National Report on Measures Taken to Implement the Convention on Biological Diversity

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PREFACE

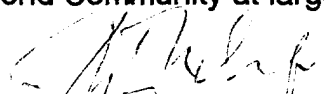
In fulfilment of Article 26 of the Convention on Biological Diversity and the decision of the second meeting of the Conference of the Parties (decision II/17), Botswana as a contracting party is obligated to prepare and present to the Conference of Parties a national report on measures taken to implement the provisions of the Convention. A National Biological Diversity Authority which consists of experts from various organisations both within and outside government was established and charged with preparing the report . The list of members of the National Biological Diversity Authority is attached in Appendix 1.

This report provides detailed current information on the status and trends in biodiversity conservation in Botswana as well as progress in the implementation of the Convention on Biological Diversity.

Biodiversity is essential for sustainable development and adaptation to the changing environment. A review of this report shows that Botswana still possesses an impressive diversity and abundance of wild fauna and flora. The Government of Botswana has demonstrated considerable commitment to maintaining the country's rich heritage by setting over 35% of the country as National Parks, Game Reserves, Forest Reserves and Wildlife Management Areas. Despite its commitment the country still lacks adequately trained manpower needed to develop national strategies and action plans as highlighted in the report.

This being the first national report, I wish to commend the National Biological Diversity Authority for the tremendous effort it has made in putting together this report. It is a product of intensive literature review by the many sectors who are involved with biodiversity conservation in Botswana. I am sure it has been an exercise from which all have learnt/ gained worthwhile experience which will make the task of preparation of subsequent reports fairly easier.

One can only hope that the reader of this product will gain as much if not more than the producers and that the tremendous efforts that Botswana is undertaking in managing and protecting its biodiversity will be understood and appreciated by the world Community at large.



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List of Abbreviations

AEWA	Africa Eurasian Water-birds Agreement
ALCOM	Aquaculture for Local Community Development
BOCCIM	Botswana Confederation of Commerce and Industry
CBMIF	Community Based Management of Indigenous Forestry
CBO	Community Based Organisation
CI	Conservation International
CITES	Convention on International Trade in Endangered Species
CJSS	Community Junior Secondary School
CKGR	Central Kalahari Game Reserve
DANCED	Danish Co-operation for Environment and Development
DFID	Department for International Development
DRFN	Desert Research Foundation of Namibia
DWA	Department of Water Affairs
DWNP	Department of Wildlife and National Parks
EEASA	Environmental Education Association for Southern Africa
EIA	Environmental Impact Assessment
EU	European Union
FAB	Forestry Association of Botswana
FAO	Food and Agricultural Organisation
FONSAG	Forum on Sustainable Agriculture
FPDP	Forestry, Protection and Development Programme
GEF/SGP	Global Environment Facility/Small Grants Programme
GTZ	German Technical Co-operation
IPGRI	International Plant Genetic Resource Institute
IRCE	Institutional Reinforcement for Community Empowerment
IUCN	World Conservation Union
IUCN-ROSA	World Conservation Union-Regional Office for Southern Africa
KCS	Kalahari Conservation Society
KMS	Kalahari Management Services
MoA	Ministry of Agriculture
NCS	National Conservation Strategy
NCSCA	National Conservation Strategy Coordinating Agency
NDP8	National Development Plan 8
NGO:	Non Governmental Organisation
NORAD	Norwegian Agency for Development Cooperation
NPGRC	National Plant Genetic Resources Centre
NRMP	Natural Resources Management Programme
ODA	Overseas Development Agency
HOORC	Harry Oppenheimer Okavango Research Centre
PACT	Private Agencies Collaborating Together
PTB	Permaculture Trust of Botswana
RIPCO	Rural Industries Promotions Company
SABONET	Southern African Botanical Diversity Network
SACCAR	Southern African Centre for Co-operation in Agriculture and Natural

	Resources Research and Training
SACWM	Southern Africa Convention for Wildlife Management
SADC	Southern African Development Community
SAFRINET	Southern African (SADC) Loop of Bionet International
SARCCUS	Southern African Regional Commission for the Conservation and Utilisation of Soil
SIDA	Swedish International Development Authority
SNV	Netherlands Development Organisation
UNCED	United Nations Commission for Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
VPR	Veld Product Research
WMA	Wildlife Management Areas

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EXECUTIVE SUMMARY

Botswana's environment and natural resources have been placed under growing pressure as a result of rapid increases in population and development. In order to counter the threats to the country's natural resources, the Government of Botswana has put in place the National Conservation Strategy which recognises the importance of economic development and environmental management. In addition, a number of policies and programmes have been promulgated to ensure that natural resources are used in an efficient and sustainable manner. The country is also a signatory to a number of international agreements, conventions and protocols.

Botswana is one of very few countries in the world that still possesses an impressive diversity and abundance of wild fauna and flora. This is reflected by the occurrence of more than 150 different species of mammals, over 500 species of birds, numerous species of reptiles, amphibians, insects and plants. The Government of Botswana has demonstrated considerable commitment to maintaining the country's rich heritage by setting aside 18% of the country as National Parks and Game reserves. An additional 21% has been dedicated to Wildlife Management Areas where the primary land use is wildlife utilisation.

In recent years, declines have been observed in the numbers of many wildlife species. A number of factors have been evoked to explain this alarming trend. These include rapidly expanding human and livestock populations, the ever present spectre of drought and the proliferation of livestock disease control cordon fences that have had the effect of impeding the free migration of wildlife.

In order to reverse this trend, a number of measures have been put in place. These include the provision of water to compensate for the loss of access to permanent water bodies, protection of wildlife migratory routes by the designation of certain areas as wildlife management areas and the use of wildlife friendly fencing. The role of conservation education in conscientising people about the necessity of maintaining the country's biodiversity cannot be overemphasised. In this regard, concrete steps have been taken by introducing conservation education in school curricula and the development of ex-situ facilities such as natural history collections and botanical gardens.

The Government of Botswana in conjunction with all stakeholders has embarked upon a process of developing a comprehensive strategy for wildlife management in the 21 st Century.

In Botswana, as elsewhere, there is widespread replacement of diverse varieties by homogeneous modern cultivars resulting in genetic vulnerability. Major crops such as sorghum, maize, millet and cowpeas are essential for the food security of Botswana and genetic diversity within these crops is important for stable production.

In view of the fast disappearance of crop diversity in Botswana, the only safe approach to provide broad genetic base to satisfy future needs is to collect and maintain as much of the genetic diversity as possible for both cultivated crops and their wild relatives which highlights the need for Government support to store plant genetic resources in Genebanks. To this end, the Government of Botswana has established a National Plant Genetic Resources Centre for the conservation of this important heritage.

Since 1988, the Ministry of Agriculture started a project on conservation of indigenous livestock (sheep, goats, and cattle). To date there are six ranches with a total land area of 16,000 ha, 600 breeding cows, 500 breeding sheep and 400 breeding goats. This base populations are kept mainly for conservation and characterisation. During the period 1997-2001 the Government of Botswana and UNDP for an expanded project to cover both in-situ and ex-situ conservation involving all species of farm animals. The main aim of these projects is to meet the food security of the countries and to ensure a future supply of animal products and animal biodiversity.

There is great potential for production of inland fisheries with an estimated production of 10 000 tonnes per year. However, losses are high, at between 20-30% due to inadequate transport, storage and processing technologies. An initiative implemented by the FAO is the Aquaculture for Local Community Development which co-ordinates fisheries and small water bodies sectoral projects, and provision of documentation and information services.

Fuelwood is the main source of household energy for over 74% of the rural population who use it for cooking, water, heating and lighting. Overutilisation of fuelwood resources has resulted in land degradation and deforestation. In order to address the management and conservation of forest resources, the Government, NGOs and other stakeholders are in the process of drawing up a comprehensive National Forestry Action Programme. Forest and natural woodland inventories will be carried out to facilitate the implementation of natural woodland management programmes.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Geography and Environment of Botswana

1.1.1 Physical Features

Botswana is landlocked and straddles the Tropic of Capricorn in the centre of the Southern African Plateau. The mean altitude above sea level is approximately 1 000 metres and the country's total area is 582 000 km^2 - about the size of Kenya or France or the state of Texas in the USA. Botswana shares borders with Zimbabwe, the Republic of South Africa, Namibia and Zambia.

Much of the country is flat, with gentle undulations and occasional rocky outcrops. In the north-west, the Okavango River drains inland from Angola to form the Okavango Delta; in the central north-east is a large area of calcrete plains bordering the Makgadikgadi pans. In the east, adjacent to the Limpopo drainage system, the land rises above 1 200 metres, and the Limpopo Valley gradually descends from 900 metres in the south to 500 metres at its confluence with the Shashe River. This eastern region, which straddles the north-south railway line, has a somewhat less harsh climate and more fertile soils than elsewhere; and it is here that most Batswana live. Two thirds of Botswana is covered with deep Kalahari sands. The sand cover is up to 120 metres deepin some places. The Kalahari supports a vegetation of scrub and grasses, but there is an almost complete absence of surface water.

1.1.2 Climate

Botswana is situated close to the subtropical high pressure belt of the southern hemisphere. As a result, the country is largely arid or semi-arid. Mean annual rainfall ranges from over 650 mm in the extreme north to less than 250 mm in the extreme south-west. A secondary maximum of over 550 mm occurs in the south-east around Lobatse, and a secondary minimum of less than 350 mm occurs in the low lying area between the Shashe and Limpopo rivers in the extreme east.

Almost all the rainfall occurs during the summer months, from October to April; the period from May to September is generally dry. Most of the rainfall occurs in localised showers and thunderstorms, and its incidence is highly variable both in time and space.

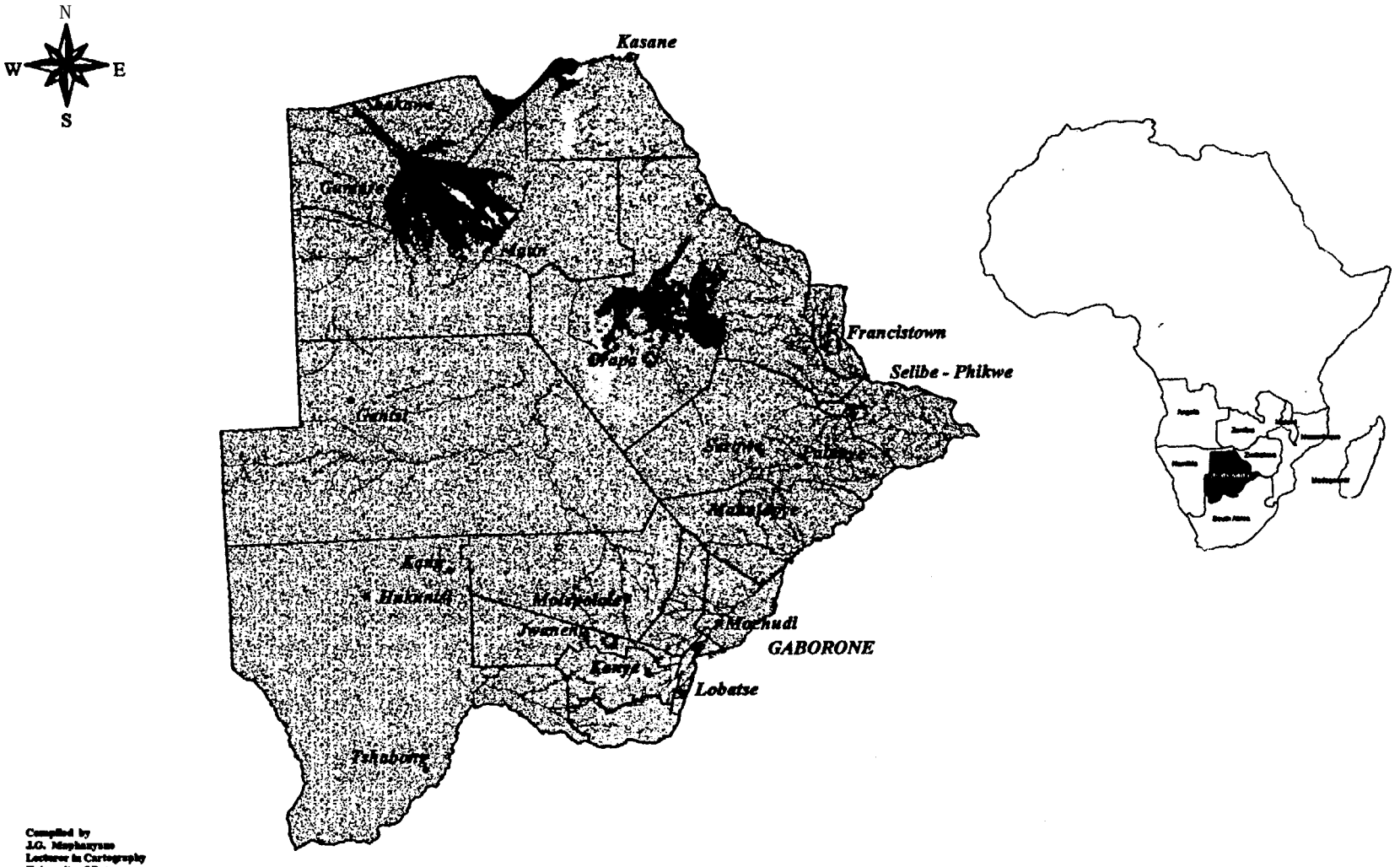

Figure 1.1 Location map for Botswana

Average daily maximum temperatures range from 20°C in July to 33°C in January while daily minimum temperatures range from 5°C in July to 19°C in January. However, the temperature range is wide, with extremes from less than minus 5°C up to 43°C. The lowest temperatures occur in the south-west, where early morning frost may occur during June through August.

Evaporation rates are high, ranging from 1800 mm to over 2200 mm annually for surface water. Sunshine varies from about 3 000 hours annually in the north-east to over 3 500 hours in the south-west (8-10 hours daily). Generally clear skies and low relative humidity lead to maximum insolation during the day and rapid energy loss at night, resulting in relatively hot days and cool nights and a large diurnal range of temperature.

Drought in Botswana is a recurring phenomenon. The six consecutive years of drought from 1981/82 to 1986/87 were the worst sequence since the early 1920s. During these drought years, agricultural production fell sharply and wildlife and livestock populations were significantly reduced. Government mounted a major drought relief effort, to enable affected households to retain access to income opportunities, food, water and health supplies.

1.1.3 Natural Resources

1.1.3.1 Vegetation

Vegetation types are closely correlated with climate. Away from the bush swampland of the Okavango Delta, the vegetation has to withstand long dry periods each season and also has to cope with drought. There are belts of indigenous forest and dense bush in the Chobe District in the north, due to higher rainfall in the area. Further south, the Makgakgadi pans are surrounded by treeless grass savanna. More than half of the country supports scrub and tree savanna , the Mopane tree dominating in the north-east and the hinterland of the Okavango. Trees are tallest and most dense where rain and soil are best and give way to poorer vegetation in the drier regions. In the south and west, the Kalahari supports only a low scrub savanna. Low rainfall and poor soils result in grasses of low productivity, particularly in the Kalahari; but the rangeland supports wildlife and livestock, although at low densities. Overgrazing can cause prolonged deterioration of the veld, which is also vulnerable to fire during winter months.

1.1.3.2 Soils

Sandy soils cover over 70% of the surface of Botswana. They vary in depth (from 30m to more than 100m), texture, colour, chemical composition and geological origin and are often underlain by calcrete. the soils are geographically old, highly leached, poorly structured and inherently infertile.

1.1.3.3 Range Resources

Botswana's main natural resources are range and arable land, rich wildlife habitats supporting large animal populations, and a variety of known and promising occurrences of minerals. Arable land is estimated at less than 5% of the total land area and the best areas are in the eastern part of the country. Unreliable rainfall make arable agriculture risky. Much more of Botswana's land is suited to extensive livestock production, and this is reflected in the fact that cattle outnumber humans. With the development of boreholes, cattle ranching has pushed further west into the Kalahari, exploiting more fragile rangeland.

Botswana has some of the last great populations of wild animals left in Africa; they constitute a tourist attraction that has yet to be fully exploited. They also make an important contribution to the subsistence economy of the country. Large areas of Botswana are designated as National Parks and Game Reserves, but game is still found outside the reserves. Livestock, agriculture and wildlife often represent competing uses of marginal land; careful management is required to ensure that such land is used to its best advantage.

1.1.3.4 Mineral Resources

In spite of the accelerated pace of mineral exploration in recent years, much remains to be discovered about Botswana's mineral resources. The thick sand covering much of the country obscures the underlying geology, although the eastern part of the country is relatively well mapped geologically. Copper-nickel is mined at Selebi-Phikwe, and other potentially exploitable copper resources are known to exist. Mining of coal at Morupule occurs at a relatively small scale, but resources of billions of tonnes are known to exist. Diamonds are mined at Orapa, Letlhakane and Jwaneng. Large salt and soda ash deposits at Sua Pan are now being exploited. Exploitation of minerals is constrained by remoteness, the thickness of the Kalahari sand and the high cost of providing infrastructure.

1.1.3.5 Water

Water is the most critical natural resource in Botswana. The Okavango and Chobe rivers are the largest surface water resources, comprising 95% of Botswana's total supply. Other rivers are perennial with a few large dams and small water bodies scattered in the rangelands. There are about 10 000 registered boreholes used for watering livestock. Livestock is the major consumer of water.

1.2 Environmental Conservation in Botswana

The people of Botswana have a long tradition of conservation of the environment and sustainable utilisation of the country's natural resources. This is reflected in large tracts of natural areas and sizeable populations of wild animals that are still found in this country today. Since independence in 1966, Government has made efforts to maintain the tradition of conservation of the environment through laws, policies and programmes aimed at promoting environmental conservation and sustainable utilisation of natural resources. Notably, these legislation and policies were largely sectoral in nature.

Despite the long tradition of environmental conservation, Botswana has, in the last twenty years, been experiencing growing pressure on the country's natural resources. The pressure has come about mainly as a result of high increase in human population and rapid growth in industrial and other forms of economic activity. Government concern at the growing pressure on the country's natural resources base led to the formulation of the National Conservation Strategy which culminated in a National Policy on Natural Resources Conservation and Development being adopted in 1990.

The National Conservation Strategy (NCS) is an encompassing policy which seek to support and improve policies and legislation in order to increase their effectiveness in promoting environmental conservation.

Since the adoption of the NCS, several policies and legislation have been or are being reviewed with the view to strengthen the capacity and capability of the country to conserve the environment in line with the requirements of this framework policy. These include the Wildlife Conservation and National Parks Act, Forest Act, Tourism Act and National Policy on Agricultural Development.

The NCS has also provided a basis for initiating new policies, legislation and programmes aimed at promoting environmental conservation. A coordinated environmental education programme has recently been developed to improve our effectiveness in promoting public awareness about the environment. A project aimed at improving waste management and protecting ground water resources has resulted in formulation of policy and legislation on waste management. Government has made a decision to promulgate Environmental Impact Assessment legislation, which is expected to ensure that development actions are environmentally friendly. Funds have been secured for carrying out the first State of the Environment Review which is expected to indicate trends in the state of our natural resources use as well as form the basis for an integrated environmental monitoring system.

The Government has also initiated a programme of undertaking environmental audits and impact assessments of past and future National Development Plans with the objective of promoting sustainable development in Botswana. Also, the National

Conservation Strategy Coordinating Agency (NCSCA) handles environmental issues which do not fall under the responsibility of any ministry . For example waste management issues, wetlands, and biodiversity.

1.3 **The Convention on Biological Diversity with respect to wildlife**

Botswana harbours a vast array of wild flora and fauna in a broad range of habitats throughout the country. This diversity of biological resources plays an immeasurable role in the social, cultural and economic well being of Botswana's people. Further to that, there is also recognition that this biological diversity is a global asset whose value has yet to be fully comprehended.

There is, however, a growing threat to the maintenance of biological diversity as a result of increased human pressure. Effective strategies have to be sought to counter these threats not only by developing and sustaining the system of protected areas but also by fostering other conservation measures outside protected areas to maintain and enhance species and ecosystem diversity.

The Convention on Biological Diversity espouses the conservation of biological diversity and the sustainable use of its components. This mirrors the commitment of the Government of Botswana to ensure that the development and diversification of the country's economy is predicated on the sustainable utilisation of her natural resources. The major benefits that accrue from the development of the wildlife and other renewable natural resources include the creation of economic opportunities and diversification of the country's economic base. From the above, communities have increasingly become aware of the importance of natural resources conservation.

1.4 The Convention on Biological Diversity with respect to Agriculture

Biodiversity, the totality of genetic resources, varieties, and ecosystems is the very foundation of life for the majority of rural people. The food security of communities is based on Biodiversity in crops, animals, forests and wildlife resources. The maintenance of yields and disease resistance is based on the access to a rich genetic resource of crops and their wild relatives, animals, forests and wildlife resources. The richness of biodiversity ensures present and future stability of food supply as well as adaptation of natural ecosystems to changing climatic conditions. However, the stability of genetic resources is threatened by among other factors, the destruction of natural habitats, and the widespread introduction of uniform seeds/breeds, over-exploitation of veld products, overgrazing and desertification.

For the rural majority, loss of biodiversity threatens the sustenance of local communities as biodiversity provides shelter, food, fibre, medicinal and other products that ensure the survival and income of the majority of the rural population. The rural population know how to maintain biodiversity. When they plant, they try to

meet the nutritional requirements of their families by inter-cropping, and reduce the risk of crop failure by cultivating a wide variety of crops or having mixed livestock. The growing emphasis on market-driven transactions contribute towards the gradual erosion of indigenous knowledge systems. The “wild” relatives of cultivated crops form an important part of the diet of rural communities as these are part of their ecosystem. The “wild” vegetables are often seen on the table of many rural and urban dwellers and contribute towards the food security and nutrition of the population.

CHAPTER TWO

2.0 GOALS AND OBJECTIVES OF POLICIES RELATED TO BIODIVERSITY CONSERVATION

By and large conservation of biodiversity in Botswana is sectoral in practice but the Government of Botswana has through its National Conservation Strategy set the goals and objectives that the different sectors now have to work towards.

2.1 National Conservation Strategy

The strategy was approved by Parliament in 1990 and it manifests Botswana Governments commitment to sustainable development of the wide range of natural resources and features that exist throughout the country. It emanates largely from the concern that many of the natural resources are under threat of being over exploited.

The primary goals of the strategy are to pursue policies and measures which:

- increase the effectiveness with which natural resources are used and managed in order to optimise environmental and economic benefits and minimise the harmful environmental side effects.
- integrate the work of sectoral Ministries and interest groups throughout Botswana, thereby improving the development of natural resources through conservation.

Development goals of the strategy have been identified by the Government as follows:

- development of new and better uses of natural resources, which are sustainable;
- optimisation of the existing uses of all natural resources;
- development of multiple, rather than single purpose, natural resource-uses;
- diversification of the rural economy so as to generate new jobs;
- increased education of, and participation by all members of society in improving the environment;
- development of links with neighbouring countries in conserving natural resources;
- establishment of a balance between population growth and the supply of natural resources.

Conservation goals are the:

- conservation of all major ecosystems, wildlife and cultural resources;
- protection of endangered species;
- maintenance of stocks of renewable resources(e.g. veld products), whilst increasing their sustainable yields;
- control of the depletion of exhaustible resources (e.g. minerals) at optimal rates;
- distribution of incomes and rewards more equitably, in the interests of conserving natural resources;
- cost- effective restoration of degraded renewable natural resources, including improved capacity for regeneration of the veld;
- the prevention and control of pollution.

2.2 **Wildlife Diversity**

In recognition of the role that wildlife plays in the sustainable development of the country's economy, the Government of Botswana continues to improve its capacity to administer and effectively protect wildlife habitats. Furthermore, the capability for effective conservation of the wildlife resource will also be enhanced. In order to derive optimal economic benefit from the wildlife resource, Government encourages and promotes its sustainable utilisation by the private sector and local communities. Botswana is a signatory to several conventions, which advocate sustainable use of renewal natural resources. An example is the Convention on International Trade in Endangered Species (CITES) of Wild Flora and Fauna that is enforced through Wildlife Conservation and National Parks Act of 1992.

2.3 **Forestry**

The Ministry of Agriculture is drafting a Forestry policy which aims, inter alia, for the:

- Development of sustainable forest management options based on sound ecological principles that recognise the varied functions of forest systems which range from provision of grazing for wildlife and livestock, fuel wood, water catchment, resources for biological diversity and sources of food (honey, fruits) and medicinal plants;

- Domestication and commercialisation of forest products such as fruits and medicines to increase food production and the likelihood of processing and increasing household food security; and

- Restore degraded land using afforestation and plantations to make land re-usable

2.4 **Plant Genetic Resources**

In Botswana there is widespread replacement of diverse varieties by homogeneous modern cultivars resulting in genetic vulnerability. Major crops such as sorghum, maize, millet and cowpeas form major staple foods and genetic diversity within these crops is important for their sustainable production. The government through the Ministry of Agriculture is developing the capacity of various institutions concerned with agro-biodiversity. The specific objectives of these institutions are:

- To collect endemic and indigenous plants with a possible national evolutionary history which are cultivated or used, or with potential for cultivation or use; as well as the wild species.
- To conserve and maintain the diversity of the plant genetic resources material through in-situ and ex-situ conservation,
- To rejuvenate, multiply, characterise, evaluate and document the plant genetic resources material collected.
- To work in close collaboration with national plant breeders and agronomists for the effective utilisation of the plant genetic resources material.

2.5 **Indigenous Livestock Species**

The main objectives of the project to conserve indigenous livestock species is to achieve food security and to ensure the future supply of animal products and animal biodiversity. The specific objectives are:

- Ensure the efficient and sustainable use, effective management and conservation of natural resources;
- Maintain and maximise the use of animal genetic resources, with special emphasis on indigenous livestock.
- Base the use of animal genetic resources on informed understanding of the merits of available genotypes within the country; and
- Create capacity and capability in the management and use of indigenous livestock.

These national objectives are consistent with the mission statement of the Livestock Sector of SADC which state that the aim is to; "promote a common sustainable regional approval *to* livestock *production,* animal disease *control* strategies, *manpower development strategies, and livestock products ufilisafion in order to create employment, improve the living standard of the people of the SADC region and meet the food security objectives";* the strategy for the Livestock Production and Animal Disease Control sector, revised in 1995 which Botswana co-ordinates, whose objective is; *"to improve stock breeds and breeding methods with emphasis on indigenous livestock"*.

These objectives are encompassed in the project on Conservation of Indigenous Livestock Species being executed by the Botswana Ministry of Agriculture and funded to the sum of P2.5 million. These same objectives are strengthened by a regional project on The Management of Farm Animal Genetic Resources in the

SADC region funded by UNDP for US $2.5 million

CHAPTER THREE

3.0 BACKGROUND

3.1 Major Ecosystems Types in Botswana

Due to the predominance of the Kalahari sands and the narrow climatic range, relatively few vegetation and wildlife habitats exist naturally. Although ecosystems are low in biomes, several unique habitats occur in the Okavango Delta and the sodic pans of the Makgadikgadi. The major ecosystem types are identified in Table 3.1.

3.1 .1 Flora

There are between 2600 and 2800 species of flora in Botswana (World Conservation Monitoring Centre 1991). The level of floral endemism in the country has been described as low, ranging from virtually non-existent to 17 species. The richest floral areas are found in the northern part of the country, particularly within the Okavango and Chobe river systems.

The major vegetation zones descibed below are based on the vegetation map compiled by Bekker and de Wit (1991).

Sandveld
Aeolian sand deposits cover more than two-thirds of Botswana's land surface. *Terminalia sericea* and *Lonchocarpus nelsii* or *Acacia erioloba* are the most common vegetation associations found in the sandveld. Other species associated with the sandveld include . *Acacia luederitzii*, *Boscia albitrunca*, *Bauhinia petersiana* and *Baphia massaiensis* and *Acacia haematoxylon*. The latter is only found in the southwest of the country. Grass species which occur in the sandveld include *Schmidtia kalahariensis*, *Aristida spp., Eragrostis spp.,* and *Anthepora spp.*

Hardveld
The eastern hardveld has a far greater diversity of vegetation types than the sandveld due to a greater range of parent material, soils and climate. The vegetation associations most frequently observed in this region include *Peltophorum africanum*, Acacia *tortilis*, A. *nigrescens and Combretum apiculatum.* Further to the north, *Colophospermum mopane* features strongly to the extent that pure stands are not uncommon.

Table 3.1 Major ecosystem types in Botswana

Ecosystem Number	Ecosystem type	Geographical region
1	Arid shrub savanna	Extreme south-west
2	Kalahari bush savanna	Southwest
3	Northern Kalahari tree and bushsavanna	Midwest, Okwa/Quoxo valley, mideast, Letiahau, hainaveld, northwest Ghanzi, Midnorth
4	Mixed Bushveld	South east
5	Mopane tree and Bush savanna	Eastern hardveld Northeast Northwest Midnorth
6	Fringing pan grassland	Makgadikgadi system and Nxai Pan area
7	*Brachystegia* woodlands (miombo)	Northeast
8	Ngamiland tree savanna	Northwest
9	Seasonal swamp grasslands	Northwest, Mababe, Kwando, Linyanti,Okavango
10	Wetlands/Riparian swamp	Okavango, Chobe, Linyanti, Zambezi, Limpopo, permanent and seasonal swamps, Makgadikgadi Pans (wet)
11	Aquatic	Permanent and seasonal waterways
12	Pans	Makgadikgadi Pans (dry)

Source: Hannah et al (1988)

Chobe

The southern most extension of the *Brachystegia* woodlands are found in this region. The vegetation in this region is transitional between the southern Kalahari savanna and the miombo woodland to the north. Important tree species most frequently associated with this region include *Baikiaea plurijuga*, *Pterocarpus angolensis, Guibourtia coteosperma, Amblygonocarpus andongensis, Julbernardia globiflora* and *Isoberlinia spp.*

Okavango Delta

The Okavango Delta is a very complex ecosystem with a diversity of vegetation species of an aquatic and terrestrial nature. The delta is made up of swamp, islands and floodplains each with its own distinctive vegetation. The most common species associated with the swamps include *Cyperus spp., Phragmites australis* among other aquatic species. Woody vegetation most associated with the delta include *Phoenix reclinata*, *Hyphaene petersiana, Ficus sycomorus, Combretum imberbe* and *Syzygium cordatum* on the islands. Grasses and sedgelands dominate the floodplains.

Makgadikgadi Pans

The Makgadikgadi comprises two major pans and their associated open grasslands. The grasslands are comprised of *Aristida spp., Heteropogon contortus* and the halophytic species Odyssea *paucinetvis.* Islands of *Hyphaene petersiana* and isolated clumps of *Adansonia digitata* (baobab) also occur.

3.1.2 Wildlife

The wide range of habitats, from the arid dunes of the south-west to the permanent swamps of the Okavango is reflected in a great diversity of animal species (Table 3.2).

Table 3.2 Species numbers of selected fauna occurring in different ecosystem types

Ecosystem type	Number of species		
	Mammals	Birds	Amphibians and Reptiles
Arid Shrub Savanna	45	153	53
Kalahari Bush Savanna	52	1179	52
Northern Kalahari Tree and Bush savanna	67	214	70
Mixed Bushveld	74	287	76
Mopane Tree and Bush Savanna	81	289	80
Frinaina Pan Grassland	54	1195	23
Brachystigea Woodland	74	244	48
Ngamiland Tree savanna	67	254	51
Seasonal Swamp Grasslands	92	284	38
Wetlands/Riparian Vegetation	107	457	77
Aquatic	4	55	23

Source: Smithers (1971); Tyler (1997) pers comm; Auerbach (1987)

3.1.2.1 Mammalian Fauna

The number of mammalian taxa that occur in Botswana stands at 162, including 39 taxa of hoofed mammals (Perissodactyla and Artiodactyla), 38 taxa of carnivores and 7 taxa of primates. Most large mammals are found in the 'western part of the country with a greater diversity occurring in the north-west. Mammalian numbers in the eastern part of the country have declined as a result of displacement by human settlement and its associated activities.

There are 26 species of mammals that are protected under the Wildlife Conservation and National Parks Act of 1992. Five of these species of mammals are considered globally threatened. These are:

Wild dog	*Lycaon pictus*
Black rhinoceros	*Diceros bicornis*
Square-lipped rhinoceros	*Ceratothetium simum*
Brown hyaena	*Hyaena brunnea*
Cheetah	*Acinonyx jubatus*

3.1.2.2 Avifauna

There are 496 main species of birds occurring in Botswana that are represented by 285 non-passerine and 211 passerine species from 47 and 25 families respectively. Although none of these birds are endemic to Botswana, 64 species are found only in Southern Africa. Twenty percent of the avifauna is composed of migrants from the Paleartic and other African countries. In addition, approximately 65 species of rare visitors and rarely observed birds have been identified in Botswana. There are 21 protected species of birds in Botswana six of which are considered globally threatened:

Wattled Crane	*Grus carunculata*
Cape Vulture	*Gyps coprotheres*
Peregrine Falcon	Falco *peregrinus*
Black-cheeked Lovebird	*Agapornis nigrigenis*
Slaty egret	*Egretta vinaceigula*
Lesser kestrel	*Falco naumanni*

3.1.2.3 Herpetofauna

Botswana is the centre of a major transition zone although the arid conditions militate against the abundance of species. An analysis of the distribution of herpetofauna of Botswana reveals interesting associations to the physical nature of

the country.

Of the 38 species of amphibians recorded in Botswana, 35 have been classified in the Serowe Snake and Insect collection. The distribution of amphibians is largely determined by the presence of water and some species are restricted to specific river systems only. Species diversity tends to be very low in arid areas such as the Kalahari desert.

About 160 species of reptiles have been recorded in Botswana, 67 of which have been classified in the Serowe Snake and Insect Collection. They are found in a very wide range of habitat types and as such are widely distributed. In Botswana only the python (*Python sebae)* is protected.

3.1.2.4 Ichthyofauna

The Okavango River has the greatest species diversity of fish within the river systems of Botswana. There are about 80 species from 10 different families compared with approximately 28 species which occur in the Chobe-Linyanti River system. A lot of work remains to be done in the wetlands and artificial water bodies that occur in Botswana on aspects of species and habitat interactions.

There is great potential for production of inland fisheries with an estimated production of 10 000 tonnes per year. However, losses are high, at between 2030% due to poor processing technologies, transport and storage. An initiative implemented by the FAO is the Aquaculture for Local Community Development which co-ordinates fisheries and small water bodies sectoral projects, and provision of documentation and information services. The project targets smallholder farmers and small water bodies fisheries including aquaculture, and strengthening of local institutions.

3.1.2.5 Invertebrate Fauna

The invertebrate fauna of Botswana has received very little attention to date. Between 1000 and 1500 species have been classified although it is believed that more than 10 000 species actually exist in Botswana. The main source of information available on the insect fauna is the Serowe Snake and Insect Collection. The following number of insect species have been identified in Table 3.3:

A survey yielded 162 species of spiders (Eagle, 1985).

Table 3.3 Insect species identified to date in Botswana

Order/Family	Common Name	Number of species
Acrididae	Grasshoppers	159
Lepidoptera	Butterflies	240
Myrrneleontidae	Antlion	62
Anthicidae	Beetles	65
Dytiscidae	Water beetles	117
Coccinellidae	Ladybird Beetles	32
Pleidae	Water Bugs	2
Scarabidae (Cetoniini)	Dung Beetles	55
Odonata	Dragon Flies	64

Source: Serowe Snake and insect Collection

3.2 Assessment of the legal and policy framework

3.2.1 The Legal and Policy Framework

Botswana has identified a number of measures set out in the Convention which are of present relevance in the conservation and sustainable use of biological diversity. These measures include the following:

i. Conservation of biological diversity;

ii. Cooperation at regional and international levels in the conservation and sustainable use of biodiversity;

iii. Identification and Monitoring;

iv. *In Situ* Conservation;

v. *Ex Situ* Conservation:

vi. Public Education and Awareness;

vii. Impact Assessment and Minimising Adverse Impacts;

viii. Access to Genetic Resources;

ix. Access to and Transfer of Technology;

x. Handling of Biotechnology and Distribution of its Benefits.

3.2.1 .1. Conservation of Biological Diversity

National legislation, as well as policy instruments having a bearing on the environment have been implemented in Botswana since 1966. Legislation for the purposes of conserving and regulating the use of natural resources is discussed below.

The Wildlife Conservation and National Parks Act, 1992

The National Parks Act and the Fauna Conservation Act were consolidated into a single statute to become the Wildlife Conservation and National Parks Act. The Act, in conjunction with the Wildlife Conservation Policy of 1986, the National Conservation Strategy and the Tourism Policy of 1990 provide the base for a comprehensive wildlife conservation programme.

The Wildlife Conservation and National Parks Act provides for the conservation and management of Botswana's wildlife resources and for the national enforcement of

CITES and any other international convention for the protection of fauna and flora to which Botswana is a party. The Act further provides for the establishment, control and management of national parks and game reserves.

Plant Diseases and Pests Act, 1959
The Act provides for the prevention of the introduction into and the spread of plant diseases and plant pests within Botswana.

The Forest Act, 1968
This Act provides for the regulation and protection of forests and forest produce in Botswana. Of particular relevance is the designation of forest reserves on State Land where certain activities are prohibited such as the felling, cutting and burning of trees. The Act also provides for the protective designation for any tree or type of tree.

Aquatic Weeds (Control), 1971
The Act provides for the control of aquatic weeds. It lists aquatic weeds, identifies location of infestation and prohibits their importance and movement.

Agricultural Resources Conservation Act, 1974
The purposes of this Act is to provide for conservation and improvement of agricultural resources. These include the soils, waters, the plant life and vegetation and their products therefrom, the animal life in all their classifications, the fauna, and, such other things of similar nature of Botswana. The Act further provides for the legislating of laws in order to effect conservation and improvement of the agricultural resources.

In addition, the National Policy on Agricultural Development, 1991, facilitates agricultural diversification and development through research, training, extension and provision of infrastructure while protecting the environment. In order to combat the adverse effects brought about by the development of the livestock industry such as overgrazing and overstocking, the Tribal Grazing Land Policy of 1984 creates commercial leasehold ranches. The commercial leasehold ranches aim to protect rangeland from poor management.

Diseases of Animals Act, 1977
Provision is made to prevent and control diseases affecting animals, regulate the import, export, movement and quarantine of animals.

Herbage Preservation (Prevention of Fires) Act, 1978
This Act is for the prevention and control of bush and other fires.

The Fish Protection Act, 1976
The Act provides for the conservation and sustainable exploitation of fish.

Seed Certification Act, 1976
The Act provides for the better provision for the testing, and for the control of the

sale, export and use of seeds.

The Water Act, 1968
This Act defines water use rights, including water servitudes. Proposal for amendment of the Act to include more strict pollution controls and penalties, provision for polluter pays principle and control of waste discharges.

3.2.1.2. Ecosystem monitoring and management

Monitoring within wildlife management areas is done for the purposes of evaluating whether specific habitats can adequately sustain wildlife species. Where eco-systems are under threat, measures are taken to minimise the adverse effects.

The Wildlife Conservation Policy, 1986, further identifies wildlife resources as Botswana's heritage, potential economic value and the need for their sustainable management. The economic value of the willdife resources is further emphasised in the Tourism Policy of 1990.

3.2.1.3 In Situ Conservation

The Wildlife Conservation and National Parks Act provides for in *situ* conservation by requiring the establishment of national parks, game reserves and sanctuaries. Hunting in the protected areas is subject to a licensing and quota system as provided for by the Act. Flora is monitored as per the provisions of the Act and controls are in place in relation to harvesting of such flora.

3.2.1.4. Ex Situ Conservation

Ex situ conservation of flora outside protected areas is regulated by a policy set up under the NDP6 with the objective to conserve the natural resource base. *Ex* situ conservation on domesticated livestock is carried out on a small scale under the same policy.

3.2.1.5.Public Education and Awareness

The Agricultural Resources Act provides for regulations to be made for public education and awareness. The Ministry of Agriculture provides for the publication and dissemination of information relating to the protection and use of the resources covered by the Act.

3.2.1.6. Impact Assessment and Minimising Adverse Effects

Environmental impact assessment has been carried out as a matter of practice without enjoying legal backing. However presently, environmental impact assessment legislation is in the process of being drafted after a need to make it a legal requirement was identified. This legislation will infer *alia* provide for assessment of developmental effects on the human and biophysical environments.

3.2.1.7. Access to Genetic Resources

Access to wildlife resources and wildlife products is regulated under the Wildlife Conservation and National Parks Act. The Act covers access to wildlife found within protected areas and classified according to the provisions of CITES within the Act. There is no legislation providing for access to resources outside protected areas.

3.2.1.8 **Access to and Transfer of Technology**

This is not provided for by legislation.

3.2.1.9. Handling of Biotechnology and Distribution of its Benefits

The Seeds Certification Act provides for the establishment of a committee comprising of all stakeholders to handle the importation and exportation of seeds. The Act does not address the issue of biotechnolgy.

3.2.2. Regional and International Cooperation

Botswana has sought international cooperation by being party to a number of international instruments having a significant bearing on the conservation of biological resources. These instruments include the following:

Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar 1971).

This was ratified by Botswana in 1996. Its objectives are to stem the

progressive encroachment on and loss of wetlands now and in the future, recognising the fundamental ecological functions of wetlands and their cultural, economic, scientific and recreational value. Currently The Okavango River System has been proposed for listing as a Ramsar Site of international importance.

- **Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES 1973).** Acceded to in 1997 and enforced nationally by the Wildlife Conservation and National Parks Act with the aim of protecting certain endangered species from over exploitation.

- **Vienna Convention for the Protection of the Ozone Layer, 1985.**
  This was acceded to in 1991. This convention seeks to protect human health and the environment against adverse effects resulting from the modification of the ozone layer.

- **Montreal Protocol on Substances that Deplete the Ozone Layer, 1987,**
  The objective being to protect the ozone layer by taking precautionary measures to control global emissions of depleting substances. Botswana ratified this convention in 1991.

- **United Nations Framework Convention on Climate Changes, 1992.**
  Acceded to in 1992 by Botswana. .The objectives are to regulate levels of greenhouse gas concentrate in the atmosphere in order to minimise the occurrence of climate change on a level that would impede sustainable economic development, or compromise food production.

- **United Nations Convention to Combat Desertification in those Countries experiencing Serious Drought and/or Desertification, Particularly Africa, 1994.**
  This was ratified in 1995.

- **The Base! Convention**
  Botswana is in the process of ratifying the Convention The purpose of the Convention is to control transboundary movement of hazardous waste and their disposal, and, to establish international mechanisms to control the treatment and disposal of hazardous wastes and such other waste subject to the Convention.

- **Agenda 21, 1992**
  Botswana participated in the UNCED process which resulted in Agenda 21. Agenda 21 provided a blueprint for addressing current global needs for the environment and challenges of the next century.

- **Agreement of the Action Plan for the Environmentally Sound Management of the Common Zambezi River System, 1987.**
  This was signed in 1987, its objectives are to coordinate the efforts of parties

in the sound management of the water resources and the environment of the Common Zambezi River System.

Botswana has also entered into regional agreements through SADC in her efforts to address the conservation and sustainable use of biological diversity.

An overall assessment of the legal framework indicates that a reasonably sufficient amount of legislation pertaining to the conservation and sustainable use of biological diversity is available in Botswana. However for the proper implementation of the law to be achieved there is need to address coordination by the different government institutions and departments. Furthermore, institutional capacity to effectively enforce the law needs to be enhanced.

The legal and policy framework fails to address the issues of access to genetic resources, related issues of intellectual property of those resources; the handling of biotechnology and related issues of biosafety; and the issue of access and transfer of technology.

3.3 **Assessment of institutional responsibility and capacity**

3.3.1 Department of Wildlife and National Parks

The Department of Wildlife and National Parks (DWNP) has been charged with the responsibility of facilitating the development, management and protection of Botswana's wildlife and scenic resources as national assets. DWNP endeavours to conserve natural habitats and wildlife in protected areas by minimal interference and adaptive management. The Department also encourages the sustainable utilisation of wildlife resources outside protected areas by local communities and the private sector. In order to ensure that the management and utilisation of wildlife resources is based on scientific principles, DWNP undertakes with the assistance of other institutions in Botswana and internationally, continuous research into many aspects of wildlife management. It is also the responsibility of DWNP to raise public awareness and appreciation of Botswana's wildlife resources. The Department also enforces all legislation relating to wildlife resources.

A major constraint in DWNP is the shortage of adequately trained staff particularly at management level. This has hampered the department from effectively carrying out its mandate. In order to improve the capacity of DWNP to attain agreed objectives for wildlife management in Botswana, an institutional strengthening programme has been instituted and the process has already begun to bear fruit. Plans are in place to reduce the problem of lack of senior staff by training manpower at PhD level over the next five years.

The Department of Wildlife and National Parks does not have sufficient research personnel to reach the goals of its Strategic Research Policy. Researchers from other institutions within and outside Botswana are encouraged to conduct research

on various aspects of wildlife management, provided that their research is in line with the Strategic Research Policy.

The responsibility for research generally rests with Government Ministries and Departments. In many instances, these offices do not have the capacity to carry out the research due to a shortage of qualified personnel and facilities. Research efforts are therefore often supported and carried out by parastatals, NGOs and private researchers.

3.3.2 **Department of National Museum, Monuments and Art Gallery**

The Natural History Division of the National Museum, Monuments and Art Gallery has a responsibility to assist in safe-guarding Biological diversity through:

a) Collection and recording
b) Preservation and storage
c) Research and identification
d) Creation and management of in-situ natural history monuments
e) Education and promotion of awareness about Botswana's biological heritage, based on ex-situ facilities and collections.

A number of constraints have been identified in many areas. There is a severe shortage of staff in all specialised fields and existing staff do not have sufficient academic training and experience in taxonomic research or on biodiversity issues. The documentation of existing collections is incomplete. Collection of new specimen is hampered both by staff constraints and by a lack of funds for field trips as well as a lack of proper equipment for field work.

3.3.3 **Department of Water Affairs**

The Department of Water Affairs (DWA) is responsible for the development and management of all water resources in the country. This achieved through the Aquatic Vegetation Control Unit and the Water Quality and Pollution Control Unit.

The DWA through the Aquatic Vegetation Control Unit is charged with the responsibility of monitoring, controlling and protection of Botswana's water resources from aquatic weed infestation. The Boat Importation Regulation prohibits the importation of boats and fishing equipment to Botswana without a permit. This includes all forms of water transportation; outboard and inboard motor etc. The country is divided into six boat control zones for the purpose of controlling boat movement and registration.

The Water Quality and Pollution Control unit is responsible for monitoring the quality of water for both human and livestock watering. In addition to this, the unit also monitors water pollution with the aim of monitoring water resources from

polluting activities. The unit also controls the siting of industrial developments to ensure that waste generation from such facilities would not have a negative impact on the environment particularly on water resources. The Department of Water Affairs is the secretariat of the Water Apportionment Board which is a quasi-judicial body with powers to allocate water rights and waste effluents discharge permits.

3.3.4 **Ministry of Agriculture**

Botswana's agricultural development policy responds positively to the various circumstances involving an inherently poor natural resource base (soil and water) and high human growth rate. The Ministry of Agriculture is responsible for increased food production, food security and management technologies that must be developed with environmental concerns and conservation of natural resources in mind. One of the major objectives of the Ministry of Agriculture is the conservation of agricultural and land resources for future generations.

Different departments working on biodiversity include Agricultural Research, Crop Production and Forestry, Animal Health and Production, and Agricultural Resources Board.

3.4 **Status of national in-situ and ex-situ conservation facilities**

3.4.1 In-situ Resources

3.4.1.1 National Parks and Game Reserves

Botswana has set aside over 17% of her land area as National Parks and Game Reserves. An additional 22% of the country has been zoned as Wildlife Management Areas (WMAs) which have been earmarked for wildlife utilisation as the primary form of land use. The protected area system covers all ecosystem types represented in Botswana (see Figure 3.1).

Figure 3.1 Protected Areas in Botswana

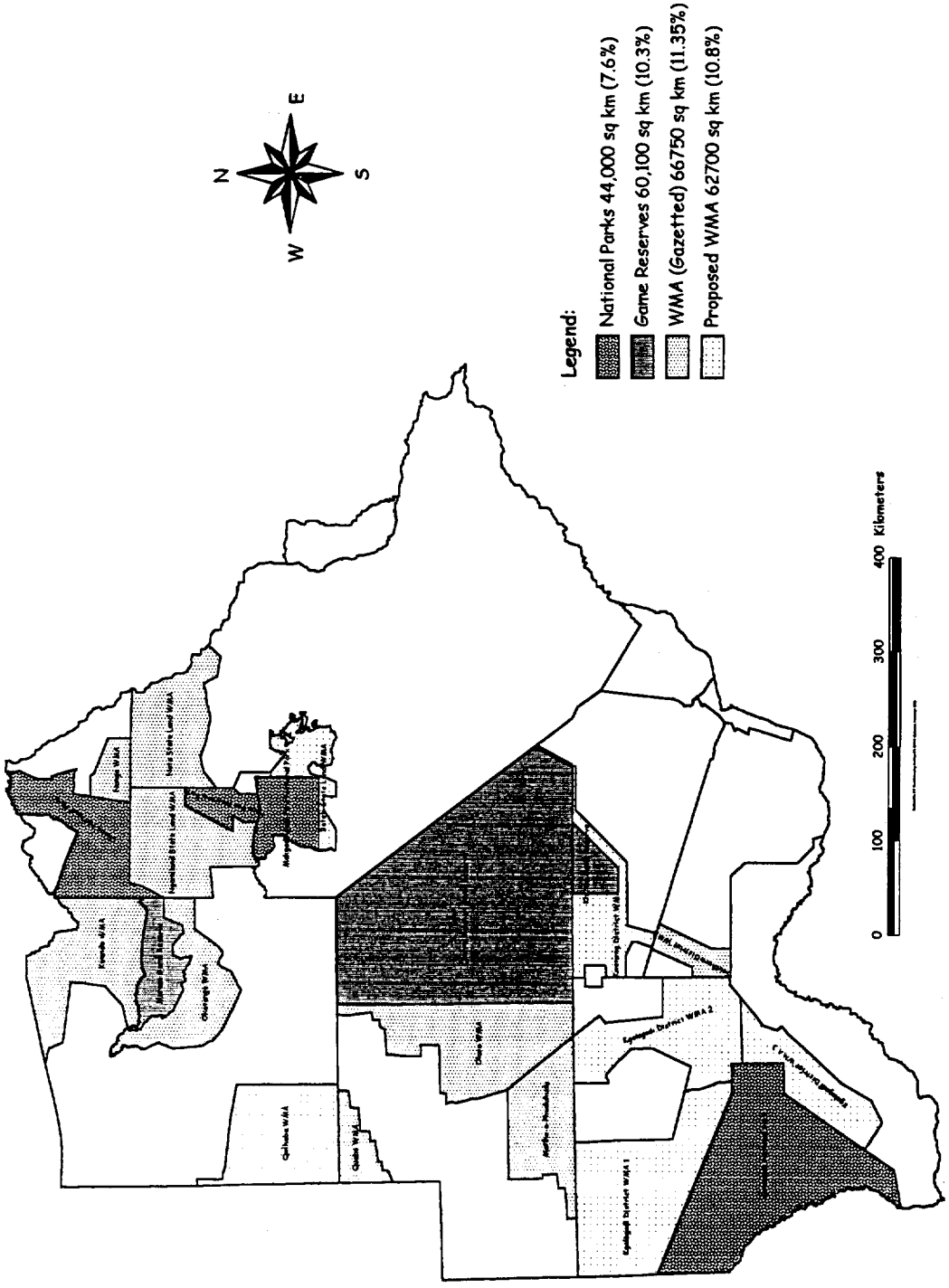

Table 3.4 National Parks and Game Reserves

Protected area	Size (Sq.km)	Ecosystems protected	Purpose
Chobe National Park	10 500	*Brachystegia* Woodland (miombo), riparian vegetation, alluvial floodplain, mopane forest	Ecosystem conservation
Gemsbok National Park	28 000	Arid shrub savanna, Kalahari bush savanna, fossil rivers and pans	Ecosystem conservation
Makgadikgadi Pans and Nxai Pan National Park	7 400	Fossil lakebed, pan grassland, northern Kalahari tree and bush savanna	Ecosystem conservation
Moremi Game Reserve	4 800	Okavango Delta, floodplain, riparian vegetation	Ecosystem conservation
Central Kalahari Game Reserve	52 800	Kalahari bush savanna, northern Kalahari tree and bush savanna	Ecosystem conservation
Khutse Game Reserve	2 500	Kalahari bush savanna, fossil rivers and pans	Ecosystem conservation
Mannyelanong Game Reserve	3	Rocky hill closed tree woodland	Ecosystem conservation and Cape Vulture breeding site
Gaborone Game Reserve	5	Mixed bushveld	Educational Species management
Maun Wildlife Educational Park	3	Ngamiland tree savanna, riparian vegetation	Educational
Nnywane Dam Game Reserve	Na'	Artificial wetland	Bird sanctuary
Francistown Game Reserve (proposed)	10	Mixed bushveld	Educational

[1]Not available

Table 3.5 Private Game Reserves and Community Sanctuaries

Protected area	Size (Sq.km)	Ecosystems protected	Purpose
Khama Rhino Sanctuary	4.5	Mixed bushveld	Species management (white rhino)
Mokolodi Nature Reserve	4	Mixed bushveld	Educational, recreational
Mashatu Game Reserve	450	Mixed bushveld, riparian woodland, mopane woodland	Ecosystem conservation, recreation
Jwaneng Game Park	22	Kalahari bushveld savanna	Ecosystem conservation
Nata Sanctuary	310	Pan, fossil lakebed	Bird sanctuary
Orapa Game Park	8.5	Mixed bushveld	Ecosystem conservation

3.4.1.2 Wildlife Management Areas

Significant wildlife populations occur outside protected areas. It has been recognised by government that sustainable consumptive and non-consumptive wildlife utilisation in areas deemed marginal for agriculture may well yield an economic return greater than more conventional activities including agriculture. Additionally, the establishment of Wildlife Management Areas (WMAs) allows for long term conservation of game populations by providing extended habitats for wildlife. Not all proposed WMAs have been gazetted, particularly those in the south-western part of Botswana. Just over half of the land area set aside as WMAs have been gazetted to date (Figure 3.1).

3.4.1.3 Forest Reserves

Past efforts to conserve forestry resources included the gazettement of 1% of the country. Some indigenous trees have been protected which include certain timber species such as *Pterocarpus angolensis, Baikiaea plurijuga* and *Guibourtia coleosperma*.

3.4.1.4 Natural History Monuments

The following list gives the names of the Natural History Monuments that have been identified to date. These sites have been approved by tribal and local authorities, however, these have yet to be gazetted.

Table 3.6 Natural History Monument identified as of 1997

Name of Monument	Category	Remarks
Gcwihaba	Geology/Cave system	Historic cave that needs stronger protection as too many tourists have affected negatively
!Wadum	Geology/Cave system	Intricate formations, initially to secure for research
Bone Cave	Geology/Cave system	Rich fossil deposits, initially for research purposes but might eventually be for limited accompanied tour groups
Blue Cave	Geology/Cave system	Part of the cave systems development in the area, might attract some accompanied tour groups
Tsodilo Hills	Geology, Botany and Zoology/Geological formations	Part of the Museum's effort to ensure the protection of this very historically important site which is scenically beautiful and also has a lot of interesting plant and animal life
Mowana Prison Tree	Botany/Historic Tree	Trunk historically used as a prison cell
Xanikag Fossil Animal Prints	Geology/Fossil footprints	To preserve the pan deposits with the prints so that cattle and people to not erase the prints
Nxazini Fossil Pan Deposits	Geology/Fossil bones and stone tools	Protection of area so that people should not take away Fossils and artefacts
Unikae Water Spring	Geology/Natural perennial spring	Protection of water source and surrounding area
Mosu Water spring	Geology/Natural perennial spring	Protection of water source and surrounding area. Beautiful scenic views of Makgadikgadi Pans from above the springs
Mmakagama spring	, Geology/Natural perennial spring	Protection of water source and surrounding area. Beautiful scenic views of Makgadikgadi Pans from above the springs
Mazilibgwa's Mowana	Botany/Huge baobab tree	Ensure that this very big tree is protected. No one has engraver anything on this tree
Green's Gutsaa Baobab	Botany/Historic huge baobab	Ensure that the tree is not harmed
Baine's baobabs	Botany/Historic huge baobab	Ensure that trees are not harmed

Table 3.6 Continued

Lekhubu Island	Geology and Botany/Impressive and scenic landscape	To ensure that the natural features of this island in the middle of Makgadikgadi Pans are conserved and are not unsustainably utilised by tourists
Sowa Marula	Botany/Stand of marula trees	Ensure the trees are not harmed as the town grows
Maitengwe Mopane Forest Reserve	Botany/Different stands of all trees along the river	Secure this area as an in-situ area for protection of and research on vegetation
Marula-Mantsi Tree Trail	Botany/Morula trees	Secure this forest of wild fruit trees, as there are commercial projects initiated for the harvesting of morula fruit. This is in-situ reserve will act as a study area
Moremi Gorge	Geology/Botany and Zoology/Natural Perennial spring and fascinating vegetation and Cape vultures	Protect the area as an entity but still encourage regulated tourism development within the local community
Lecha Water spring	Geology/Natural perennial spring	Protection of water source and surrounding area
Makosho trees	Botany/Stand of tall trees	A very impressive stand of all Acacia albida trees on a fossil riverbed in the middle of the village. Need protection so that the village development does not affect the trees and to allow regrowth
Malaka springs	Geology/Natural perennial spring	Protection of water source and surrounding area
Sokwe Forest Reserve	Botany Area rich in botanic diversity	Protection of botanic diversity
Mahalapye Baobab	Botany/Most southern wild baobab in Botswana	To protect this southernmost baobab from harm due to development in the village
Lobatse Caves	Geology/Cave system	Cave system on a private farm, protection so that any tourism development does not destroy the scientific value of the caves
Molepolole Aloe Forest Reserve	Botany/Aloe forest	Protection of this attractive forest of Aloe marlothii
Mamuno Aloe Forest Reserve	Botany/Aloe forest	Protection of this attractive forest of Aloe marlothii
Mamuno Worm Casts	Geology/Fossil traces of very old life forms	Protection of fossil sedimentary structures showing the movement of worms on soft sediments some 800 million years ago

Source: National Museum, Monuments and Art Gallery

3.4.2 Ex-Situ Resources

Ex-situ facilities are very few and developments have recently begun to address this.

3.4.2.1 Zoos, Natural History Collections, Herbaria and Arboreta

There is one private zoo in Botswana located in Francistown. Wildlife species, which occur in Southern Africa, are wall represented in zoos around the world, although distribution and species lists are not available.

There are four herbaria in Botswana. The National Herbarium is part of the Natural History Collections of the National Museum in Gaborone. The collection now stands at close to 15 000 specimens. The other herbaria are the University of Botswana (Gaborone) with about 10 000 specimens, Peter Smith Herbarium at the Okavango Research Centre (Maun) with about 6000 specimens and the Agricultural Research Herbarium (Sebele) with about 2000 specimens.

A number of specimens have been collected by institutions from outside Botswana, although the extent of the collections deposited with such institutions is unknown.

The Natural History Collections of Botswana are housed in the Natural History Centre of the National Museum in Gaborone. The table below shows the present size of these collections. The latest addition is a snake and insect collection. This collection consists of more than 10 000 insects, including more than 40 genera and species from Serowe in the central district. There are plans to construct custom built infrastructure for the national natural history collection as part of the Natural History Centre. The national working groups for SAFRINET (Invertebrate Zoology, fungi) as well as the one for SABONET (Botany) have welcomed these plans.

Table 3.7 Number of specimens in the different sections of the Natural History Collection of Botswana

Section	**No. of specimens in collection**	**Nature of collection**
Invertebrates (almost 100% entomology)	17500 4 500	Wet Pinned
Vertebrates		
Fish	1 100 6 species	Wet Live
Amphibians	100 1 species	Wet Live
Reptiles	440 6	Wet Mounted
Birds	65	Mounted
Mammals	75 80 55	Wet Studv skins Mounted
Geology (includes fossils)	500	
Botany (National Herbarium)	12 000	Dry, pressed
Additional collection:		
Forchhammer donation (still in Serowe)		
Invertebrates		
Molluscs	150	Shells
Entomology	12 000	Dry
Vertebrates		
Reptiles	95	wet

Source: National Museum, Monuments and Art Gallery

In addition to the central depository for natural history collections, there will be collections for specific research and teaching at other key institutions. Efforts will be made to ensure that duplicate specimens are deposited to at least one institution outside the Natural History Centre.

In addition to the collections held by the Natural History Centre there is a collection of insects at Botswana College of Agriculture in Sebele.

The National Botanical Garden, which falls under the jurisdiction of the National Museum, situated in Gaborone. Development is in its initial stages. Its 6.7 ha will be zoned to show all the major vegetation types of Botswana. There will also be displays of insects, fish, reptiles and birds.

The Gaborone City Council is considering the development of another botanical garden in Gaborone. The International Botanical Gardens Institute and the Institute of Botanical Gardens of South Africa have showed interest.

3.4.2.2 **National Plant Genetic Resources Centre**

In recognition of the importance of crop diversity to meet the challenges of food security and poverty alleviation, the Government of Botswana has established a National Plant Genetic Resources Centre (NPGRC) for the conservation of crop varieties and their wild relatives.

The PGRC has made considerable strides since its establishment in 1986. The key points of its achievements include the following:

- Extensive and diversified plant genetic resources collection of important and potential crops, indigenous plants and wild species that can be utilised.
- Production of 4 cowpea germplasm catalogues of characterised accessions, and dissemination of the information,
- Promotion of the use of plant genetic resources material by breeders and agronomists. For example, breeders in West Africa are using the local cowpea landrace (B301), which was found to be resistant to *Striga gesneroids*. Cowpeas landraces resistant to *Alectra vogilli* (molelwane) and *Aphis crassivora* (Nngadule) have also been identified and are now being incorporated into the local variety Blackeye.

3.4.2.3 **Indigenous livestock Species**

Conservation of a small number of livestock species takes place at strategic sites. Currently, there are: (a) two populations of cattle (300 breeding females each); two

populations of sheep (250 breeding females each); and two populations of goats (230 and 100 females each).These species are kept to generate baseline productivity information of the local livestock breeds.

3.5 Assessment of threats to biodiversity and its management

3.5.1 Fauna

3.51 .1 Mammals

The populations of many large mammals have been declining in the last twenty years. The reasons for these declines have yet to be thoroughly elucidated but a combination of factors have been labelled as possible contributory causes.

Habitat loss

Migratory wildlife species such as wildebeest, zebra and hartebeest have been denied excess to ancestral ranges by the proliferation of human settlements and associated activities such as livestock rearing and arable agriculture. Many wildlife species are unable to sustain themselves in areas where habitats have been degraded and have been displaced by livestock.

Drought

Wildlife has evolved specific adaptations to cope with conditions in an environment in which drought is a regular occurrence. Some wildlife species sustained great losses in the early 1980s drought. Unlike after previous droughts, the numbers of wildebeest and hartebeest have not recovered and have instead stabilised at a low level. It has been postulated that this is a direct result of loss of seasonal range and hunting pressure.

Habitat fragmentation

Veterinary cordon fences while contributing significantly in the control of livestock diseases have imposed artificial barriers to migratory wildlife movements between seasonal ranges. Botswana has functionally been divided into two distinct systems by veterinary cordon fences, the south-western and north-eastern system. The greatest impact has been on migratory species in the south-west such as wildebeest that cannot move to permanent water in the north during drought years.

Illegal offtake

Illegal offtake may be exceeding the ability of wildlife populations to sustain themselves. This effect is magnified in drought years when wildlife is forced to congregate around permanent water supplies making them more susceptible to poaching.

Increased elephant populations

The elephant population in Botswana is estimated at around 80 000 with 99% of these being concentrated in northern Botswana. The average estimate for the northern population is increasing at 6% per annum from natural increase and immigration. The effect of increased elephant populations has been the transformation of riparian fringe woodlands to grassland. Animals associated with woodlands such as the bushbuck (*Tragelaphus scriptus ornatus*) have been negatively impacted. There is the increasing danger that the elephant population will become vulnerable to mortality associated with poor nutrition and disease outbreaks. There is a greater likelihood of conflicts with humans as the elephant range expands.

3.5.1.2 Avifauna

Hunting

Gallinaceous birds are important species for hunting in Botswana. There is insufficient information as yet on the abundance to establish sustainable offtake levels.

Habitat loss

Insectivorous birds and raptors are negatively impacted by livestock overgrazing which tends to render primary production unavailable to insects and prey species.

3.5.1.3 Herpetofauna

Legislation relating to reptiles and amphibians is inadequate in Botswana according to Auerbach (1987). Eighty percent of reptile families are inadequately protected. Range studies have indicated that land tortoises are in a precarious position throughout their range and are worthy of immediate protection. Habitat destruction seems to pose the greatest threat to this species.

3.5.1.4 Ichthyofauna

Fisheries work started in the early 1960's. The work covered estimating species diversity and taxonomic studies; stock assessment in the water bodies mainly in the Okavango Delta; limnological studies and seasonal water changes; breeding and migration patterns of commercially important fish species, food cycles and available fish biomass and the physiology of certain species of fish as they are affected by water availability and quality. However, difficulties encountered in fisheries development in the Okavango Delta are the conflict between fishermen and safari

companies (tourism) due to absence of knowledge of user/s rights. The planned conservation project should be able to address this conflict.

The Ministry of Agriculture seriously pursues:

- Knowledge on the status and use of public water bodies and fish resources including stock assessment, biological potentials and sustainable harvesting methods;
- Socioeconomic understanding of the different users (tourists, traditional fishermen) and their interactions in order to develop policies and management plans; and
- Understanding the man-made environmental degradation processes like the increase in noxious weeds, loss of biological diversity and fluctuations in the ecosystems (low oxygen-holding capacity and reduced water flows).

3.5.1.5 **Livestock**

There are eight domestic animal species in Botswana. These species are cattle, sheep, goats, donkeys, horses, chickens, pigs and camels. Among these, the Botswana camel, less than 100 in 1994 statistics is listed in the world watch list for Domestic Animal Diversity, (FAO, 1995).

The importance of indigenous domestic animals in Botswana comes from their ability to withstand drought or disease challenges, their ability to convert poor forages into high quality human food and their role as locally available sources of fibre, draught power, meat, milk or other animal products to suite local commodities. Animal biodiversity sustain the many conditions and serve as reserve banks for small farmers, a hedge against economic instability and are a source of year-round employment for the many rural population. For these reasons, the farmers and the nation have a responsibility to ensure the sustainable utilisation of farm animal genetic resources.

The importation of exotic animals with their consequent crossbreeding is likely to lead to loss of many indigenous breeds. Strategies were worked out to address this important facet of conservation of biological diversity.

3.5.2 **Flora**

3.5.2.1 Forestry

Threat to forestry resources include:

Fuelwood Depletion
There is a continued depletion of wood resources both in terms of the commercial, harvest of forests and as the main source of domestic fuel. Wood harvesting has

been largely undertaken in an uncontrolled manner without ensuring sustainability of yields.

Fire

Intensity and frequency of wild fires, mainly human-induced, have increased in recent years. In the forest reserves there is an annual burning back of 55% of first year shoots of all species. Only a small proportion of shoots survive the fire season to develop into mature trees. This is particularly important for teak *(Baikiaea plurijuga)*.

Elephant Damage

Elephant populations within the forest reserves have increased greatly during the past decades and densities exceed 1 animal/l00 hectares increasing to 2-3 animals/l 00 hectares in the northern reserves. These densities are considered 5-10 times larger than the lower threshold for impacting woodlands. Approximately 18% of Mukwa (*Pterocarpus angolensis*) have been damaged by elephants and this can be as high as 50% in some areas.

Logging

Mukwa woodlands have been severely damaged by logging activities thus rendering the timber industry unsustainable. Logging has been suspended until regulatory mechanisms are put in place. Fire damage increases significantly in logging areas due burning of harvest residues. Clauses in the existing concessions to combat this are not enforced.

3.5.2.2 **Other Vegetation Types**

Overuse of Veld Products

The collection of veld products has largely been uncontrolled. Where there is commercial market for products, there are threats from over-exploitation of species (e.g. *Harpagophytum procumbens*).

Collection of Rare Species

Uncontrolled collection of plant species by private collectors and researchers threatens floral biodiversity.

Encroachment by Invasive Species

Degradation of habitats result from the encroachment by invasive species such as Acacia species on over-grazed rangelands. Furthermore, the introduction of exotic pecies such as the aquatic weed, *Salvinia molesta*, presently found in the Okavango Delta threatens aquatic biodiversity.

3.5.2.3 **Range Resources**

Soil erosion
This is one of the most important factors causing range degradation and can be caused by a variety of mechanisms such as overgrazing and fire. Wind and water removes soil from denuded areas leading to their impoverishment.

Veld Fires
Excessive uncontrolled burning leads to loss in productivity and biodiversity.

3.5.2.4 **Plant Genetic Resources**

The basic building blocks of any plant improvement programme are the plant genetic resources, which include indigenous material, primitive cultivars and wild species of the cultivated plants. These landraces are major sources of genetic material for crop improvement that are highly adapted to agricultural practices relying on low levels of cultivation, low soil fertility and semi-arid environmental fluctuations. They are genetically diverse, stable and are exploited for the differences in seed types and maturity.

Botswana is a centre of diversity for wild relatives of cultivated crop such as *Citrullus lunatus* (watermelon) and a wide range of *Cucumis species.* The wild subspecies of *Vigna,* cowpea are also native to Kalahari desert. Indigenous germplasm has shown a lot of potential as sources of economically important genes. For example our indigenous sorghum landraces are photo-period insensitive, making them adapted to many parts of the world.

Although formal conservation of crop plant diversity is a recent venture in this country, the use of plant germplasm in formal research dates back to the 1940's in an attempt to improve local varieties. With the increase in crop improvement activities, collection and conservation of the country's diverse gene pool of crop diversity is inevitable. Traditional agriculture serves as a natural repository for the diverse genes of landraces. In most communities in Botswana, small holder farmers (mostly women) select the best sorghum heads for seed production. Little recognition is given to these farmers who are themselves plant breeders as they spend the time and labour on observations and conservation. Worse still they do not hold any intellectual property rights. In view of the fast disappearance of this heritage, the only safe approach to provide a broad genetic base to satisfy future needs is to collect and maintain as much of the genetic diversity as possible for both cultivated and wild relatives.

Table 3.8: Plant Accessions held in the Botswana National Gene Bank

Crop Name	Number of Accessions
Mungbean - *Vigna radiata*	*25*
Cowpea - *Vigna unguiculata*	*1489*
Bambara Nuts - *Vigna subterrea*	*331*
Pearl Millet - *Pennisitium glaucum*	*57*
Sorghum - *Sorghum bicolor*	*310*
Maize - *Zea mays*	13
Groundnuts - *Arachis* hypogea	331
Cucurbita spp *Cucunis spp*	17 *15*
Citrullus lunatus	110
Gynandropsis gynandra *Cenchrus ciliaris* *Stipagrostis gressi Kres* *Momordia charatia*	*15* 100 *17* *1*
Cleome Monophylla	*1*
Cochorus spp	*10*
Amarunthus spp	*2*
Sesame spp Unknown	*7* 84

Source: Department of Agricultural Research

CHAPTER FOUR

4.0 Strategy/ Action Plan

Botswana does not yet have an approved national biodiversity strategy and action plan. Presently different sectors have their own projects outlining strategies and action plans addressing components of biodiversity.

4.1 Department of Wildlife and National Parks

The Department of Wildlife and National Parks has a multi-pronged strategy to achieve its policy objectives of improving its capability to conserve the wildlife resource and encouraging and promoting its sustainable utilisation by local communities and the private sector. DWNP realises that conservation and sustainable utilisation of the wildlife resource is dependent upon the result of scientific and objective research. In this regard, the Government through DWNP will continue to conduct research in the key areas identified in the Strategic Plan for Wildlife Research.

Areas of concern such as the management of the country's large elephant population and its habitat will continue to receive attention as set out in the Elephant Management Plan of 1990 which is currently undergoing review.

The national protected area system will continue to be managed to maintain and enhance biological diversity for their aesthetic and ecological value as well as to provide a reservoir of wildlife species for wildlife utilisation schemes in surrounding wildlife management areas. The current National Development Plan (NDP8), lays emphasis on the implementation of management plans for protected areas.

The Wildlife Conservation Policy of 1988 is the blue-print for the management and utilisation of the wildlife resources. Wildlife Management Areas which have not yet been gazetted will be afforded this status. Management plans will be implemented to encourage investment by the private sector and participation in wildlife utilisation by local communities. Revised Ostrich and Crocodile Management Plans have been drawn up to encourage and regulate the sustainable utilisation of these species.

The Government of Botswana, conscious of the need to involve all stakeholders in the management of the wildlife resource, has embarked upon a process of drawing up a comprehensive strategy for wildlife management as the country enters the new millennium.

4.2 Department of National Museum, Monuments and Art Gallery

The Natural History Division of the Museum has already begun to develop the National Botanical Garden. The plan that has been put forward for additional funding outlines the development of the garden to an ex-situ facility, to which plants and some animals can be studied in a concentrated area. The visitor will be able to get detailed information on the flora and fauna. Research projects relating to biodiversity and its management will be undertaken on species in the garden.

Another project outlined in NDP8 is the creation of a new History Centre in the Botanical Garden. The Centre should cater for research, documentation and storage of Botswana's existing and growing Natural History Collections. The aim is to collect and store specimens of all species existing in Botswana. It is to become the national reference collection for natural history which should serve the needs of other institutions working with issues related to biodiversity. The national working groups of both SABONET and SAFRINET, have stated that they would welcome the creation of such a Natural History Centre.

4.3 Ministry of Agriculture

4.3.1 Plant Genetic Resources

The agricultural development strategy is to concentrate on small-holders since they are the custodians of landraces, which provide an insurance for, continued evolution of crop plants for use in the agricultural development.

Conservation through seed storage (ex situ) is being applied for conservation of crops like sorghum, cowpeas, pearl millet and forage species. Other species such as sweet potatoes are conserved vegetatively in field genebanks. A fully operational genebank has been established at the Central Agricultural Research Station. The national genebank will continue to collect and preserve the wealth of local germplasm. The collections are used in the crop improvement programmes through breeding to develop cultivars that are tolerant to drought and disease stress.

In accordance with the National Agricultural Development Policy Objectives on plant diversification and conservation of natural resources, the NPGRC has adopted the following strategies:

- Collects germplasm from small-scale farmers since they usually keep landraces for seed for the next season. This provides insurance for continued conservation of crop plants.
- Ex-situ conservation of germplasm in the genebank. To date the genebank stores about 2400 accessions (Table 3.8) which include the following species: Zea mays, *Sorghum bicolor, Pennisetum, Vigna, Cucurbita, Cucumis, Citrullus, Amaranthus, Cleome, Cochorus, Sesame.*

- Promotion of the use of plant genetic resources material by breeders and agronomists. Breeders in West Africa are using the local cowpea landrace (B301), which was found to be resistant to Striga gesneroids. Cowpeas landraces resistant to *Alectra vogilli* (molelwane) and *Aphis crassivora* (Nngadule) have also been identified and are now being incorporated into the local variety Blackeye.
- Evaluation of the potential of indigenous under-utilised plants for potential use. Emphasis is currently on *Citrullus* and *Cucumis* species, which are recognised to originate in the Western region of Botswana. Some work is also being done on indigenous leaf vegetables such as *Amaranthus thunbergii* (Thepe), *Cleome gynandra* (Rothwe), *Cleome monophylla* (Rothwana), *Cochorus olitoruis* (Delele) and *Hermbstaedtia odorata* (Letl hogotshweu).

The constraints anticipated in implementing these strategies are mainly limitations due to manpower, their shortage and lack of experience working with indigenous plants since they are not commonly grown. However, training is an important component of this strategy.

4.3.2 **Indigenous Livestock Species**

Strategies were worked out to address this important facet of conservation of biological diversity by carrying out :-

- Population and breed surveys at national, district and farmer level;
- Conservation of a small number of livestock at strategic sites. Currently, there are: (a) two populations of cattle (300 breeding females each); and two populations of sheep (250 breeding females each), and two populations of goats (230 and 100 females each), kept at different agro-ecological sites;
- Preservation of germplasm which include storage of semen. Currently only cattle semen of various local and exotic breeds is in storage; and
- A national local point at the Ministry of Agriculture, Department of Agricultural Research, which will enable sustainable work related to animal genetic resources. The National Committee will draw expertise in health/veterinary/genetics and animal breeding, legal aspects, and trade in animal genetic materials, property rights and trade.

4.3.3 **Sustainable Forestry**

The Ministry of Agriculture is currently working on a National Forestry Policy, which defines basic principles and goals for conservation, development, management and sustainable utilisation of forestry resources to meet social economic and environmental needs. The policy intends to establish short and long-term goals and strategies to achieve the objectives and to ensure government commitment as well as co-operation between government, private sector, NGO's, civil society, individuals and other partners in development.

Forests, woodlands and trees contribute towards (i) the improvement of food security at the household and national levels since about 53% of the total energy consumption is generated from wood; (ii) meeting rural subsistence needs by providing construction material; (iii) generation of income through handicraft production, honey, fodder for livestock and wildlife and (iv) increasing agricultural productivity and conservation of the environment by protecting soil erosion, conserving wetlands and biological diversity as well as sequestration of carbon dioxide.

On an annual basis, there is a National Tree Planting Day carried out in various parts of the country where various communities plant over 100,000 trees. The various trees range from fruit trees (both indigenous and exotic), shade trees, soil reclamation species and ornamental trees.

Past efforts to conserve forestry resources included the gazettment of 1% of the country. Some indigenous trees have been protected which include some timber species such as Mukwa *(Pterocarpus angolensis),* Rhodesian teak *(Baikieae pluriguga)* and Tsaudi *(Guibourtia coleosperma)* and some fruit trees such as Baobab (*Adansonia digitata*, African ebony *(Diospyros mespiliformis*) and Mozinzila (*Berchemia discolor).*

CHAPTER FIVE

5.0 COLLABORATION AND PARTNERSHIP

5.1 Government Insitutions

5.1.1 Wildlife and National Parks

Regional networks, notably through the Southern African Development Community (SADC), have been created to enhance communication on common environmental issues. Information exchange on matters pertaining to wildlife takes place through the SADC Wildlife Technical Co-ordination Unit, which is based in Malawi. Botswana also has benefited from co-operation with international organisations such as IUCN and its related structures such as the IUCN African Elephant Support Group. Co-operation under the auspices of the Southern African Convention for Wildlife Management (formerly Southern African Centre for Ivory Management) has led to the downlisting of the African elephant to Appendix 2 at CITES Conference of Parties 10 held in Zimbabwe in 1997. The recent installation of Internet facilities in DWNP will considerably increase the scope for exchange of information with other institutions both locally and internationally.

5.1.3 National Museum, Monuments and Art Gallery

SAFRINET is a regional SADC program focusing on networking among institutions dealing with invertebrates and fungi. Initially, the main focus will be on pests although strengthening of institutional taxonomic capacity through training is part of the programme.

The main regional network for the strengthening of botanical institutions is SABONET. Ten SADC countries are part of this programme. It aims at capacity building of each country's botanical herbaria and botanical gardens. The major components are training and documentation of botanical collections.

5.1.4 Forestry

The Ministry of Agriculture, the Forestry Association of Botswana and several communities have carried out some work to address deforestation. A large number of trees have been tested in various regions of the country, and plantations have been established by the Ministry of Agriculture, and NGO's such as the Forestry Association of Botswana, Veld Products Research, Thusano Lefatsheng and/or communities.

5.1.5 Consewation of Plant Genetic Resources

The Botswana PGRC has good collaboration with both the National and International institutions. In recognition of the importance of collaboration and partnership within the country, a National Plant Genetic Resource Committee was established in which all the stakeholders in the country are represented. These include the Department of Agricultural Research, Department of Crop Production and Forestry, University of Botswana, National Institute of Research, Botswana College of Agriculture, Forestry Association of Botswana, Agricultural Resource Board, Veld Products Research, Thusano Lefatsheng and the National Museum, Monuments and Art Gallery. This committee is the national advisory body on issues relating to plant genetic resources and its also responsible for promoting public awareness on the benefits and importance of plant genetic resources within the country.

Botswana as a member of SADC and the FAO Commission on Genetic Resources participates in the on-going negotiations to bring the International Undertaking on Plant Genetic Resources in accordance with the Convention on Biological Diversity. It also maintains collaboration with SADC Plant Genetic Resource Programme based in Zambia, the International Plant Genetic Resource Institute (IPGRI) and the NORDIC genebank in Sweden in an attempt to arrest genetic erosion and conserve plant heritage.

5.1.6 Fisheries

Collaboration efforts on fisheries research and management have been made with various institutes and International agencies, among which are the J.L.B. Smith Institute of ichthyology (SA), FAO and NORAD. The Fisheries Section of the Ministry of Agriculture, ORC and the National Museum have begun collaboration on collection of specimen and related data. Fishermen and private researchers, are collecting baseline information on fisheries mainly in the Okavango Delta.

5.1.7 Indigenous Livestock Species

The National Advisory Committee has been formed which includes the Ministry of Agriculture livestock research and extension agents, farmer organisations, private farmers, the faculty of Agriculture, and the Botswana Agricultural Union. These collaborations are strengthened by a regional project on The Management of Farm Animal Genetic Resources in the SADC region funded by FAO/UNDP/SADC, which will further assist in training workshops for the national advisory committees.

5.2 Non-Governmental Organisations (NGOs) Collaboration and Partnership

The invaluable involvement of Non- Government Organisations (NGOs) in environmental conservation is a positive approach to the safeguarding of the biological diversity in Botswana. This collaboration is discussed below.

52.1 Kalahari Conservation Society (KCS)

KCS, a national NGO, has been and continues to be involved in a number of ongoing projects. These include:

- Cheetah Translocation Project funded by Debswana, Canada Fund and WUSC
- DWNP/KCS wildlife conference "Conservation and Management of Wildlife in Botswana – Strategies into the 21st Century" – sponsored by EU, DFID and USAID
- Community mobilisation project – funded by US Democracy and Human Rights Fund – USAID
- Conference on "Women and the Environment", together with Department of Women Affairs, Ministry of Labour and Home Affairs. Funded by NORAD.
- Newsletter Project – funded by NORAD
- Environmental Education Programme – Funded by Debswana
- KCS Billboard – environmental awareness project – Funded by the British High Commission
- Harry Oppenheimer Okavango Research Centre – fund-raising project – raised P4 million to date from DeBeers, Anglo American and Debswana
- Okavango Fish Parasite Project – together with University of the Orange Free State in South Africa – Funded by Debswana
- Okavango Liaison Group – project which brings together NGO's as an information distribution source for communities in the Okavango delta
- Environmental Education Association of Southern Africa (EEASA) Conference being hosted in Botswana in July 1998, KCS playing and integral role in the organisation through secondment of one of their staff to the organisation team at NCSCA
- Proposed power Line Project together with Endangered Wildlife Trust of South Africa to determine whether raptors in Botswana are adversely affected by power lines
- Proposed Northern Tuli Elephant Research Project
- Proposed Transfrontier Parks Botswana Team
- Proposed supply of water in the Central Kalahari Game Reserve for wildlife – together with DWNP
- Pre-feasibility and feasibility study of Moremi Gorge, Tswapong Hills, for the community

5.2.2 **Skill Share Africa**

Skill share Africa is funded by the ODA and provide assistance to volunteers for organisations such as Veld Products Research (VPR), Environmental Watch Botswana and also to government agencies.

5.2.3 Forestry Association of Botswana (FAB)

FAB have a number of ongoing projects funded by a variety of agencies and-donors. These project include:

- Tree Seed collection, Research and Documentation funded by Burrow and Binnie Botswana and Stanley Consultants
- Around-The-Home Tree Planting funded by Debswana Diamond Company
- Community Based Woodland Natural Management funded by SIDA and NORAD.
- Schools Programme funded by NORAD, Kalahari Management Service Trust and His Excellency the President Sir Ketumile Masire.
- Nursery Development
- Agroforestry Species Trial funded by European Community
- Organisation Administration funded by HIVOS to meet short falls in funding of other projects.

5.2.4 **Veld Products Research (VPR)**

VPR are involved in a number of projects relating to veld products. These projects include:

- Indigenous Fruit Tree Research Programme. This project is largely involved in domestication of fruit trees with economic potential. The major donors for this project are EU, DANCED and CED (Finland)
- Community Based Management of indigenous Forestry (CBMIF) project funded jointly now with GTZ and later with SNV
- Community Based Agroforestry Project funded by EU and FPDP(Forestry Protection and Development Programme)
- VPR workshop and storeroom funded by Netherlands Embassy

5.2.5 Thusano Lefatsheng

Thusano Lefatsheng is involved in ecological studies, cultivation and management of the grapple plant (Harpagophytum procumbens) in order to enhance its sustainable use.

5.2.6 Harry Oppenheimer Okavango Research Centre (ORC)

This centre is running three research programme namely:-

* Preservation of the Peter Smith herbarium (started in 1995) aimed at preserving a collection of more than 5 000 pressed plants from the Okavango Delta.
- Hydrology and ecology of flooding in the Okavango Delta aimed at understanding the effect of the seasonal flood on the structure and productivity of both terrestrial and aquatic biota. It started in 1996.
- INVASS Project (started in 1997) studies the impact of alien, invasive grass on sand dune systems.

Its aim is to reach a better understanding of underlying processes of successful establishment of alien invading plant species that may form a threat to indigenous vegetation

5.2.7 Permaculture Trust of Botswana (PTB)

Activities include:

- Assisting communities with drawing natural resources management plans with particular reference to a certain tree, large turtle and river sand;
- Developing a water harvesting and an erosion control projects;
- Trials in sustainable use and management of veld products which have been proved to be valuable;
- Grassroots research investigating uses, conditions of growth and distribution of such veld products;

5.2.8 Somaretang Tikologo (Environment Watch Botswana)

The overall aim of Somarelang Tikologo is to monitor, protect and increase awareness about Botswana's environment and to encourage the prudent use and conservation of the country's resources.

Somarelang Tikologo has vigorously embarked on the process of tree planting throughout the country more especially in population centres. Indigenous trees are mostly planted since they have adapted to environmental conditions in Botswana.

5.2.9 Forum On Sustainable Agriculture (FONSAG)

It consists of Non- Governmental Organisations (NGOs), Community Based Organisations, Individuals and Relevant Government institutions.

Activities include:

- Farmers seminars and workshops on sustainable agriculture;
- Education and information dissemination

5.2.10 Conservation International (C.I.)

C.I. is an external organisation that has a project in Botswana. The Botswana project was established in 1991 with the aim to conserve endangered ecosystems that are important either, for their biological diversity or their importance to life systems. The focus of the project has been training in conservation, environmental and support services to communities in and around the Okavango Delta.

Planned Activities:
- Environmental communication and dissemination activities;
- Environmental education activities with schools through development of education materials;
- Development of a wilderness school;
- Combined educational activities with research on the wild-dog and on the cheetah.

5.2.11 Chobe Wildlife Trust

It was established in 1988 to assist in the conservation of natural assets of Northern Botswana in particular, the Chobe National Park.

Activities include:

- Research in the Chobe National Park;
- Development of water holes in wildlife areas;
- Research and monitoring of vegetation around water holes;
- Carrying out educational and interpretative activities.

5.2.12 Botswana Bird Club

The club is undertaking the following projects:-
- Waterfowl Counts- done twice a year at a large range of wetland sites;
- Birds Records- collation and publication of bird records;
- Publication of journal- the Babbler is published twice a year and it contains papers and notes on any aspect of ornithology in Botswana, and bird records;
- Nest record scheme;
- Awareness creation among junior secondary schools;

- Important Bird Areas- 13 Important Bird Areas (IBAs) in Botswana have been researched identifying sites with globally or regionally threatened birds and the conservation issues at each site;
- Identification of declining or threatened bird species and suggests measures to safeguard them;

5.2.13 **Private Agencies Collaborating Together (PACT)**

The project entitled 'Institutional Reinforcement for Community Empowerment (IRCE)', aims to promote sustainable conservation based development on marginal lands.

5.3 **Raising Public Awareness**

5.3.1 Department of Wildlife and National Parks

The Department of Wildlife and National Parks has Wildlife Conservation Education Division which runs education programmes for public awareness. The division has an informal programme, which runs seminars and workshops for the general public, local authorities and other organisations. Furthermore, the division assists the Ministry of Education's Curriculum and evaluation department on environmental education matters. DWNP spearheads the Wildlife Clubs of Botswana programme. Over 90% of schools in Botswana have a wildlife club. Media activities include the publication of newsletters and newspaper articles and the production of radio programmes. Non-Governmental Organisations (NGOs) also play an important role in the collection and dissemination of environmental information. These are elaborated in section 5.2.

5.3.2 **National Museum, Monuments and Art Gallery**

The National History (Biological Sciences) division of the National Museum raises public awareness through;

- Three dimensional displays. These are mounted plant and animal specimens in show-cases displayed in galleries. These are available for viewing by members of the public and school children who are taken on conducted tours of the galleries.
- Natural History Collection

Members of the public have access on request to a small collection of animals, plants and fossils collected by the museum. The public is also encouraged to donate specimens to the museum. Research on collected specimens leads to further information for dissemination to different audiences.

- Botanical gardens and display house

Species of plants and animals are available for viewing. Continuous individual and group (mostly schools) visits are a reflection that biodiversity is appreciated.

- Zebra's Voice magazine

This publication contains some articles on plants, animals and sites preserved by the National Museum. The magazine is distributed at no charge to institutions in Botswana and other SADC countries.

5.3.3 **Forestry**

On an annual basis, there is a National Tree Planting Day carried out in various parts of the country where various communities plant over 100,000 trees. The various trees range from fruit trees (both indigenous and exotic), shade trees, soil reclamation species and ornamental trees.

5.3.4 Livestock

The FAO/UNDP/SADC project and Management of Animal Genetic will assist in executive training workshop for the regional advisory committee who will in turn raise public awareness on the importance of conservation of indigenous animal genetic resources.

5.4 Foreign and Donor Agencies: Current and Proposed Financial Support

54.1 United Kingdom (DFID)

As part of DFID strategy funding is provided for a number of ongoing Renewable Natural Resources projects in Botswana

These projects include:-

- Support to the Division of Agricultural Planning and Statistics
- Range Inventory and Monitoring Project
- Community Participation in Range Management
- Assistance to the Meteorological Service Department
- Veterinary epidemiology and Economics Unit Project
- Support to the Tsetse Control Division
- Farming System Research
- Institutional Review of the Department of Animal Health and Production
- Community Wildlife Management Projects
- Support for International Conventions

- Poverty Alleviation enhancing Benefits to the Rural poor
- Environmental Impact Assessment of Veterinary fences in Ngamiland

5.4.2 United States Agency for International Development (USAID)

USAID has allocated over US$ 24 million to the Natural Resources Management Project (NRMP) which is ongoing. NRMP encompasses a number of projects covering: Wildlife Utilisation, Veld Products, monitoring and evaluation, park and Wildlife Management Areas (WMA) planning, Personnel Planning and Training and Environmental Education. Further grants have been made under PACT to support community based projects

5.4.3 Southern African Development Community (SADC)

Current and future SADC projects include the following:

- Development of Environmental Impact Assessment funded by SADC
- Plan of Action for Kalahari - Namib Region funded by UNEP and SADC
- SADC Environmental Information Systems Programme funded by SADC
- Land Degradation and Desertification Control Programme
- Strengthening of Desert Research Foundation of Namibia (DRFN)
- Environmental; Education Programme funded by SIDA,IUCN-ROSA
- Environmental Monitoring in the SADC Region
- Assistance to Co-ordination Unit funded by SIDA

5.4.4 HIVOS

HIVOS are providing funding to meet short falls in projects carried out by the Forestry Association of Botswana (FAB).

5.4.5 United Nations Development Programme (UNDP)

UNDP has, allocated some funds to:

- Support to Environment Programme co-ordinated and implemented by
  National Conservation Strategy (Co-ordinating) (NCSA}
  Desertification Combat (through the Ministry of Agriculture)

Through GEF and SGP it funds the following:

- SABONET (Southern African Botanical Diversity Network)
- Impact of Jackal Predation on Impalas in Mokolodi Nature Reserve
- Establishment of Community Seed Bank

- Lobbying for a Policy to Address Declining Wildlife Populations
- Woody Biomass Research Project
- Promotion of Solar Powered Borehole
- Khwai Community Based Natural Resource Management Project
- Environmental Education Programme for a Community Managed Wetland
- Use of Alternative Energy and Woodlot
- Construction of Electric Fence to Reduce the Conflict between Wildlife and Human Activities
- Establishment of a Herbarium for Plants of the Okavango
- Newspaper Environmental Supplement to Promote Debate on conservation Issues
- Development of Environmental Education Centre
- Development of a Rhino Sanctuary
- Water conservation in schools
- Domestication and Conservation of Grapple Plant in Southern Kalahari
- HOORC Phase II

5.4.6 **SNV Botswana**

The Environmental Programme funded by SNV Botswana includes four grass roots Community -Based Natural Resources Projects which are being implemented at:

- Xai Xai which is implemented under own management and takes natural resources management as a starting point for community mobilisation
- Ukwi and surrounding settlements taking veld product management as a starting point then adding wildlife management at a later stage
- Settlements in Western Kweneng- implemented by VPR concentrating mainly on veld products and working through village-based researchers
- Okwa WMA in Ghanzi implemented by Kuru-Development Trust developing a game farm

5.4.7 **NORAD**

As part of Botswana - Norway bilateral co-operation in the natural resources sector NORAD is funding a number of ongoing projects with the Government of Botswana. Current projects include:

- Air pollution monitoring and surveillance system
- Institutional co-operation: Training, Research and Capacity Building
- Biological study on the Phane toward improved production, harvesting, processing, storage, marketing and utilisation in Botswana
- Sustainable Productivity of Savannas
- SACCAR (Southern African Centre for Co-operation in Agricultural and Natural Resources Research and Training)

5.4.8 SIDA

SIDA is funding an environmental education training programme at the University of Botswana

Another project that it is supporting is the preparation of the action plan of the Botswana's National Conservation Strategy - National Policyon Natural Resources Conservation and Development. The action plan is meant to translate this policy into sustainable and implementable conservation projects and programmes.

5.4.9 Danish Co-operation for Environment and Development (DANCED)

DANCED through Rural Industries promotions company (RIPCO) Botswana, is funding a very comprehensive programme on empowerment of Non-Governmental Organisations (NGOs)/Community Based Organisations (CBOs) in environmental conservation and management. Under this programme, environment conservation community -based projects, countrywide are funded. Other projects are concerned with capacity building for the project proponents and forging NGO/CBO partnership

5.4.10 Kalahari Management Services (KMS) Trust

The trust is funding and assisting several environment conservation organisations that deal largely with enhancing conservation and sustainable use of biological diversity. These are:

- Chobe Wildlife Trust;
- Conservation International;
- Kalahari Conservation Society (KCS);
- Lekang Natural Resources Defence Council;
- Mokolodi Wildlife Foundation;
- Forestry Association of Botswana (FAB);
- Thusano Lefatsheng;
- Permaculture Trust Botswana (PTB);
- Khama Rhino Sanctuary;
- Harry Oppeinheimer Okavango Research Centre

5.4.11 IUCN- World Conservation Union

- Regional Zambezi Biodiversity study

- Non- Governmental Organisations (NGOs) support programme
- Business and environmental project

CHAPTER SIX

6.0 RESOURCE AVAILABILITY

6.1 Department of Wildlife and National Parks

During the implementation of National Development Plan 8, the Government will continue to implement the Wildlife Conservation and Tourism Policies. A number of priority areas have been identified. These include the:

- continued implementation of the Wildlife Strategic Research Policy.
- wildlife disease control and management
- development of a wildlife quarantine facility
- management of endangered species in order to maintain biological diversity.
- management of protected areas to provide a reservoir of animals for surrounding consumptive and non-consumptive wildlife utilisation schemes.
- implementation of management plans for wildlife management areas to maximise economic returns and maintain ecological integrity.
- development of tourist facilities and the provision of artificial waterpoints to assist in drought management.
- demarcation of boundaries to reduce conflicts between wildlife and other landuses and to assist in fire management.
- continued implementation of the Community Based Natural Resource Management Programme.
- enforcement of Wildlife Management Area regulations.
- development of infrastructure and provision of funding for viable conservation initiatives.
- conservation education and awareness

Just under P 75 000 000 will be set aside to fund these and other programmes during National Development Plan (NDP) 8.

6.2 Department of National Museum, Monuments and Art Gallery

The Ministry of Labour and Home Affairs through the relevant department is planning to develop the following during National Development Plan 8;

i) National Botanical Garden

This is for ex-situ conservation of species from various ecosystems and to a limited extent exotic species for purposes of preservation, research, education and recreation. A detailed project proposal to the sum of P3 000 000 has been submitted for approval.

ii) Development of biological monuments and vegetation reserves for sustainable utilisation of resources by local communities. This is the basis for in-situ conservation. The cost for this development is still to be determined as community and private sector involvement is anticipated.

iii) To plan and ensure construction of a purpose built Natural History Centre. Funds for this development still need to be negotiated.

6.3 **Ministry of Agriculture**

6.3.1 Plant Genetic Resources

The Government of Botswana has provided funds for the construction of the National PGRC and is also providing its operational costs through the recurrent budget. However, the genebank is also receiving financial and technical support from the SADC Plant Genetic Resource programme. Support in the form of equipment and training has also been received from the NORDIC genebank in Sweden.

Currently, recurrent costs for running the genebank and related activities are met by the government. The genebank is adequately supported with resources to cover all activities including collection of germplasm, characterisation and multiplication of accessions for distribution to improvement programmes.

6.3.2 **Indigenous Livestock**

The Botswana project on Conservation of Indigenous Livestock Species has a P2.5 million allocation for carrying out the several components of the project. Government ranches are being renovated to serve as *in-situ* and ex-situ sites for the various livestock species. This project will be complemented by the SADC/UNDP project to be executed by the FAO. The National Co-ordinators will be trained through the SADC/UNDP project and to interface with the FAO Global Databank conservation.

CHAPTER SEVEN

7.0 Monitoring and evaluation

7.1 Department of Wildlife and National Parks

The Department of Wildlife and National Parks has overall responsibility to ensure conservation and management of wildlife resources is based on objective and scientific research. Various measures have been put in place to monitor and combat threats to the maintenance and enhancement of biological diversity.

i) Baseline inventory on wildlife populations and their habitats.
This research includes the identification and monitoring of individual wildlife populations; monitoring of wildlife habitats and the determination of wildlife off-takes.

ii) Research into wildlife management problems
This includes research into the migration, population dynamics and habitat impacts of elephants, provision of water for wildlife, the effect of drought on wildlife, and the incidence and control of livestock predators.

iii) Research into the ecology of specific species and communities
This includes the co-ordination of private researchers. Areas of study include the effect of fire on range condition, specific ecosystem studies, ornithological studies and a study of amphibians and reptiles.

iv) Studies of factors affecting wildlife utilisation
These include research on suitable game fencing and trophy animal offtake strategies. Specific studies include the effects of fencing on the movements of wildlife; lion population dynamics and distribution; wild and domesticated ostrich; gallinaceous fowl, the effects of bird capture and export.

v) Research into wildlife disease control
These include a study of livestock diseases important to wildlife and vice versa; compilation of predator disease database and genetic research.

Wildlife management strategies, which have been instituted to combat threats to biodiversity, include;

i) Enhancement of efficacy of protected area networks
The effectiveness of protected areas is enhanced if they are linked as opposed to existing as isolated systems. The extension of Chobe National Park and the linking of Nxai Pan National Park with Makgadikgadi Pans Game Reserve represent the first concrete steps to achieve this goal. Further to this, research has identified important routes for migrating wildlife. The establishment of corridors are being

considered in key areas.

The proposed Kalahari Transfrontier Park which links Gemsbok National Park with the Kalahari Gemsbok National Park in South Africa will provided greater protection for wildlife species and enhance genetic diversity. Management Plans for National Parks and Game Reserves will be implemented during NDP8 in order to ensure that ecological integrity and diversity are maintained.

ii) Development of game sanctuaries

In attempt to rebuild depleted white rhino populations in Botswana, several of these animals have been translocated to Khama Rhino Sanctuary further inland from the northern border region where they where subject to poaching pressure. The sanctuary has also been the recipient of rhino from South Africa where'the species was brought back from the brink of extinction. A measure of success has been recorded with the recent birth of a white rhino calf. Other conservation initiatives will be implemented for a variety of species such as the black rhino, Chobe bushbuck, cheetah and wild dog. The programmes will include components of captive breeding, rehabilitation and protected sanctuary development.

iii) Provision of water for wildlife

Supplementary watering points have been located in protected areas to counter the effects of drought and to compensate for the loss of access to seasonal ranges and permanent water sources. It is envisaged that this network of artificial drinking points will reduce large scale movements of wildebeest, zebra and buffalo and will also alleviate the impact of elephants on sensitive water-front habitats. Regular monitoring of these water points has been instituted to identify and propose management actions to minimise adverse effects on the environment

iv) Wildlife friendly fencing

The relevant authorities are addressing the issues related to the impact of fencing on wildlife migration. Issues being considered include the realignment of some veterinary fences and an environmental audit of existing fences, policies and programmes.

v) Community Based Natural Management

In line with the Wildlife Conservation and Tourism Policies, community based wildlife conservation has been recently introduced to increase rural economic activity through sustainable utilisation and also to improve the attitudes on the part of communities living in areas abutting protected areas towards wildlife. Associating conservation with increased income, thereby improving the status of wildlife and conservation is doing this. Community based projects have been initiated with some success, notably in the Chobe Enclave in northern Botswana.

vi) Game Ranching and Farming

Game ranching has become an important cornerstone in wildlife conservation and management on the sub-continent. An increasing number of farmers in Botswana

have begun incorporating wildlife into their enterprises as a result of a growing awareness of the value of wildlife. There is also a high level of interest in game farming where one or two species are intensively managed on relatively small areas. Ostrich and Crocodile Management Plans have been drawn up by DWNP in conjunction with other stakeholders to facilitate the development of these enterprises.

7.3 **Department of National Museum, Monuments and Art Gallery**

Records are being compiled by all four herbaria in Botswana. Some have already begun to computerise their collections. Networking with other herbaria in the region will also assist attempts to compile plant distribution maps. Participation in biodiversity networking programmes such as SABONET will be increased. Regular national working group meetings will monitor progress on training of staff, computerisation of existing collections and collection coverage of the country.

7.4 **Ministry of Agriculture**

7.4.1 Conservation of Indigenous Livestock Species

The National Advisory Committee will monitor the project implementation. Various workshops, database and the production of reports will be instruments used to monitor the project. Physical existence of conserved germplasm and a training plan will also be measurable indicators.

A national focal point has been formed at the Ministry of Agriculture, which involve livestock research and extension departments, farmer organisations, private farmers, the Faculty of Agriculture, and the Botswana Agricultural Union. The National Committee will draw on expertise in health/veterinary/genetics and animal breeders, legal aspects, and trade in animal genetic materials, property rights and trade.

7.4.2 **Plant and Genetic Resources**

The Botswana National Plant Genetic Resources Committee, meets on a regular basis to monitor the progress made by the project. Reviews are also done through the SADC Gene bank and evaluation of the SADC gene bank often includes the national gene banks.

7.5 Water

As the custodian of Botswana's water resources, the Department of Water Affairs through its various units is responsible for the provision of safe and clean water.

Most of the major potential pollution sources such industries, municipalities and sewage treatment plants that discharges into rivers are monitored on regular bases to insure that there is adherence to the set guidelines.

The Department of Water Affairs is to implement the Water Quality Management Project. One of the components of this project is to look at water conservation issues which will draw special attention to wastewater minimisation, recycling and re-use. This will have a positive impact on biological diversity of our river systems which normally receives poor quality waste water discharges from various industrial developments.

Though there is no legislation currently dealing exclusively with the implementation of EIA's on water development projects, the Department of Water Affairs carries out Environmental Impact Assessments for all its major water development projects.

APPENDIX 1: Editorial Committee and Botswana National Biodiversity Authority Members

Editorial Committee

Chief Editor:	Dr Otlogetswe Totolo
Editorial Team:	Dr Louis Mazhani (Chairman, National Biodiversity Authority)
	Dr Bernard Mosimanyana
	Mr Cyril Taolo
	Mr Ulf Nermark
	Ms Joanne Addy
	Mr Papadi Oagile
	Mr David Lesolle
	Mrs Botsalano Coyne(Secretary, National Biodiversity Authority)

Botswana National Biodiversity Authority Members

Dr L.M. Mazhani (Chairman)	Department of Agricultural Research (DAR)
Ms R.M. Mojaphoko (Vice)	Department of Wildlife and National Parks
Mr E.K.Maloiso	National Conservation Strategy Coordinating Agency
Ms B. Coyne (Secretary)	National Conservation Strategy Coordinating Agency
Dr B.M. Mosimanyana	Department of Agricultural Research
Mr T.L. Makosha	Forestry Association of Botswana
Mr N.E. Mosesane	National Museum and Art Gallery
Mr D. Lesolle	Department of Meteorological Services
Ms J. Addy	Kalahati Conservation Society
Ms S. George	Department of Lands
Ms 0. Serumola	Department of Water Affairs
Mr Papadi Oagile	Department of Water Affairs
Mr U.P. Nermark	National Museum and Art Gallery
Prof. B.H. Raseroka	University of Botswana
Dr M. Ditlhogo	University of Botswana
Dr 0. Totolo	University of Botswana
Mr B. Mannathoko	Ministry of Finance and Development Planning
Ms D. Matlakala	Attorney General's Chambers
Ms N. Basinyi-Moyo	Attorney General's Chambers
Mr C.J. Matale	Department of Mines
Mr R. Kashweeka	Forum on Sustainable Agriculture

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