanning and data basing of type, endemic and invasive plant species in the herbarium collections ongoing</li> <li>• Baseline surveys for wetlands in Zimbabwe are ongoing/ Established Community Wetland Resources Monitoring teams</li> <li>• Vegetation cover mapping including land use change ongoing under the Forestry Commission</li> <li>• Inventory of medicinal plants in four districts undertaken under the GEF project</li> </ul> <p><b>Challenges:</b></p> <p>Lack of adequate human, financial and infrastructure support hindered progress carrying out an elaborate inventory and monitoring programs. Regional and international collaboration on inventorying and monitoring can be an option to improve the country’s capacity.</p>

Strategy	Progress to date
<p><b>Strategy 2.</b></p> <p><b>Promote incentives for local communities and individuals to undertake biodiversity conservation and sustainable use initiatives</b></p>	<p><b>Progress:</b></p> <ul style="list-style-type: none"> <li>• Wildlife-based Land Reform Policy Adopted.</li> <li>• Introduction of Resource Sharing Concept in Protected Areas (Non timber Product harvesting, Bee keeping, Firewood Collection, Ecotourism)</li> <li>• Resource Sharing Arrangements in gazetted forests e.g. Mafungabutsi, Sikumi, Fuller, Gwayi, and Mbembesi. Communities benefit from harvesting NTFPs</li> <li>• Adoption of the Access and Benefit Sharing Regulations in 2009</li> <li>• Promotion of Value Addition on non timber Products by NGOS and CBOS, some of the products have found international markets</li> <li>• Promotion of community based seed banks especially in the drier and remote parts of the country</li> <li>• Collaboration between national gene bank of plant genetic resources and communities ( ex situ and n situ conservation programs)</li> <li>• Promotion of participatory plant breeding programs amongst rural communities.</li> </ul> <p><b>Challenges:</b></p> <p>The lack of resources hindered the execution of this strategy. NGOS and CBOs played a major role in promoting incentives for local communities in the conservation and sustainable utilization. More progress could have been achieved under an enabling environment. Even though communities continue to take a lead role in biodiversity conservation, the lack economic incentives might impact negatively on future conservation of biodiversity.</p> <p>Opportunities to enhance sustainable utilization of biodiversity exists however lack a clear strategy, technology transfer and policy framework will continue to hinder progress. Areas with potential for enhancing sustainable use include: bioprospecting and application of traditional knowledge systems on traditional medicines, value addition and processing of wild fruits and plants, promotion of small livestock and indigenous breeds, promotion of household fisheries</p>



	Progress and Challenges to Date
<p><b>Strategy 3.</b></p> <p><b>Create awareness and appreciation of the importance and contribution of biodiversity of the national economy and to local communities by policy makers</b></p>	<p><b>Progress:</b></p> <ul style="list-style-type: none"> <li>• Awareness raising programs on wildlife management to policy makers and legislators undertaken</li> <li>• Commemorations for World Wetland Day, Biodiversity Day, International Year on Biodiversity, Desertification Day held with communities through out the country.</li> <li>• National Forestry Extension Activities (Exhibitions, Commemorations &amp; Campaigns) by Forestry Commission &amp; EMA e.g. National Tree Planting Day.</li> <li>• National Schools Debates on sustainable forest management issues by FC &amp; EMA.</li> <li>• National Fire Awareness Campaigns.</li> <li>• Environmental Education Policy Adopted by Government in 2005.</li> <li>• Adopted the Wildlife Land Reform Program and strengthening of the CAMPFIRE Program in communal lands</li> <li>• Completion of various Plans fro National Parks (Gonarezhou, Matopos, Hwange)</li> <li>• Introduction on new Statutory Instruments for Management of Parks.</li> </ul> <p><b>Challenges:</b></p> <p>The responsibility for biodiversity conservation and sustainable utilization continues to rest mainly within the Ministry of Environment and Natural Resources. Mainstreaming the objectives of the CBD into national development programs continue to be a challenge. National Development Strategies have not been able to clearly articulate issues of biodiversity conservation and use into national frameworks. There is limited coordination and cooperation between government departments and agencies in mainstreaming environment and development. Limited progress in framing operational indicators for Goal 7 in the country's MDG Strategy.</p>

Strategy	Progress to date
<p>Strategy 4</p> <p><b>Harmonize policies and legislation to enhance biodiversity conservation and sustainable use</b></p>	<p><b>Progress:</b></p> <ul style="list-style-type: none"> <li>• Reviewed policies (for Exports of import &amp; export of wildlife) and gazetting of new statutory instruments</li> <li>• Wildlife-based Land Reform Policy</li> <li>• EMA ACT and its regulations are based on the polluter pays principle</li> <li>• Formulation of by-laws by local authorities to manage natural resources</li> <li>• The National Environmental Policy and Strategies -document published in 2009</li> <li>• Legislative and policy reviews by Parks and National Wildlife Authority and establishment of new statutory instruments ga</li> <li>• Environmental Impact Assessments to monitor developmental projects by EMA.</li> <li>• Polluter Pays Principle enforcement by EMA.</li> <li>• A number of transfrontier parks national were established (KAZA, GKM,)</li> </ul> <p><b>Challenges:</b></p> <p>Framework for harmonizing policies and legislation on biodiversity conservation and utilization exists within the National Environmental Policy and the Environmental Management Act, the challenge is the lack of adequate human and financial resources to implement the provisions of these instruments, especially at the local level. Policies to enhance biodiversity conservation in the area of aquatic biodiversity, domesticated animal diversity, and microorganisms are required.</p>
<p>Strategy 5</p> <p><b>Establish the financial base and strengthen the institutional capacity to facilitate the formulation, implementation and monitoring of biodiversity projects at the local level.</b></p>	<p><b>Progress:</b></p> <ul style="list-style-type: none"> <li>• Parks as an Authority has a revolving fund that does not go into fiscus</li> <li>• CIRAD provides funding and technical assistance</li> <li>• Provision of funds by the Global Environmental Facility for the development of National Biodiversity Strategic Action Plan</li> <li>• Support from the GEF Small Grants fund to support community based natural resource management projects</li> <li>• GEF supported the Traditional Medicine biodiversity conservation and utilization project</li> <li>• Financial support from UNDP, UNEP, UNCCD, CITES and UNCBD secretariats</li> </ul> <p><b>Challenges:</b></p> <p>The environmental management policy and act provide for the establishment of an environment fund. This fund has not been established, limiting access to resources for biodiversity conservation and sustainable use.</p>

Strategy	Progress to date
<p><b>Strategy 6</b></p> <p><b>Create adequate affordable alternative means of livelihood that reduce the reliance on natural resources at the local level</b></p>	<p><b>Progress:</b></p> <ul style="list-style-type: none"> <li>• Alternative energy sources developed e.g. the rural electrification, solar panels</li> <li>• Non consumptive tourism e.g. Mahenya Community</li> <li>• RDCs afforded appropriate authority for wildlife management.</li> <li>• . Bee keeping projects supported in community woodlots and areas adjacent to protected parks</li> <li>• Promotion of local breeds of small livestock including chickens</li> <li>• Reduction in the quantities of biomass used through the introduction of energy saving stoves</li> <li>• Establishment of community woodlots including fruit trees</li> </ul> <p><b>Challenges:</b> Lack of adequate technologies that promote alternative livelihoods outside natural resource management. Where alternative livelihoods have been secured lack of markets for products</p>
<p><b>Strategy 7</b></p> <p><b>Develop appropriate research and extension approaches in biodiversity conservation and sustainable use</b></p>	<ul style="list-style-type: none"> <li>• Research on invasive plant species in Zimbabwe e.g. <i>Opuntia falgidah</i> and other specific wildlife species e.g. wild dog, lion, large carnivore movement, buffalo and cattle disease interface etc</li> <li>• Application of education and awareness approach</li> <li>• Development of a Human-wildlife Conflict toolkit</li> <li>• Outside researchers carrying out wild dog and large carnivore research in Gonarezhou</li> <li>• Outside researchers carrying out research on elephant movement in Gonarezhou</li> <li>• Outside researchers carrying out research of buffalo/cattle disease interfaces and leopards</li> <li>• Human/wildlife conflict research (development of a human/wildlife conflict toolkit)</li> <li>• Research on alien invasive plant species e.g. <i>Opuntia</i>.</li> <li>• Value addition on NTFPs. e.g. <i>Zizphus mauritiana</i> project, Makoni tea, <i>Uapaca kirkiana</i> jam, Baobab oil.</li> </ul> <p><b>Challenges:</b> Inadequate institutes with required skills on alternative livelihoods.</p>
<p><b>8. Develop appropriate research and extension approach in biodiversity conservation and sustainable use.</b></p>	<p><b>Progress:</b></p> <ul style="list-style-type: none"> <li>• Mopane Worm project (regional involving South Africa, Botswana and Zimbabwe). Mopane worm farming at homesteads was achieved.</li> <li>• <i>Opuntia fulgida</i> project to determine extent of infestation and appropriate control methods.</li> <li>• Forest Invasive Insect species programme to establish extent of infestation by <i>Thaumastocoris peregrinus</i> and <i>Leptocybe invasa</i> in Zimbabwe.</li> </ul> <p><b>Challenges:</b> Lack of a strong research agenda that supports biodiversity conservation and sustainable use.</p>

## CHAPTER III

### 3.0 MAINSTREAMING BIODIVERSITY INTO NATIONAL, REGIONAL AND INTERNATIONAL LEVEL

According to Article 6b of the Convention, Parties have an obligation to: “Integrate as far as a possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.”

In addition, COP V endorsed the Ecosystem Approach, which provides for the integrated management of land, water and living resources and promotes a balance in the achievement of the three objectives of the Convention, as the primary framework for action under the Convention.

The economic survival of various productive sectors and of the people depending on those sectors for their livelihoods is intrinsically connected to the conservation use of biodiversity. Mainstreaming of biodiversity into national, regional and international development strategies and frameworks entails the articulation of maximizing the benefits of biodiversity and minimizing its loss through all productive sectors such as agriculture, fisheries, forestry, tourism and mining. Mainstreaming also relates to biodiversity consideration in poverty reduction plans and national sustainable development plans.

Current national and regional development plans for Zimbabwe have made limited achievements in mainstreaming biodiversity. Despite this challenge, Zimbabwe’s pioneering work on the ecosystems approach has contributed to an integrated approach to biodiversity management.

This chapter highlights some of the achievements that the country has made in mainstreaming biodiversity into sectoral and cross-sectoral policies, legislations and programmes.

#### 3.1 NATIONAL FRAMEWORKS FOR MAINSTREAMING BIODIVERSITY

There are a number of national frameworks that serve as entry points for mainstreaming biodiversity into the country’s economic, political, and cultural and development matrices. These include:

- **The Zimbabwe constitution**

The country is currently undergoing a constitutional reform process. This creates opportunities for the inclusion of environmental issues into the country’s supreme law. The current constitution lacks a clear articulation on how the country is to conserve, use and share the benefits arising from the natural resources. The National Environmental Policy and the Environmental Management Act contain instruments that facilitate the sustainable

management of natural resources at the local, national levels. It is therefore anticipated that the new constitution would incorporate environmental issues as articulated in the National environmental Policy and the Environmental Management Act.

- **National Environment Policy**

The National Environmental Policy recognizes guiding principles to biodiversity conservation, use and sustainable management. These include the following:

- (a) That the biodiversity of Zimbabwe is the foundation of the natural heritage of the country.
- (b) The conservation of biodiversity in all its forms is more likely to be sustained if there are economic incentives arising from the use of that biodiversity by those people living closest to the resource.
- (c) As a major component of Zimbabwe's natural heritage, and as an economic resource, plant diversity and the ecosystems of which it forms part must be protected, conserved and used in sustainable ways.
- (d) The many economic, environmental, cultural, spiritual and aesthetic functions and values of forests and woodlands need to be maintained, both for their intrinsic worth and for the contributions they make to human welfare.
- (e) The best custodians of wildlife and other natural resources are those landholders, including local communities, who are able to benefit directly from the use of the wild life on their land.
- (f) The conservation of biodiversity and other natural resources requires a multi-faceted approach including the establishment of protected areas.
- (g) Collaboration between countries over shared transboundary natural resources ensures more effective sustainable development.

- **Environmental Impact Assessments**

Environmental impact assessment is a tool that aims at minimizing adverse environmental impacts arising from human activities. These include productive sectors like mining, agriculture, industry, and energy provision. These productive sectors have been responsible for the loss of biodiversity, thus undertaking environmental impact assessments has significantly contributed to conservation to biodiversity throughout the various economic sectors. Implementing EIAs is a major tool to mainstreaming biodiversity issues.

- **National and local environmental action planning**

Under the National Environmental Policy, the country has committed itself to the development of National Environment Action Plan (NEAP), Local Environment Action Plan (LEAP) and Environment Management Plans (EMP) in accordance with its commitments made under the Rio Convention on Environment and Development (Agenda 21). The purpose of national level environmental planning is to promote and facilitate the consolidation and coordination of strategies, plans and activities developed at different levels (provincial, district and community) and in different sectors across the country.

- **Gender mainstreaming**

Women are the major custodians of biodiversity especially those residing in the rural areas. Understanding their roles in biodiversity conservation, use and management is a key strategy in the sustainable management of biodiversity.

- **Multilateral Environmental Agreements**

Zimbabwe is signatory to a number of Multilateral Environment Agreements (MEAs) which have a bearing on the overall implementation of biodiversity programs. Key among these instruments is the UNCCD, CITES and UNFCCC. The implementation of these instruments is contributing to the overall mainstreaming of biodiversity into national development programmes.

- **The Millennium Development Goals**

Zimbabwe has adopted the Millennium Development Goals (MDGs) as set out in the UN Millennium Declaration of 2000. Goal 7 of the MDG sets out targets and indicators to be achieved by 2015. Among the various indicators being monitored under this goal, two indicators are relevant to biodiversity conservation. These are (i) the proportion of land area protected to maintain biodiversity (protected areas) and (ii) the proportion of land area covered by forest. Thus the millennium development goals are a key platform for mainstreaming biodiversity into national strategies.

## 3.2 SECTORAL POLICIES

There are a number of sectoral policies that are designed to effectively mainstream biodiversity into national development strategies, plans and programmes. These include:

### 3.2.1 WILDLIFE BASED LAND REFORM POLICY

The overall objective of the policy is to maximize the livelihoods options for resettled farmers particularly those living in areas where crop production has limited potential by ensuring profitable, equitable and sustainable use of wildlife and other resources. The specific objectives are to:

- Ensure more equitable access by the majority of Zimbabweans to land and wildlife resources and to the business opportunities that stem from these resources
- Maintain a proportion of land outside protected areas under wildlife production
- Promote a diversity of land uses through wildlife production and to develop, and implement appropriate institutional arrangements from wildlife based land reform.

### 3.2.2 FOREST BASED LAND REFORM POLICY

The Forest Based Land Reform Policy ensures that the forest development plans are integrated with the overall land use plans and supports the development of environmental sustainable small scale industries including out grower schemes, furniture manufacturing and wood carving. In addition the policy ensures strict control of invasive alien species encroaching from plantations into natural forests, cultural heritage sites, and protected biodiversity zones

### 3.2.3 DRAFT NATIONAL AGRICULTURAL POLICY

The Zimbabwe National Agricultural Policy aims at facilitating and supporting the development of a sustainable and competitive agricultural sector that assures food security at national and household level and maximizes the sector's contribution to GDP is currently being finalized. The policy encourages the promotion of crop and animal diversity of species as a strategy of reducing vulnerability of households to drought induced food insecurity due to mono cropping.

### 3.2.4 NATIONAL ENERGY POLICY

The Zimbabwe National Energy Policy promotes the development of alternative sources of energy (solar, wind and hydro) as a way of reducing demand for wood fuel, subsequently enhancing conservation of forest biodiversity. The policy recognizes that a significant population will continue to use biomass energy and for this reason it seeks to put in place measures to address sustainable utilization of the biomass energy.

### 3.2.5 WATER AND SANITATION SECTOR POLICY

The Water and Sanitation Sector Policy's promotes the sustainable, efficient and integrated utilization of water resources for the benefit of all Zimbabweans.

### 3.2.6 ENVIRONMENT EDUCATION POLICY

A knowledgeable and well-informed public on environmental issues is essential for effective environmental conservation and management. Establishing environmental education centers from communities upwards to improve the effectiveness of existing education programmes by promoting the inclusion of both scientific and indigenous knowledge practices in formal and informal and non-formal teaching, learning, training and extension programmes as proposed in the Zimbabwe Environmental Education Policy, is one way of raising awareness in all sectors of the population.

## 3.3 CROSS-SECTORAL PROGRAMMES AND STRATEGIES

There are various sector programmes that contribute in meeting the three objectives of the CBD.

### 3.3.1 THE INTEGRATED CONSERVATION PLAN FOR THE FAST TRACK LAND REFORM PROGRAMME

The Integrated Conservation Plan for the Fast Track Land Reform Programme represents a direct reactive response to the increasing land degradation that is becoming a threat to resources in resettlement areas. The programme is a retrospective strategy meant to prevent environmental degradation in newly settled lands. The main objective of the plan is to impart environmental awareness and develop a culture of resource management in resettled areas.

### 3.3.2 NATIONAL FIRE PROTECTION STRATEGY

The strategy outlines how fire incidences can be reduced and controlled. Forestry Commission and EMA are undertaking fire awareness campaigns in different parts of the country and have established fire committees in the communities. Progress made but more resources needed to effectively implement the National Fire Protection Strategy also in collaboration with EMA the establishment of Fire Brigade and involvement of Traditional Leaders.

### 3.3.3 POVERTY REDUCTION PROGRAMMES

Although Zimbabwe has not adopted a Poverty Reduction Strategy Programme (PRSP) a number of projects highlight the need for crosscutting poverty reduction activities. One of the key initiatives on poverty reduction is the community based natural resource management concept where communities are encouraged to conserve, sustainably use and equitably share the benefits derived therein. A successful case is the CAMPFIRE programme under which the rural people are granted the authority to manage their wildlife and other natural resources for their own benefit.

## 3.4 CROSS-SECTORAL PROJECTS AND PROGRAMMES

There are a number of cross-sectoral projects and programmes being undertaken by government, private sector and civil society to enhance biodiversity conservation, utilization and sustainable management. A database of these projects is being developed under the GEF Small Grants Project.

## 3.5 REGIONAL COOPERATION AND TRANSBOUNDARY INITIATIVES

Zimbabwe is cooperating with its neighbours on a number of transboundary natural resource management projects. Examples of such projects include the following:

- SADC Protocol on Shared Water Resource,
- Fisheries
- Wildlife
- Transfrontier Parks (Great Limpopo (GKP), KAZA, ZIMOZA, Shashe-Limpopo, Mapungubwe etc.) All these are intended to expand the area of biodiversity conservation.



- Southern Africa Biodiversity Network (SABNET) and the Southern Africa Biodiversity Support Programme (SABSP)
- Zambezi Basin Wetlands Conservation and Utilization Project and SADC Regional Wildlife Training Project
- SADC Rhino conservation project
- Global water partnership Southern Africa chapter
- SADC Plant Genetic Resources project
- SADC Food Security Programmes
- SADC Forestry database
- SADC Miombo Woodland management project
- SADC Tree Seed Centre Network project

Zimbabwe has made significant progress with in establishing TBNRM with its neighbours. There are however significant challenges in establishing TBNRM areas, including issues of sovereignty and national security, the harmonization of policies, legislation and law enforcement in the countries concerned, determining what kinds of joint decentralized management arrangements are best, particularly those related to sustainable use and equitable sharing of resources and the benefits arising from them, and how to strengthen existing or establish new local institutions to govern these arrangements.

## CHAPTER IV

### 4.0 PROGRESS TOWARDS THE 2010 TARGETS, CONCLUSION AND RECOMMENDATIONS

#### 4.1 PROGRESS TOWARDS MEETING THE 2010 BIODIVERSITY TARGETS

The Global 2010 Biodiversity Action Plan sets out eleven goals for the conservation, sustainable use and equitable sharing of benefits arising out of the use of genetic resources. Zimbabwe has contributed significantly over the past ten years in towards meeting the 2010 biodiversity targets. However, the country encountered challenges during implementation as elaborated in Chapter II.

It is not possible to quantify the level of contribution that Zimbabwe has made towards the 2010-biodiversity targets. Indicators for monitoring the Global Biodiversity Target were not established. This chapter presents key highlights and qualitative assessments of the contribution the country has made towards the global targets.

#### **Goal 1: Promote the conservation of the biological diversity of ecosystems, habitats and biomes**

The country has identified areas of particular importance for biodiversity conservation with over 832,662 hectares under gazetted forests and 5,403,500 million hectares under national parks, safari conservancies and other protected areas. In 2010 UNESCO designated 44000 km<sup>2</sup> in the Zambezi Valley as a Biosphere zone.

#### **Goal 2: Promote the conservation of species diversity**

Efforts have been made to restore agro-biodiversity on selected food crops (maize, sorghum, millet). Farmers' landraces have been promoted through community seed banks and collaboration in situ conservation (communities) ex situ collaboration (national gene banks). National inventories of threatened species both animal and plants have been undertaken and strategies to protect the threatened species are being developed.

#### **Goal 3: Promote the conservation of genetic diversity**

Progress has been made towards conserving genetic diversity through in situ and ex situ actions. However the promotion of monoculture, cash cropping further threaten genetic diversity.

#### **Goal 4: Promote sustainable use and consumption**

There are a significant number of registered varieties of plants, but only a few are in use. Evidence of increased identification and use of indigenous vegetables have been noted. Collection of plants for medicinal purposes continues to threaten plant biodiversity. Implementation of CITES on wildlife fauna has reduced the level of biodiversity loss.

#### **Goal 5: Pressures from habitat loss, land use change and degradation, and unsustainable water use reduced**

Expansion of agricultural land continues to threaten biodiversity. However, the introduction of the Wildlife and forest based land reform, reforestation, the implementation of national fire strategy and the integrated water resource management minimizes the level of biodiversity loss.

#### **Goal 6: Control threats from invasive alien species**

No new invasive species have been identified. Progress has been made in clearing major water bodies of the water hyacinth. Lack of effective management plans on the eradication of the terrestrial invasive species (lantana camara and the wattle) continues to be a challenge. The country continues to collaborate with regional and international partners on the invasive species programme.

#### **Goal 7: Address challenges to biodiversity from climate change, and pollution**

Limited action has been undertaken to mainstream biodiversity conservation through climate change adaptation. However progress has been made to introduce drought tolerant varieties in drought prone areas of the country. Reduction on rain fed agriculture through expansion of irrigation facilities is in progress.

#### **Goal 8: Maintain capacity of ecosystems to deliver goods and services and support livelihoods**

Ecosystems management of land and water is being promoted through integrated land management. The identification of water catchment areas and establishment of water catchment councils have greatly improved integrated water resources management concept. Gazetted forests provide habitat for plant and wildlife species that, are important for sustaining livelihoods (health, food and shelter).

#### **Goal 9: Maintain socio-cultural diversity of indigenous and local communities**

There is a decline in traditional knowledge and rights among communities. Efforts to empower local communities through the recognition of their rights have increased through the introduction of the access and benefit sharing regulations. The amendment of the seed laws that recognize the farmers' right to conserve, save, and market local seed is a major achievement.

**Goal 10: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources**

The adoption of the access and benefit sharing regulation under the Environmental Management Act will ensure the fair and equitable sharing of benefits arising out of the use of genetic resources. The establishment of the Medical Traditional Practitioners Council and enactment of the Traditional Leadership Act further enhances the access and benefit sharing arrangements between the communities and other stakeholders.

**Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention.**

Due to the limited partnership between the international development partners and the country, Zimbabwe has not benefited on commitments made by developed countries under the Convention, in accordance with its article 20, paragraph 4, which provides financial, human, scientific, technical and technological capacity to implement the Convention.

## Progress towards the 2010 Global Biodiversity Target

<b><i>Goal 1: Promote the conservation of the biological diversity of ecosystems, habitats and biomes</i></b>	
Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.	<ul style="list-style-type: none"> <li>In Zimbabwe the protected areas system comprise approximately 13% of the land area. There are also other conservation areas outside of protected areas such as Conservancies, some communal lands, botanical gardens and private property (+30% together with protected areas) however the security of areas outside of protected areas is threatened due to human encroachment.</li> </ul>
Target 1.2: Areas of particular importance to biodiversity protected	<ul style="list-style-type: none"> <li>The country has designated areas of particular importance to biodiversity through national parks, gazetted forests, protected areas, important bird areas and world cultural heritage sites.</li> </ul>
<b><i>Goal 2. Promote the conservation of species diversity</i></b>	
Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.	<ul style="list-style-type: none"> <li>A number of programmes to restore, maintain, or reduce the decline of populations of species have been undertaken. These include (promotion of local seed varieties by NGOs, resuscitation of underutilized crops such as small grains, indigenous vegetables, that have a high nutritional value, recovery of the rhino population in and outside of protected areas).</li> </ul>
Target 2.2: Status of threatened species improved.	<ul style="list-style-type: none"> <li>Improved ways of identification of threatened species both plant and animal. The IUCN Red List is constantly being updated and is a good basis for planning.. Efforts are being made to conserve threatened indigenous stud breeds such as Mashona, Nkone and Tuli.</li> </ul>
<b><i>Goal 3. Promote the conservation of genetic diversity</i></b>	

<p>Target 3.1: Genetic diversity of crops, livestock, and other natural resources maintained.</p>	<ul style="list-style-type: none"> <li>• Promotion of cross breeding between indigenous and exotic breeds of domesticated animals.</li> <li>• Efforts have been made to promote genetic diversity through in situ and ex situ conservation.</li> <li>• There are gaps in knowledge about species</li> <li>• No information about micro-organisms</li> <li>• Inventory of large mammals undertaken and plans to develop management options ongoing</li> </ul>
<p><i>Goal 4. Promote sustainable use and consumption.</i></p>	
<p>Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.</p>	<ul style="list-style-type: none"> <li>• Tough there are a significant number of registered varieties of plants and food agriculture, only a few are in use.</li> <li>• A number of products derived from sustainable management of forests, wildlife, fisheries in use by communities</li> </ul>
<p>Target 4.2. Unsustainable consumption, of biological resources, or that impact upon biodiversity, reduced.</p>	<ul style="list-style-type: none"> <li>• Hunting quota system- scientifically derived accompanied with the issuance of. import/export permits,</li> <li>• Incentives for local communities to sustainably manage natural resources inplace</li> <li>• Supervised logging/harvesting in gazetted forests enforced</li> <li>• Harvesting or logging in the Middle Altitude forests in the Eastern Highlands eco-region prohibited.</li> </ul>
<p>Target 4.3: No species of wild flora or fauna endangered by international trade.</p>	<ul style="list-style-type: none"> <li>• Fully complaint with CITES and other regional and international environmental agreements</li> </ul>
<p><i>Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.</i></p>	

Target 5.1. Rate of loss and degradation of natural habitats decreased.	<ul style="list-style-type: none"> <li>• Lack of adequate grazing land reduces the diversity.</li> <li>• Cash crop production like cotton, tobacco and others is affecting negatively on diversity.</li> <li>• Forest based land reform policy (forestry is a viable land use system).</li> <li>• National Fire Protection Strategy</li> </ul>
<i>Goal 6. Control threats from invasive alien species</i>	
Target 6.1. Pathways for major potential alien invasive species controlled.	<ul style="list-style-type: none"> <li>• Working with Agriculture to help in providing phytosanitary certification.</li> <li>• A quarantine Centre has been established to screen threats.</li> <li>• Routine surveys targeted at impending threats.</li> </ul>
Target 6. 2. Management plans in place for major alien species that threaten ecosystems, habitats or species.	<ul style="list-style-type: none"> <li>• Manning of Border posts and other ports of entry by Agriculture Experts.</li> <li>• Routine surveys targeted at impending threats.</li> </ul>
<i>Goal 7. Address challenges to biodiversity from climate change, and pollution</i>	
Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.	<ul style="list-style-type: none"> <li>• Cross breeding and use of small grains.</li> <li>• Drought resistant varieties in food crops are being utilized</li> <li>• Promotion of reforestation and -afforestation projects.</li> </ul>
Target 7.2. Reduce pollution and its impacts on biodiversity.	<ul style="list-style-type: none"> <li>• Increased pollution of water bodies through municipal waste, mining wastes and agricultural activities . Major challenges in Lake Chivero and Manyame of sewage and industrial effluent pollution</li> <li>• Enforcement of Polluter Pays Principle by EMA.</li> </ul>

<i>Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods</i>	
Target 8.1. Capacity of ecosystems to deliver goods and services maintained.	<ul style="list-style-type: none"> <li>• Promotion of ecosystems management across borders, Zimbabwe has 6 TFCA's which link ecosystems between neighboring countries</li> <li>• A number of ecosystems have been maintained and continue to deliver goods and services to local communities and the national economy.</li> </ul>
Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.	<ul style="list-style-type: none"> <li>• CAMPFIRE is in place and the TFCA initiatives protect the rights of indigenous and local communities</li> <li>• Not achieved due to the decline in some of the important medicinal tree species.</li> </ul>
<i>Goal 9 Maintain socio-cultural diversity of indigenous and local communities</i>	
Target 9.1. Protect traditional knowledge, innovations and practices.	<ul style="list-style-type: none"> <li>• Whilst efforts are in place to encourage and protect local knowledge, this has not yet been achieved.</li> <li>• Documented Traditional Knowledge on medicinal plants in selected districts under the "Traditional Medicinal Plants project"</li> </ul>
Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.	<ul style="list-style-type: none"> <li>• TFCA's and CAMPFIRE initiatives in place but not fully covers the rights of local communities</li> <li>• The Statutory Instrument of Access and Benefit Sharing adopted SI number 61 of 2009.</li> <li>• Resource sharing management schemes introduced into gazetted forest areas.</li> </ul>
<i>Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources</i>	
Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.	<ul style="list-style-type: none"> <li>• The enactment of an SI number 61 of 2009 by the Ministry of Environment and Natural Resources Management on Access and Benefit Sharing. Implementation of this instrument is still a challenge.</li> </ul>



<p>Target 10.2. Benefits arising from the commercial and other utilization of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions</p>	<ul style="list-style-type: none"> <li>• The CAMPFIRE program has achieved the concept of sharing the benefits arising out of the use of biodiversity. Currently the concept has been well received in other countries of Southern Africa.</li> </ul>
<p><i>Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention</i></p>	
<p>Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.</p>	<ul style="list-style-type: none"> <li>• There was limited transfer of funds in line with the provision of article 20 except through GEF funding (e.g Traditional Medicinal Plants, Biodiversity Strategy and Action Plans, African Plants Initiative).</li> </ul>
<p>Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.</p>	<ul style="list-style-type: none"> <li>• Limited financial, technological transfer from developed partners, except support from UN agencies, like UNDP, UNEP and UNSECO and the GEF</li> <li>• “Molecular Marker Assisted Plant Breeding ” at the Crop Breeding Institute at DR&amp;SS.</li> </ul>

## 4.2 CHALLENGES, OBSTACLES ENCOUNTERED AND LESSONS LEARNT IN ACHIEVING THE 2010 BIODIVERSITY TARGETS

### 4.2.1 CHALLENGES IN ACHIEVING THE 2010 TARGETS

- Limited implementation and enforcement of policies due to inadequate human and financial resources.
- Weak environmental information management systems (Parks, EMA etc).
- Lack of institutional coordination within government departments, inter-ministerial and across stakeholders.
- Underdeveloped communication strategies and tools (ICT) in various sectors and stakeholders rendering communication at various levels and in particular local communities difficult.
- Low levels of scientific expertise in specialized area such as taxonomy, GIS, Remote sensing and ecological land classification.
- Increased pressure on natural resources due to human activities and natural disasters, climate change, droughts and floods, pests
- Climate variability affecting ability of ecosystems to deliver goods & services
- Traditional & local knowledge not documented
- Limited appreciation of social and economic value of biodiversity at all levels
- Inadequate specialized skills in policy analysis and harmonization of legal instruments;
- Inadequate skills of local communities in sustainable management and utilization of biological resources;
- Lack of decentralized institutional structures to manage natural resources
- Limited resources to support the management of biological resources;
- Lack of a sense of ownership among resource users affecting sustainable utilization;
- Deficiencies in the legal, regulatory, and institutional framework.

### 4.2.2 OBSTACLES ENCOUNTERED

The key obstacles encountered were as result of a weak institutional framework and program content. The lack of international support to implement the biodiversity strategy action exacerbated the problem. The economic challenges faced by the country during the reporting period meant that the available resources could only be channeled to key sectors like food security, health and education.

### 4.2.3 LESSONS LEARNT

Implementation of the Convention is largely depended on external funding which has not

been forthcoming over the past 10 years. Lack of a clearly defined implementation framework resulted in uncoordinated activities.

The limited awareness on the ecosystems approach and lack of human resource to advocate and pilot projects based on this holistic system impacted negatively on meeting the set objectives of the National Biodiversity Strategy and the Global Biodiversity targets.

#### 4.2.4 FUTURE PRIORITIES

- Revise and update the National Biodiversity Strategic Plan based on the Post 2010 Global Biodiversity Strategy.
- Mainstreaming biodiversity programs into national development strategies and plans
- Enhancing Ecosystems Approach in biodiversity management.
- Strengthening the data collection methods on biodiversity through the development of appropriate biodiversity indicators.
- Establish an effective biodiversity monitoring and reporting system at the local, national and regional level.
- Identify regional and international partners for technical assistance in the review and development of the post 2010 National Biodiversity Strategy Action Plan.
- Strengthen the Links with Other Multilateral Environment Conventions.
- Strengthen national institutions to coordinate biodiversity programmes at the local, regional and international levels.
- Develop a strong scientific base for research and development of biodiversity programmes. Involvement of academic universities and other academic institutions are a key priority.

#### 4.5 CONCLUSIONS

Zimbabwe's biological resources will remain essential for sustainable social and economic development especially for the rural communities, which are largely dependent on these resources for their livelihoods. However, these resources continue to be under pressure due to over exploitation and destruction from natural disasters, and human activities.

The lack of an institutional coordination on biodiversity issues remains a major challenge. The intricate link between forestry, wildlife, aquatic systems, agro biodiversity, and invasive species require a well articulated institutional framework that response to the challenges and opportunities around conservation, use and equitable sharing of benefits arising out of the use of genetic resources.

The lack of qualitative and quantitative data, which shows trends over time, creates challenges for the establishment of biodiversity programs that respond to the needs of the country's ecology and human livelihoods. The timely availability of data is therefore crucial in developing the country's second National Biodiversity Strategy Action Plan.

Poverty and environmental degradation are closely linked; a degraded environment produces less worsening the vulnerability of those communities that are directly dependant on natural resources, especially biodiversity.

The Secretariat to the Convention on Biological Diversity has produced a number of training modules on how to prepare and update a national biodiversity strategy action plan. The country has to seize this opportunity and start a broad based consultative process in developing the second national biodiversity strategy action plan.

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**ANNEX I – INFORMATION CONCERNING REPORTING PARTY AND PREPARATION OF NATIONAL REPORT**

A. Reporting Party

Contracting Party	
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<b>SUBMISSION</b>	
Signature of officer responsible for submitting national report Date of submission	
 <span style="float: right;">15 DECEMBER, 2010</span>	

## B. Process of preparation of national report

### **Process of preparation of national report**

The preparation of the report followed a participatory and consultative approach. The Ministry of Environment and Natural Resources Management commissioned a consultant who closely worked with other stakeholders and a selected core team. The methodology to prepare the report involved:

#### **1. Literature Review:**

This involved reviewing all relevant documents related to the implementation of the Convention including the Guidelines in the Preparation of the National Report as provided by the CBD Secretariat, The Zimbabwe State of the Environment Report 1998, The National Biodiversity Strategy Plan 1998, The Millennium Development Goals Progress Reports 2004, 2007 and 2010, The National Environmental Policy, The Environmental Management Act. A detailed list of documents consulted is contained under references.

#### **2. Field Work:**

The Consultant undertook fieldwork in four of the five ecoregions representing the country. The aim of the field visit was to get first hand information about the current challenges and achievements faced in the ecoregions.

#### **3. Report Drafting:**

After the field visit a draft report was prepared by the consultant for review by the Ministry of Environment and Natural Resources Management and other stakeholders.

#### **4. Validation Workshop:**

A validation workshop was held on 28<sup>th</sup> November to 1<sup>st</sup> December 2010 in Nyanga in the Eastern Highlands. The workshop was attended by 23 of the 30 invited participants representing various stakeholders (government, civil society, and Parastatals). (See annex II).



## ANNEX II: LIST OF PARTICIPANTS ATTENDING THE VALIDATION WORKSHOP

**MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT  
FOURTH NATIONAL BIODIVERSITY REPORT WORKSHOP  
28-30 NOVEMBER 2010  
MONTCLAIR HOTEL, NYANGA**

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## Annex III: IUCN Categories of Protected Areas

### **Category 1a Strict nature reserve protected managed mainly for science.**

*Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.*

### **Category 1b Wilderness Area: protected area managed mainly for wilderness protection.**

*Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.*

### **Category II National Park: protected area managed mainly for ecosystem protection and recreation.**

*Natural area of land and/or sea, designated to:*

- a) Protect the ecologic integrity of one or more ecosystems for present and future generations.*
- b) Exclude exploitation or occupation inimical to the purposes of designation of the area.*
- c) Provide a foundation for spiritual, scientific, educational, and recreational and visitor opportunities, all of which must be environmentally and culturally compatible.*

### **Category III Natural Monument: protected area managed mainly for conservation of specific natural features.**

*Area containing one or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.*

### **Category IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention.**

*Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.*

### **Category V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation**

*Area of land with coast and sea as appropriate, when the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological, and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.*

### **Category VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.**

*Area containing predominantly unmodified, natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.*

#### ANNEX IV: POPULATION OF SOME OF THE COMMON MAMMALS IN ZIMBABWE (1998)

Species	Population status (1998)
African Elephant	66,000 animals. Down-listed to CITES Appendix II in 1997
Black Rhinoceros	320. increasing by 3% per yr. Specially protected. Listed on CITES Appendix I
White Rhinoceros	150. Specially protected. Listed on CITES Appendix I
Cape Buffalo	90,000. Decreasing by 2.5%/year
Cape Eland	1,854. Population decreasing
Greater Kudu	10,652 animals
Nyala	Found in Save and Lower Zambezi Valley
Bushbuck	Uncommon
Roan Antelope	395. Specially protected
Sable Antelope	11,232. Increasing by 1.4%/yr
Gemsbok	100. population static for 25 yrs. Specially protected
Common Waterbuck	4,400 animals
Southern Reedbuck	200 animals
Blue Wildebeest	1,500 in Hwange National Park. Decreasing by 3.6%/yr
Red Hartebeest	Rare (very few individuals present)
Tsessebe	20 in Hwange National Park. Decreasing by 3.8%/yr
Bush Pig	Common
Hippopotamus	Common
Giraffe	200 in Gonarezhou & 2,220 in Hwange National Park
Burchell's Zebra	Common

<b>Species</b>	<b>Population status (1998)</b>
Lion	1,000 in Hwange National Park, 300 in Zambezi Valley, 200 in southeast lowveld. Increasing by 4%/yr in Hwange National Park
Leopard	14,650. Increasing by 4.3%/yr. Specially protected.
Cheetah	850. Increasing by 17%/yr. Specially protected.
Serval	Very secretive species
African Wild Cat	Common
Caracal	Rare and shy species
Spotted hyenabirds	1,500 in Hwange National Park. Population static.
Black-backed Jackal	Very common
Wild Dog	600 – 700 needs legal protection
Chacma Baboon	Very common
Velvet Monkey	Very common
Pangolin	Very rare. Specially protected
Scrub Hare	Common

**ANNEX V: MAJOR INVASIVE ALIEN WOODY SPECIES IN ZIMBABWE, THEIR PURPOSE OF INTRODUCTION, ECOSYSTEM INVADED AND THEIR DEGREE OF INVASIVENESS.**

Species	Purpose of introduction	Vegetation type or habitats invaded	Index*
<i>Pinus patula</i>	timber	Pines invade Afromontane grasslands, riverine and miombo woodlands.	5
<i>P. radiata</i>	timber		4
<i>P. roxburghii</i>	windbreak, ornamental		3
<i>Acacia mearnsii</i>	tannin, char, fuelwood	Acacias invade Afromontane forests, riverine and miombo woodlands.	5
<i>A. melanoxylon</i>	furniture, pole,		4
<i>A. podalyrifolia</i>	fuelwood		4
<i>A. elata</i>	ornamental		4
<i>A. dealbata</i>	ornamental		4
<i>A. decurrens</i>	pole, fuelwood, tannin pole, fuelwood		4
<i>Populus canescens</i>	erosion control, ornamental	Riverbeds.	5
<i>Lantana</i> spp.	Ornamental	Open grasslands, woodlands and riverine.	5
<i>Psidium guajava</i>	fruit	Forest margin and roadside.	4
<i>P. cattleianum</i>	fruit	Forest margin and roadside.	3
<i>Eucalyptus</i> spp	poles, fuelwood	Open disturbed areas and roadside.	2
<i>Callistris calcarata</i> (black cypress pine)	poles, ornamental	Roadside.	3
<i>Cupressus lusitanica</i> ( Mexican cypress)	timber, hedge, windbreak	Roadside.	3
<i>Grevillea robusta</i> (silver oak)	shelter belt, ornamental	Grasslands.	2
<i>Ziziphus mauritiana</i>	Fruit	Grasslands and roadside.	3
<i>Jacaranda mimosifolia</i>	ornamental, shelter belt	Grasslands.	3
<i>Melia azedarach</i> (Persian lilac)	ornamental, shade	Grasslands.	3
<i>Prunus cerasoides</i> (Himalayan flowering cherry)	Ornamental	Afromontane forests.	2
<i>Bauhinia variegata</i>	Ornamental	Roadside and urban open area.	3
<i>Homalanthus populifolius</i> (bleeding heart tree or umbrella tree)	Ornamental	Grasslands and roadside.	1
<i>Senna didymobotrya</i> (African senna)	ornamental, hedge	Riverbank and roadside.	3
<i>Albizia procera</i> (white siris)	shade for tea	Woodlands and grasslands.	2
<i>Toona ciliata</i> (Australian red cedar)	shade, ornamental	Roadside and urban open areas.	2
<i>Morus alba</i>	Fruit	Open areas.	1

\*Index refers to an Index of invasiveness: 5=highly invasive, 1=least invasive.

Source: Nyoka (2003).

## ANNEX VI: FOOD COMPOSITION TABLE FOR INDIGENOUS VEGETABLES FROM AFRICA (PER 100G EDIBLE PORTION)

Vegetable	Local names													
		Energy (kcal)	Moisture (g)	Protein (g)	Fat (g)	Carbohydrates incl. Fibre (g)	Fibre (g)	Ash (g)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	B-carotene (mg)	Source of data	
Amaranthus spp	Mowa	42	84.0	4.6	0.2	8.3	1.8	2.9	410	103	89	5716	FAO, 2004	
Amaranthus dubius		49	85	4	0.2		2.87	3.42	252	73	3.7		Odhav 2007	
Amaranthus hybridus	Mowa guru	53	83	6	0.5		2.81	4.91	400.5	102.4	3.6		Odhav 2007	
Amaranthus spinosus	Mowa	27	91	4	0.6		2.48	2.76	354	56.7	2.9		Odhav 2007	
Bidens pilosa	Tsine	39	88	5	0.6		2.92	2.82	163	60.7	2.0		Odhav 2007	
Vigna unguiculata	Nyemba	44	85.0	4.7	0.3	8.3	2.0	1.7	256	63	5.7	7970	Fao 2004	
Cleome spp		57	81	5.5	0.9	10.1	1.7	2.5	454	59	2.7		FAO 2004	
Cleome monophylla		39	88	5	0.7		2.14	3.01	386	94.5	2.9		Odhav 2007	
Cleome gynandra	Nyevhe	39	88	5	0.7	3.40	2.14	3.01			49.9	2100	Weiberger & Msuya, 2004	
Hibiscus esculendus	Okra fruit	36	88.6	2.1	0.2	8.2	2.4	2.0	84	90	1.2	185	FAO, 2004	
Ipomoea batatas	Sweetpotato leaves	49	83.0	4.6	0.2	10.2	2.4	2.0	158	84	6.2	5870	FAO, 2004	
Solanum nigrum	Blacknight shade	38	87.2	4.3	0.8	5.7	1.3	2.0	442	75	1.0	3660	FAO, 2004	
Spinacia oleracea	Spinach	26	90.6	2.1	0.2	5.3	0.8	1.8	61	46	1.7		FAO, 2004	
Brassica oleracea var. capitata	Cabbage	26	91.4	1.7	0.1	6.0	1.2	0.8	47	40	0.7	100	FAO, 2004	

## ANNEX VII: DAMS IN THE CATCHMENT AREAS

Catchment	Dam Name	Purpose	Net Capacity (10 <sup>6</sup> M <sup>3</sup> )	Present Capacity (10 <sup>6</sup> M <sup>3</sup> )	% Full
<b>Gwayi</b>					
	INSUKAMINI	IR	7.792	4.852	62.3
	MOZA	IR	3.213	1.787	55.6
	EXCHANGE	IR	14.506	6.75	46.5
	KHAMI	IR	3.256	3.024	92.9
	MAMANDE	IRW	11.736	4.584	39.1
	UPPER MGUZA	IR	3.134	2.581	82.4
	SHANGANI	MI	13.388	9.542	71.3
	LUNGWALA	IR	9.647	4.843	50.2
<b>MANYANE</b>					
	CHIVERO	IRWS	247.181	216.672	87.7
	MANYAME	WSIR	480.236	368.692	76.8
	MAZVIKAEI	IRMI	343.815	325.223	94.6
	EASTWOLDS	IR	14.713	12.605	85.7
	BLOCKLEY	IRWS	4.868	3.711	76.2
	BHIRI-MANYAME	IR	172.485	139.386	80.8
<b>MAZOWE</b>					
	ARCADIA	IR	55.293	52.458	94.9
	WILLIAM LAURIE	IR	16.874	13.388	79.3
	NEGOMO	IR	4.968	4.944	99.5
	MWARAZI	MIWS	5.893	5.564	94.4
	JUMBO	IRMI	20.951	18.111	86.4
	KUSHINGA PHIKELELA	IRWS	7.721	5.85	75.8
	RUFARO	WS	4.84	2.759	57.0
	CHIMHANDA	IR	3.469	3.605	103.9
	MASEMBURA	IR	25.775	25.775	100.0
	MWENJE (NOAKES - STAGE II)	IRWSI	36.117	32.377	89.6
	MAZOWE	IR	39.357	19.987	50.8
	MUFURUDZI	IR	9.619	7.97	82.9
<b>MZINGWANE</b>					
	TULI MAKWE	IRMI	6.122	5.376	87.8
	MUNDI MATAGA	IR	38.827	35.167	90.6
	BEIT BRIDGE 2	WS	5.315	0.048	0.9
	INGWESI	IRWS	67.183	32.288	48.1
	INSIZA	WSIR	173.491	120.08	69.2
	CHIMWE	IR	6.416	5.845	91.1
	SHASHANI	IRWS	27.338	23.046	84.3
	MTSHABEZI	IRWS	51.996	50.427	97.0
	MHLANGWA	IRWS	4.239	1.236	29.2

Catchment	Dam Name	Purpose	Net Capacity (10 <sup>6</sup> M <sup>3</sup> )	Present Capacity (10 <sup>6</sup> M <sup>3</sup> )	% Full
	LOWER MUJENI VALLEY	IRWS	10.126	7.395	73.0
	UPPER NCEMA	WS	44.82	0.459	1.0
	ZHOVHE	IR	130.46	90.515	69.4
	MANYUCHI	IR	309.066	252.644	81.7
	LOWER NCEMA	WS	18.186	7.031	38.7
	MANGWE	WS	8.713	6.111	70.1
	UPPER INSIZA	IR	7.818	3.217	41.1
	SILALABUWA	IRWS	23.22	6.903	29.7
	MZINGWANE	IRWS	42.179	3.36	8.0
	ANTELOPE	IRWS	12.525	10.724	85.6
	INYANKUNI	WS	74.52	0.115	0.2
<b>RUNDE</b>					<b>#DIV/O!</b>
	TUGWANE	IR	3.955	2.449	61.9
	AMAPONGOKWE	IRWS	37.587	34.699	92.3
	CHIVAKE	IR	4.639	4.525	97.5
	BANGALA	IR	126.588	46.904	37.1
	MABVUTE	IR	3.219	3.177	98.7
	MHEMDE	IR	3.642	3.443	94.5
	NYAJENA	IR	4.667	3.735	80.0
	MBINDANGOMBE	IR	22.583	11.284	50.0
	MUSHANDIKE	IR	37.252	0.561	1.5
	MUTERI	IR	74.214	67.201	90.6
	MANJIRENJI	IR	274.179	157.081	57.3
	MUTIRIKWI	WSIR	1378.082	754.111	54.7
	MAGUDU	IR	5.845	4.15	71.0
	MUZHIMI	IRMI	106.961	48.324	45.2
	JIRI	IR	20	19.87	99.4
	NGEZI	WSIR	72.32	69.29	95.8
	GWENORO	IR	29.554	22.366	75.7
	TOKWANE	IR	14.467	7.654	52.9
	MUSAWEREMA	IR	7.316	5.272	72.1
<b>SANYATI</b>					<b>#DIV/O!</b>
	SURI SURI	IR	9.971	4.59	46.0
	NYAMARUFU	WS	9.113	4.258	46.7
	MUPFURE WEIRS	WS	3.835	3.835	100.0
	SEBAKWE STAGE 1	WSIR	265.733	122.477	46.1
	CLIFTON	IRWS	10.807	8.371	77.5
	MAMINA	IR	11.361	5.901	51.9
	MAHUSEKWA	IR	2.992	2.954	98.7
	LOWER ZIVAGWE	IRWS	6.993	6.858	98.1
	KARIBA	HY	64800	45831.2	70.7
	NGESI	IRWS	22.686	14.915	65.7
	NGONDOMA	IR	7.487	3.369	45.0
	CACTUS POORT	INWS	3.009	1.859	61.8



Catchment	Dam Name	Purpose	Net Capacity (10 <sup>6</sup> M <sup>3</sup> )	Present Capacity (10 <sup>6</sup> M <sup>3</sup> )	% Full
	WHITE WATERS	WS	4.895	4.262	87.1
	CLAW (STAGE II)	IRWS	65.455	51.785	79.1
	CHIKOMBA	IRWS	5.461	2.637	48.3
	CHIBERO	WSIR	3.12	0.585	18.8
	PADRE'S POOL	WSIR	2.987	2.517	84.3
SAVE					#DIV/0!
	SMALL BRIDGE	WS	14.785	14.837	100.4
	ODZANI	WS	6.442	5.621	87.3
	OSBORNE	IR	401.646	320.066	79.7
	WENIMBI	IR	9.616	8.841	91.9
	RUSAPE	WSIR	66.964	60.289	90.0
	RUTI	IR	152.308	106.972	70.2
	SIYA	IR	105.455	69.849	66.2
IR=IRRIGATION, MI=MINING, HY=HYDROELECTRIC, IN=INDUSTRY, WS=WATER SUPPLY					

## **ANNEX VIII: INVASIVE PLANT AND INSECT SPECIES FOUND IN ZIMBABWE.**

### **• Invasive Plants found in Zimbabwe.**

1. *Pinus patula*: Pines invade afro-montane grasslands, riverine and miombo woodlands
2. *Pinus radiata*: Pines invade afro-montane grasslands, riverine and miombo woodlands.
3. *Acacia mearnsii*: Acacias invade afro-montane forests; riverine and miombo woodlands.
4. *Eucalyptus grandis*: Open disturbed areas and roadside.
5. *Caesalpinia decapetala*: Afro-montane forests.
6. *Cupressus lusitanica*: Roadsides.
7. *Melia azedarach*: Grasslands
8. *Prunus cerasoides*: Afro-montane forests
9. *Psidium guajava*: Forest margins and roadsides
10. *Lantana camara*: Wet areas and grasslands.

### **Aquatic invasive plants.**

1. Water hyacinth: *Eichhornia crassipes*
2. Kariba weed: *Salvinia molesta*

### **Invasive Forestry Insect Pests**

1. Eucalyptus bronze bug: *Thaumastocoris peregrinus* (Affects eucalyptus trees).
2. Eucalyptus gall wasp: *Leytocybe invasa* (Affects eucalyptus trees).
3. Eucalyptus snout beetle: *Gonipterus scutellatus* (Affects eucalyptus trees).
4. Cypress aphid: *Cinara cupressi* (Affects cypress trees).
5. Pine Needle Aphid: *Eulachnus rileyi* (Affects pine trees).
6. Pine Woolly Aphid: *Pineus boernerii* (Affects pine trees).

## ANNEX IX: THREATENED MEDICINAL PLANT SPECIES IN SELECTED DISTRICT IN ZIMBABWE

Verneular name	Latin Name	Part used	Ailments
Muranga	<i>Warbugia salutaris</i>	Bark, leaves	Used for treating heart problems, sexual transmitted diseases and headache
Mutovhoti	<i>Spriostachys Africana</i>	Stem	Used for treating abdominal pains and for driving away bad spirits
Mabope	<i>Abrus precatorius</i>	Seeds, roots, leaves	Used for treating infertility in women and cleansing of blood, seeds are used as lucky charm.
Gumiti	<i>Celtis gomophophylla</i>	Whole plant	Used to treat general body sickness
Chifumuro	<i>Dicoma anomala</i>	Tuber	Used for treating abdominal pains, uterus ailments, backache and gonorrhoea and for driving away bad luck.
Mufavhuka	<i>Myrothumnus flabellifolius</i>	Whole plant	Used to chase away bad spirits and to treat a protruding rectum in children
Musosoti	<i>Fluggea virosa</i>	Roots	Used for treating stomach pains
Mundiriri	<i>Rubia cordifolia</i>	Roots	Used as a lucky charm
Mutsombori	<i>Lannea edulis</i>	Roots	Used for treating gonorrhoea, diarrhea, abdominal pains and cough
Mubikasadza	<i>Rhus dentate</i>	Roots	Used for treating infertility and heavy menstruation in women.
Mungurahwe	<i>Mondia whitei</i>	Roots	Used for boosting appetite
Muvhangazi	<i>Pterocarpus angolensis</i>	Bark	Used for treating diarrhoea backache, ringworms, venereal diseases and ulcers
Nhunguru	<i>Flacourtia indica</i>	Stem bark	Used for treating measles
Murudza	<i>Alepedia gracilis</i>	Roots	Tuberous root used in treating abdominal pains, diarrhoea and headaches
Muvara	<i>Monotes glaber</i>	Roots, leaves	Used for treating heart pains, toothache, bilharzias and infertility in men.
Muwore	<i>Adenia gummifera</i>	Bark	Used for increasing general body strength

Source: Ministry of Environment and Tourism

## ANNEX X: THE MEAN COMPOSITION (% ABUNDANCE) OF THE FISH COMMUNITY IN LAKE KARIBA IN 1968-72, 1974-75 AND 2006

Family	Species	N	1968-71 <sub>1</sub> 113493	1974-75 20220 <sub>2</sub>	2006 52 880
Clupeidae	<i>Limnothrissa miodon</i>			7.5	0.3
Mormyridae	<i>Cyphomyrus discorhynchus</i>		7.9	8.1	+
	<i>Mormyrops anguilloides</i>		0.5	1.2	+
	<i>Mormyrus longirostris</i>		0.1	0.3	+
	<i>Marcusenius macrolepidotus</i>		0.1	1.4	+
Alestiidae	<i>Brycinus imberi</i>		0.3	0.1	0.7
	<b><i>Brycinus lateralis</i></b>		<b>58.8</b>	<b>22.6</b>	+
	<i>Hydrocynus vittatus</i>		2.5	2.7	0.5
	<i>Micralestes acutidens</i>		0.4	0.4	+
Distichodontidae	<i>Distichodus mossambicus</i>		+	+	+
	<i>Distichodus schenga</i>		0.3	+	1.7
Cyprinidae	<i>Barbus fasciolatus</i>		4.6	3.9	1.8
	<i>Barbus unitaeniatus</i>		1.8	9.4	59.3
	<b><i>Barbus poechii</i></b>		+		
	<i>Barbus lineomaculatus</i>		+	+	
	<i>Labeo altivelis</i>		0.2	0.2	0.8
	<i>Labeo congoro</i>		+		+
	<i>Labeo cylindricus</i>		+		0.1
	<b><i>Labeo lunatus*</i></b>		+		
Schilbeidae	<i>Schilbe intermedius</i>		0.9	0.3	+
Clariidae	<i>Clarias gariepinus</i>		2.0	0.5	0.2
	<i>Heterobranchus longifilis</i>		0.1	0.2	
Malapteruridae	<i>Malapterurus shirensis</i>		0.1	0.1	
Mochokidae	<i>Synodontis nebulosus</i>		0.3	+	+
	<i>Synodontis zambezensis</i>		1.0	1.5	0.1
Poeciliidae	<i>Aplocheilichthys johnstonii</i>		+	0.1	3.6
Cichlidae	<i>Pseudocrenilabrus philander</i>		1.3	7.4	4.6
	<i>Pharyngochromis acuticeps</i>		5.2	16.9	7.8
	<i>Sargochromis codringtonii</i>		1.1	2.2	1.4
	<b><i>Sargochromis carlottae</i></b>		<b>0.1</b>		
	<b><i>Sargochromis giardi</i></b>		<b>0.2</b>		
	<b><i>Serranochromis robustus</i></b>		+		
	<b><i>Serranochromis macrocephalus</i></b>		+		<b>4.2</b>
	<i>Tilapia rendalli</i>		3.6	9.7	6.6
	<i>Tilapia sparrmanii</i>				1.3
	<b><i>Oreochromis andersonii</i></b>		<b>0.9</b>		
	<i>Oreochromis mortimeri</i>		10.0	3.5	0.3
	<i>Oreochromis macrochir</i>				+
	<i>Oreochromis niloticus</i>				4.6

Source: Zengeya and Marshall (2008)

## **ANNEX XI: ENVIRONMENT DATA SETS**

### **A) General Land Statistics**

- Fland base (land use and agro-ecological distribution)
- Fland classification
- Fnumber and area of protected sites

### **B) Soil Resources**

- Soil classification
- Soil erosion and valued lost

### **C) Forests**

- Ftotal forest area, indigenous and plantation
- Depletion rates by area and timber volume, round wood balance
- Fuel consumption
- Farea planted and managed
- Deforestation
- Causes of forest depletion

### **D) Water**

- Total fresh water resources
- Annual depletion and recharging
- Annual rainfall
- Total and per capita water consumption for domestic and industrial uses
- Domestic and industrial discharges
- Water recycling in major urban centers
- Water quality index (BOD and turbidity)
- Fish production and value by type
- Fish production versus stock levels
- Number of dams, capacity, lifespan, water levels over time
- Water hyacinth and other noxious weeds

### **E) Wildlife**

- Stock level of key bird and mammal species
- Depletion rate versus stock levels
- Number of endangered and threatened species
- Number and value of hunting permits and other fees
- Number and value of other wildlife products
- Number of campfire projects, wildlife populations, revenues
- Total area assigned to wildlife
- Wildlife in commercial ownership
- Number and species of animals culled

### **F) Mining**

- Number of active mines by type
- Mineral production and values by type

- Estimated reserves of key minerals
  - Scarcity index for key minerals
  - Number of mine dumps requiring rehabilitation
  - Number of rivers with gold panning
  - Number of permits for gold panning issued by district
  - Labour in mining
- G) Agriculture
- Land distribution by farm type and tenure
  - Commodity production, exports and values
  - Chemical use, total and per hectare (using sales and import data)
  - Livestock numbers and by land sector
  - Level of food self-sufficiency
  - Crop hectarage by tenure
  - Land under irrigation
  - Losses from diseases for crops and animals
  - Labor in agriculture sector
- H) Energy
- Energy production by type
  - Energy imports and exports
  - Greenhouse, acid rain and ozone depleting gas emissions from energy production
  - % of households with electricity

## ANNEX XII: ENVIRONMENTAL CONVENTIONS TO WHICH ZIMBABWE IS SIGNATORY

Convention	Signature	Ratification Accession	Entry into Force
Trade in Species Convention	1973	19 May 1981	19 August 1981
World Heritage Convention		16 August 1982	16 November 1982
Bamako Waste Convention		10 July 1992	10 October 1992
Vienna Convention	1985	3 November 1992	3 February 1993
Montreal Ozone Amendment	1987	3 November 1992	3 February 1993
Climate Change	12 June 1992	2 November 1992	21 March 1994
SADC Watercourse		1995	
Law of the Sea Convention	1982	24 February 1993	16 November 1994
Biodiversity Convention	12 June 1992	11 November 1994	11 February 1995
Desertification	15 October 1995	September 1995	26 December 1996

Source: ZIMSTAT 2010