REPUBLIC OF MOZAMBIQUE

MINISTRY FOR THE COORDINATION OF ENVIRONMENTAL AFFAIRS

Fifth National Report on the Implementation of Convention on Biological Diversity in

MOZAMBIQUE

MAPUTO 2014

REPUBLIC OF MOZAMBIQUE

President

ARMANDO EMÍLIO GUEBUZA

Ministry for the Coordination of Environmental Affairs

Minister

ALCINDA ANTÓNIO DE ABREU

National Directorate of Environmental Management

Director

ANSELMINA L. LIPHOLA

REPUBLIC OF MOZAMBIQUE

MINISTRY FOR THE COORDINATION OF ENVIRONMENTAL AFFAIRS

Fifth National Report on the Implementation of
Convention on Biological Diversity in MOZAMBIQUE

Coordination

Anselmina L. Liphola – MICOA

Technical Coordination and Editing

Cornélio Ntumi

Editorial supervision

Anselmina L. Liphola, Clara Landeiro, Ana Paula Francisco

Technical Team

Cornélio Ntumi, Bruno Nhancale, Verónica Micas José, Angelina Martins, Alice Massinga, Hugo Mabilana

Citation:
Ministry for the Coordination of Environmental Affairs (2014). Fifth National Report on the Implementation of Convention on Biological Diversity in MOZAMBIQUE. Maputo. MICOA. 129 pp.

Preface

Mozambique has long recognized that its development cannot be sustainable without ensuring the conservation of its biodiversity. Numerous examples confirm the silent but key role biodiversity plays in poverty alleviation efforts, with Tourism, a sector heavily dependent on our fauna, flora and landscape heritage, illustrating well the contribution it brings to the economy of the country both in terms of revenue and employement. The need to ensure that our rich biological heritage contributes, in a sustainable way, to the development of the country has led Mozambique to develop continued efforts at the national and international levels. One of the significant steps taken was the signature of the UN Convention on Biological Diversity (CBD), in 1992, at the World Summit on Environment and Sustainable Development - Rio Summit. With the ratification of this Convention by the Legislature two years later, Mozambique became a State Party to the Convention, taking on the commitment to promote international cooperation on the management and sustainable use of biological resources for the implementation of the three objectives of the Convention: the conservation of biological diversity, the sustainable use of its components and the fair and equitable benefit sharing from genetic resources.

The Fifth National Report, now being published, offers us an assessment of the state of biodiversity, its tendencies and implications for the well-being of our communities, and brings to the fore some of the significant advances that the country has made through actions undertaken by different sectors, highlighting also some of the challenges that still remain, in particular in regards to the achievement of the Aichi Targets (established for the period 2011 - 2020) and of the Millennium Development Goals (set for 2015).

Of the significant progress made in different areas, I would like to highlight the investment made in our national protected areas system, which currently covers approximately 26% of the national territory clearly exceeding the target internationally established of 17%, the establishment of the Institute of Traditional Medicine, the

Namaacha Ethnobotanical Center in and the Malhazine Ecological Park, among other initiatives which have contributed to the conservation of biodiversity. I would also like to highlight the steps taken to strengthen the national legal framework for the Conservation of Biodiversity, where the Law and Regulation on Forestry and Wildlife, the Conservation Areas Act, the Criminal Code and the Program for the Protection of Natural Resources and the Environment, all approved this year of 2014, are undeniable landmarks. Yet, we still have serious challenges to overcome in a few areas, including the effective implementation of the legal and policy framework, the systematization and dissemination of information on biodiversity and on the use of scientific and traditional knowledge, the rehabilitation of ecosystems, and the update of the Strategy and National Action Plan for Biodiversity Conservation in Mozambique (NBSAP), which will soon be completed.

The 5th National Report is part of these efforts, a first step which provides a solid analytical foundation for the definition of national priorities and the formulation of specific guidelines that will shape the new Strategy and National Action Plan for Biodiversity. This is an effort which requires the active involvement of all, as only together we can produce the transformational change needed to ensure the sustainable development of our country.

The Minister

Dr. Alcinda António de Abreu

ACKNOWLEDGEMENT

On behalf of MICOA, I would most like to acknowledge all those who, either individually or on behalf of a wide range of government institutions, academia, civil society organizations, private sector and development partners, contributed in different ways in the preparation and review of the different drafts that emerged during the preparation of the Fifth National Report on the Biological Diversity in Mozambique.

I would like to express my special gratitude to the consultant team at the Eduardo Mondlane University, coordinated by Dr. Cornelio Ntumi, that worked tirelessly and with great enthusiasm in preparing this report, and to the members of the Biodiversity Unit and their institutions and organizations. They all have demonstrated a long commitment and devoted effort during our common companionship, as in essence, this is an intersectoral work.

The National Focal Point and Director for the Convention on Biological Diversity

Enga. Anselmina L. Liphola

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ACRONYMS

ACs	Conservation Areas
ANAC	National Administration of Conservation Areas
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CITES	Convention on International Trade of Endangered Species
CONDES	National Council for Sustainable Development
DANIDA	Danish Agency for International Development
DPCA	Provincial Directorate for the Coordination of Environmental Affairs
ENAMMC	National Strategy for Adaptation and Mitigation of Climate Change
FUNAB	Environment Fund
FNI	National Research Fund
FUNAE	National Energy Fund
GEE	Greenhouse gas effect
IIAM	Institute of Agricultural Research of Mozambique
MCRN	Community management of natural resources
MICOA	Ministry for Coordination of Environmental Affairs
MOPH	Ministry of Public Works and Housing
NBSAP	National Strategy and Action Plan for the Conservation of Biological Diversity
NAPA	National Action Program for Adaptation to Climate Change
ODM	Millennium Development Goals
ONGs	Non-Governmental Organizations
PARPA	Poverty Reduction Plan
PASAN	Action Plan on Food Security and Nutrition
PEDSA	Strategic Plan for the Development of the Agricultural
PEDD	District Development Plan
PESOD	District Socio-Economic Plan
PDUT	District Land Use Plan
PQG	Government Plan (2009-2014)

Executive Summary

This report describes and presents the status and trends of biodiversity, by analyzing the threats and the impacts of biodiversity losses to the human lifes in Mozambique; it also presents the measures and the initiatives undertaken by Mozambique in implementing the objectives of the Convention on Biological Diversity (CBD) since the last National Report published in 2009.

Biodiversity has a paramount role in the national economy; it contributes to poverty alleviation as well as for the general economic development. This report highlights some revealing features of this vital role, among which, the fact that more than 80% of the population uses medicinal plants and various non-timber products for their survival. The role of the biodiversity can be seen in the development of different economy sectors, like for example the commercial wood sector (26.9 million hectares of wood per year are being commercially exploited), the energy sector (about 90% of the rural energy comes from firewood and charcoal), the fishery production sector, (it is estimated that the sharing of the fishery sector to the national GDP is about 2%, contributing with a significant number of working places and tourism sector, sharing MZN 32.7 billion to the national GDP in 2013 and being an important source of employment and contributing with 6.4% of total employment (718,000 jobs) of the country.

The richness of the country in terms of biodiversity is due to the **high diversity of the existing ecosystems**. There are four main categories of natural ecosystems in Mozambique: (i) terrestrial, (ii) marine ecosystems, (iii) coastal ecosystems and (iv) lake ecosystems. The country has five different biomes subdivided into 12 ecoregions, most of which are critically endangered. Floristically up 4 phyto-geographic regions are recognized namely: (i) Regional centre of Zambezian endemism, (ii) Swahilian regional centre of endemism, (iii) Swahilian-Maputaland Regional transitional zone and (iv) Maputalalad-Tongoland centre of endemism.

In terrestrial ecosystems forests have a prominent role, covering 406,000 km^2 (about 51% of the country's surface area), while other vegetation types cover approximately 147,000 km^2 (19% of the country's surface area).

Marine and coastal ecosystems (coastal dunes and sandy beaches) occupy an area of approximately 572,000 km^2, about 42% of the country. To the marine environment, it is estimated that seagrass ecosystems have coverage of 439 km^2 and 1,890 km^2 in Mozambique coral reef, whose conservation status is generally good. The coverage area

of mangroves has reduced significantly over the past 40 years, and is now estimated as being 446,712 hectares.

Mozambique also presents a significant diversity of known species (registered) occurring in different areas of the country; it is estimated that they represent a small fraction of the total number of the existing species. Although there is limited data to analyse the tendencies,, several indicators suggest the decline of the numbers of many species. Overall, about ten thousand species have been recorded; of these, a total of 4,271 terrestrial are distributed as follows: 72% represented by insects; 17% of birds; 5% by mammals and amphibians remaining 2%.

Recent records raise the number to 5,781 of plant species to over the 140 figure that has been known so far, of which 35 of are new *taxa* for the science (identified in Cabo Delgado, North of the country) and the other 105 species are new records for Mozambique (67 of were recorded in Cabo Delgado, 26 in the mounts Namuli and 12 in the mounts Mabu). Of the total number of plant species recorded in the country, about 800 species are endemic or nearly endemic. The mountainous areas of Mozambique are relatively rich in endemic species with at least 45 species of plants that are only found in Chimanimani.

The number of threatened species (especially plants, fish, birds and mammals) shows an increasing trend in Mozambique. The proportion of threatened species is higher for birds and mammals while the largest number of endemic species is found in reptiles and insects.

Genetic diversity seems to be in decline both in natural ecosystems and in agricultural and livestock production systems. However, the extent of this decline and its overall impact has not been documented. During the implementation of the Convention three native breeds' cattle and goats were identified. However, the trend to replace them with exotic species has been observed. At the time of preparing this report, the Government has launched several actions in the framework of conserving the genetic diversity, including a national breeding program (resuming the program of artificial insemination). At the same time, a project has also being implemented in order to promote the use of agro-biodiversity of local varieties of crops and regular inventories and collection of germplasm of the IIAM Centre for Plant Genetic Resources (gene bank) are being done. A germplasm of food crops conservation, especially grains and legumes in the gene bank of the Centre for Plant Genetic Resources IIAM as well as a garden of medicinal plants in Ethnobotany Research Centre in Namaacha were established; in the future, the program of the establishment of Botanical Gardens for medicinal plants will be extended to other provinces. Currently, the Ministry of Science and Technology together with the Centre for Ethnobotany Research are jointly identifying possible sites.

Main threats to biodiversity

In Mozambique, the **main threats to the biodiversity** are linked to human activities, which constitute the direct causes of change in land cover and, consequently, the loss of biodiversity; human activities are developed at the level of individual parcel of land, household or community. The main threats to biodiversity are:

- the conversion, loss, degradation and fragmentation of natural habitats
- the overexploitation of certain species
- the invasion by non-native species that damage ecosystems and native species
- pollution or contamination of natural habitats or species
- climate change damaging natural habitats or species

The **impacts of biodiversity loss** caused by land use changes are linked to human activities. The present report offers the details of the different causes of biodiversity loss, and it highlights the progressing tendency even occurring at the time of writing the report, as well as some of the deleterious consequences of this loss for the country.

The overexploitation of some tree species mainly due to the illegal cutting of timber species of high commercial value is responsible for their extinction in a long term. For example, only in 2012, between 189,615 and 215,654 cubic meters of timber, were exported illegally, exceeding up to 154,030 cubic meters both the amount of licensed timber exports, as well as the levels of allowable cut through forest licensing., threatening the sustainability of the exploitation of this resource. Besides the consequences of loosing biodiversity, the country is registering significant losses of financial resources. Only in 2012, Mozambique has lost about 29 million U.S. dollars.

The overexploitation of terrestrial fauna is of high concern for the country; it occurs mainly through poaching for subsistence and commercial purposes. The latter is more focused on the slaughter of wild animals threatened with extinction. Some of the official data related to the slaughter of wild animals threatened with extinction (we recognise they are lower than the real numbers) show the seriousness of the problem. For example, between 2006 and 2012 considerable numbers of rhinos were slaughtered in Mozambique and trends in elephant poaching are alarming, showing an increased trend of carcass ratio in the conservation areas, at the time of writing this report. .Between 2009 and 2011, the carcass ratio of elephants in Mágoè district remained high (8.4 and 11%, respectively), tripled in Niassa National Reserve, about 83 in 2009 to 271 in 2011

and between 2011 and 2013, the number of carcasses seen in the Quirimbas National Park rose from about 14 to 84.

The *overexploitation of marine species* is also a serious problem, mainly due to the illegal fishing for international trade, with negative impacts on their populations. Some marine species like shark Sierra Buck Tooth Car (*Pristis microdon*) Hammerhead Shark (*S. lewini*) and Manta Ray (*Manta sp*.), were included in Appendices I, II of CITES in 2013. Catches of some shark species tend to be significant and some of the captured species are endangered species according to IUCN.

The impact of the overexploitation of these resources for the country food security and economy is of serious concern as it is shown by the decrease in the commercial shrimp surface catches to about half in the period between 2005 and 2014); the shrimp surface is considered to be a fully exploited resource.

Other factors contributing to the loss of biodiversity and are observed in the country even at the time of writing this report. Besides the conversion of some habitats to other land use types due to the demographic dynamics and economic development, the predominant agricultural practices, the growth of livestock farming and the growing mining activity are contributing to an increased *pollution* threatening the resilience of the ecosystems and the survival of certain species.

Climate change is of concern; it may lead to an increased vulnerability of certain ecosystems (for example by enhancing the magnitude and the frequency of extreme events as draughts, floods and cyclones or other events like wildfires or coastal erosion) leading to the lost of biodiversity and some habitat areas if effective measures are not undertaken.

In order to reverse the present tendency of biodiversity lost the country need to overcome several challenges amongst which the ones related with the increasing human population living within the conservation areas, poaching, and the conflict between human populations and the wild animals. For the conservation efforts to be well succeeded will mainly depend on the capacity to find effective and sustainable answers that can be able to harmonise the existing conflicts, answers that have to be laid on both the foundations of conservation as well as development interests (it should be noted that the most poached species are those having more touristic potential and have more conservation value) It is estimated that between 2007 and 2013 more than 630 people were killed by crocodiles, elephants, hippopotamus and buffalos, 65% of people of them were killed by crocodiles; more than 1,290 animals were slaughtered as problematic).

In the framework of the efforts undertaken, Mozambique is revising its 2003-2010 NBSAP in order to adapt the country goals with those of Aichi (the goals internationally

agreed by the parties of the UNCBD in 2010) in order to achieve one of the main goals – **to reverse the tendency to diversity loss** in his new NBSAP in preparation.

Despite the adversities encountered in the process of implementation, significant progress was achieved which can be summarized as follows:

- implementation of restoration projects in areas with degraded biodiversity and empowerment achieved through various financing mechanisms (project management of biodiversity of coastal areas and marine areas in the provinces of North and the restoration project of the National Parks of Limpopo and Gorongosa);

- restoration of the areas with degraded biodiversity and the increase of the institutional capacity achieved by the implementation of projects with several funding sources (for example, the project on the management of coastal zones and marine areas biodiversity in the northern provinces of the country and the restoration project of the Limpopo and Gorongosa national parks);

- registration of genetic biodiversity on ex-situ conservation (botanical gardens, arboretum, seed banks, germplasm collections and in-vitro) systems;

- increase of the percentage of the protected areas from 11% to 26%, creating new national parks and reserves, including marine and coastal areas;

- integration of issues related to the environment, including biodiversity in different planning sectors at provincial and district levels, and in several national development programs, policies, strategies, as well as national inter-sectoral programs (including for example The Strategic Plan for the Development of the Agriculture Sector) 2010-2019, the Strategic Plan of the IIAM 2011-2015, the 2015 Agenda, the Poverty Reduction Plan (PARP) 2011-2014, The National Strategy for Development, the National Climate Change Mitigation and Adaptation Strategy 2013-2025);

- inclusion of the environment and biodiversity in school curricula materials (primary and secondary levels);

- launching programs "A student, a tree" and "A leader, one Forest";

- approval of the legislation to preserve biodiversity (the Law and Regulation on Forestry and Wildlife and the Law on Conservation Areas);

- reduction of the pressure on the forest resources by implementing the initiatives in the framework of renewable energy and prioritizing (between 2004 and 2009,

68 fixed institutional firewood stoves, 6,254 domestic fixed stoves, 16,128 domestic stoves; 29 ovens and bakery and 916 portable stoves (POCA) were produced; several families, schools, prisons, schools, hospitals, companies and NGOs have joined the use of these stoves).

- the implementation of the principle that 20% of the revenue from the exploitation of natural resources should be given to local communities, valuing the principles of sustainable management of natural resources and the sharing of benefits with those who own them.

- environmental education programs have been offered to the local communities for them to acknowledge the value of the forest protection; the education programmes includes the launching of the national programmes: "One leader, one forest" program which resulted in the designation of about 22, 000 community forests; by 2010; the initiative "One child, one tree" resulted in the planting of trees throughout the country.

The assessment of the level of accomplishment of the priority goals of the NBSAP (2003-2010) indicates that of about 18% of the goals were fully achieved, 29% substantially achieved and 41% achieved in a limited way, and about 19% of them have not been reached at all. It should be noted that all priority actions fully achieved refer to the conservation area of the components of biological diversity. In general, the aspect of sustainable use of components of biological diversity was unsatisfactory.

Taking into account that Mozambique is maintaining an accelerated growth of its economy at the rate of about 7% per year since 2004, being the majority of sectors that supports the national GDP growth associated with the protection of the environment in general and with biodiversity in particular (these include agriculture, fishing, and recently the discovery of coal, gas and oil sectors), they can themselves turn into the major threats to the rich biodiversity, if good policies that ensure ecosystem health are not formulated.

Despite all governmental policies and measures that have been already made, the following **challenges** should be faced in order to improve the implementation of the Convention:

(i) increase the integration of the biodiversity issues within the sectors and local governmental plans and budgets, as the undervaluation of the conservation sector is still prevailing;
(ii) increase the level of public awareness of the socioeconomic value of biodiversity, due to the prevailing low participation of the communities in the management of the biodiversity;

(iii) increase the allocation of resources for the integral implementation of all priority actions identified for each of the biodiversity components, as the low level of resources is one of factors responsible for the low inspection capacity by the state authorities;

(iv) improve the sharing of biodiversity data in order to improve the research capacity and the management of biodiversity, besides the improvement of the dissemination of the information and the collaboration between the institutions wing or using those data;

(v) reduce corruption and vulnerability at the country borders; and

(vi) improve institutional coordination.

Looking towards the new guidelines internationally agreed and particularly towards the **progresses of the country in relation to the Aichi goals 2020**, this assessment made for this report indicate that one of 20 goals was fully achieved. Mozambique has met the goal of Aichi number 11 which deals with the percentage of coverage and representativity of protected areas. Eight goals are in progress and 11 targets were not achieved or are likely to be slightly achieved.

Some actions taken in this perspective include:

- Increasing the number of visitors to national parks and reserves - for example, visits to the national park of Gorongosa people rose from 1,500 in 2007 to 6,500 visitors in 2012.

- Several floristic and faunal surveys have been made in the country especially in conservation areas and areas of high value for biodiversity ("hotspots"), such cases are studying the biodiversity of Gorongosa National Park in Sofala province and the study of Biodiversity "hills-islands" in the provinces of Zambezia and Nampula. However, there are few studies on the value of biodiversity and ecosystem services, and the studies restricted - to some ecosystems.

- More than 150 committees of co-management of fisheries were created in the country.

- The rate of forest conversion was, in 1990, of 219, 000 hectares / year and reduced to 211, 400 hectares / year in 2010.

- The creation of 3 National Reserves, one National Park, several official game, hunting and community areas contributed to the increase of the conservation surface from 16.2% to 26% (including marine and terrestrial areas), and exceeding the international goal of 17% for the terrestrial areas.

Lessons learnt from the implementation of the Convention

The implementation of the Convention in the country, over the years, helped to appreciate the value of biodiversity. The biodiversity serves as the backbone of the national economy and therefore its protection and preservation is on top priority.

Mozambique has been making progress in implementing the Convention. The two areas where it made the most progress were: (i) increased coverage and representativeness of protected areas is of interest to the country but the situation of rural Mozambique effectiveness of conservation requires multiple approaches to human development and protection of human interests that reside within these areas. Unfortunately, this will have to be done in progressively and coordinated manner; (ii) the development of a legal framework and of appropriate policies to the implementation of the convection was an achievement. However, influencing the implementation of environmental policy requires flexibility and cannot be a process that requires quick results.

Moderate progress has been made for example, there has been increased awareness and knowledge about biodiversity and its value, however, the adoption of the principle of conservation by the public and even by the decision-makers is slow due to cultural and social beliefs;

Progress was also in promoting sustainable use of biodiversity and ecosystems. However, Mozambique has also learnt that the promotion of alternative livelihood activities can significantly improve the protection of biodiversity and ecosystem services, reducing the pressure on biodiversity.

Despite the efforts made, little progress was made in the: (i) updating the NBSAP and red lists of the country; (ii) systematization and dissemination of information on biodiversity; (iii) use of scientific and traditional knowledge; (iv) The restoration of ecosystems; (v) implementation of the existing legal framework and policies. The biggest difficulty was the lack of basic information on targets.

The great lessons of the little progress achieved and above indicated are that the maintaining collaborative partnership between the various stakeholders is key to achieving the goals of biodiversity. Still, requires adequate communication, education and public awareness. Thus, should be strengthened and improved enforcement cooperation between the key parts as well as recognizing the principle that the integration of biodiversity in the external sectors of MICOA requires institutional change.

1. INTRODUCTION

1.1 The bottom line

Adopted in May 1992 by 156 countries, the Convention on Biological Diversity (CBD) aims to promote the conservation of biological diversity; sustainable use of its components and equitable sharing in the use of genetic resources. Mozambique ratified the CBD in August 1994, through Resolution 2/94 of 24 August. Under Article 6 of the CBD, Parties are encouraged to develop a National Strategy and Action Plan for the Conservation of Biodiversity (NBSAP), a document that works as the global and national framework for implementing the Convention's objectives, the promotion of conservation and sustainable use of biodiversity. It is in this context that in 2003, Mozambique has formulated its initial NBSAP which ended in 2010 and now the process of revising and updating is in due course. Under the CBD, the Parties shall prepare reports on measures taken to implement the Convention and analyze their effectiveness in meeting the objectives of the Convention. In this sense, Mozambique presented so far, four national reports, the last of which in 2009. This report is the fifth and updated Fourth National Report. Basically, the Fifth Report focuses on the implementation of the Strategic Plan for Biodiversity 2011 - 2020 and describes, in summary form, the progress achieved in meeting the 20 Aichi Targets on Biodiversity.

1.2 Biophysical and socio-economic aspects

Mozambique is located on the southeast coast of the African continent, between the parallels 10˚ 27'e 26˚ 52' South Latitude and the meridian of Longitude 30˚ 12'e 40˚51 E. It borders the Indian Ocean to the East; North Tanzania, Malawi and Zambia; the West, Zimbabwe and South Africa; and the South, South Africa and Swaziland. The country has about 799, 380 km^2 of surface area that extends from north to south direction facing the Indian Ocean faced over 2.800km of coastline. Narrowing from north to south, reaches its maximum width in the North Centre, between the coast and the confluence of the Zambezi and Aruângua rivers and the smaller the South, only 47.5 Km, in the Namaacha zone (Figure 1).

About 40% of the country has an altitude ranging from 0 to 200 meters, the following, in the region that covers the provinces of Cabo Delgado, Nampula and Inhambane interior of the Province. Following the lowlands, extend plateaux characterized by altitudes ranging between 200-600 meters, extending between the provinces of Manica and

Sofala. Certain plateau zones reach up to even higher altitudes of around 1,000 meters. These areas are then continued for hilly regions where the highest points in the country, 2,436 meters are in massive Massururero at the slopes of Manica, 2,419 meters in the foothills of Namuli and 2,000 meters in the Serra Gorongosa. This orographic layout associated with a tropical climate, originate major rivers that run parallel to the Indian Ocean.

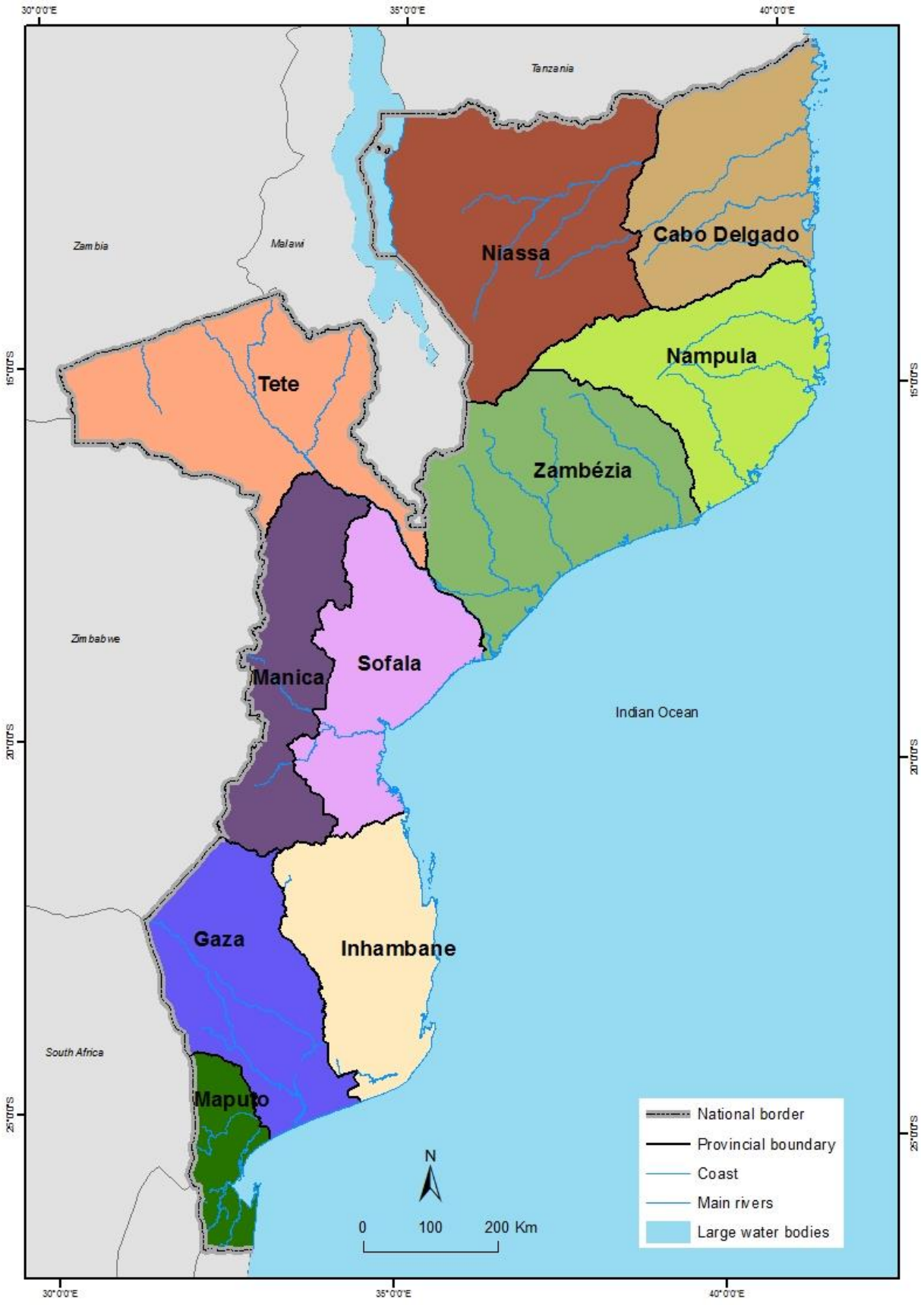

Figure 1. Map of Mozambique showing their national and international boundaries.

Table 1. Some of the socio-economic and ecological characteristics of Mozambique.

Parameter	Values
Population[1]	
Total population (2014) (millions)	**~24**
Rural population (millions)	**16.58**
Urban population (millions)	**7.52**
Average population density (peoples/km^2)[2]	**32**
Population below the average poverty line (2008)[3]	**54.7**
Land use[4]	
Available land (ha)	**6,966,036.00**
Arable land (ha)	**5,200,000.00**
Land area under cultivation (ha)	**5,842,052.26**
Land used for livestock production (ha)	**9,227,963.00**
Forests[4]	
Forest plantations (ha)	**228,800.00**
Native forest (ha)	**26,900,000.00**
Conserved forest (ha)	**4,092,279.70**
Concession areas (ha)	**3,257,542.070**
Protected areas (ha)	**12,419,545.40**
Fragile ecosystems (ha)	**10,118,992.40**
Energy[5]	
Woodfuel contribution to total energy consumption (%)	**80**
Hydropower contribution to total power supply (MW)	**13,000.00**
Hydroelectric production (GWh/year)	**65**
Contribution of hydropower to the total energy supplied (%)	**99**
Water[6]	
Renewable surface water resources (km^3)	**217.1 0**
Renewable groundwater resources (10 ^ 9 m^3/year)	**17**
Population drinking potable water in rural areas (%)	**33.20**
Population drinking potable water in urban areas (%)	**78**
Waste management [7]	
Households in urban and rural areas using pit latrines (%)	**19.10**
Rural population have access to sewerage systems (%)	**9.20**
Urban population have access to sewerage systems (%)	**40.90**
Average proportion of solid wastes collected daily in urban areas (ton/day)	**~ 800**
Natural Gas [5]	
Total reserve (bilhões de m^3)	**127.40**
Current production (billion m^3)	**3.12**
Current consumption (million m^3)	**80**
Mineral coal[5]	
Total reserve (2013) (billion)	**> de 2.50**
Current production (thousands)	**> 80**
Pollution[8]	
CO_2 emissions (000xtonnes)	**2,314.00**
Air pollution (PM_{10} (mg/m^3)	**26**
Fishing potential (tonnes)	
Marine potential[9]	**295,500**
Freshwater potential[10]	**62,444**
Total minimum potential	**244.9**
Total maximum potential	**357.9**

1.3 Report Objectives

The purpose of this report is to update and inform about the status and trends of biodiversity; measures and initiatives undertaken and their effectiveness in achieving the objectives of the CBD for a period of five years, since the presentation of the Fourth National Report in 2009. More importantly, the report serves as a valuable tool for planning biodiversity at national level.
The specific objectives of the report are:

(i) give prominence to the contributions of biodiversity and ecosystem services for human well-being and socio-economic development of the country;

(ii) assess the status and trends of threats and implications of changes in biodiversity;

(iii) evaluate the implementation of the NBSAP (2003), focusing on the actions, results and the extent to which objectives and related goals have been met;

(iv) describe how the integration of biodiversity has been addressed at the level of sectoral policies and strategies;

(v) assess the extent to which the targets of the Millennium Development Goals (MDGs) and the Aichi Biodiversity Targets were achieved.

PART I. STATE TRENDS AND THREATS TO BIODIVERSITY

1. Importance of biodiversity in Mozambique

Mozambique has a rich biodiversity that contributes to the country's economic development and poverty reduction in its population.

1.1. Forest resources

About 70% of the territory of Mozambique is covered with vegetation, 51% forests, constituting 40,6 million hectares and 19% of the other types of woody vegetation, corresponding to about 14.7 million hectares. The use of forests in Mozambique contributes to poverty alleviation as well as for economic development in general. For example, 90% of rural energy and large urban centres comes from firewood and charcoal (being that the tree cutting is not selective) and over 80% of the population uses medicinal plants and various non-timber products for their survival. In addition, 26.9 million hectares of wood are exploited commercially.

Apart from the contribution to socio-economic development, forests contribute to carbon sequestration, protection of water catchment areas and have an important role in mitigating climate change.

1.2 Fishery resources

Mozambique is a country with high potential for fish production derived from its coastal location (2,800 Km long and 200 miles of Exclusive Economic Zone, providing 586,000 Km^2 of surface ocean water). There are also 25 major rivers with permanent flow of water, the most important being the Zambezi River (Figure 2) and several inland bodies of water and floodplains that provide fish to the population throughout the year. Artisanal fishing is crucial and fish products constitute more than 20% of animal protein and in some cases the fish is the only a source of protein.

It is estimated that the fishery sector contributes about 2% of the national GDP. In 2013, the national fisheries production was 213,436 tons, 12.5% of which was from the semi-industrial and industrial fishing and 0.23% from aquaculture. Data from census in 2007 indicated that 343,000 artisanal fishermen and others are involved in the fishing industry, of which 18% were women and all depend directly and indirectly on fishing activities.

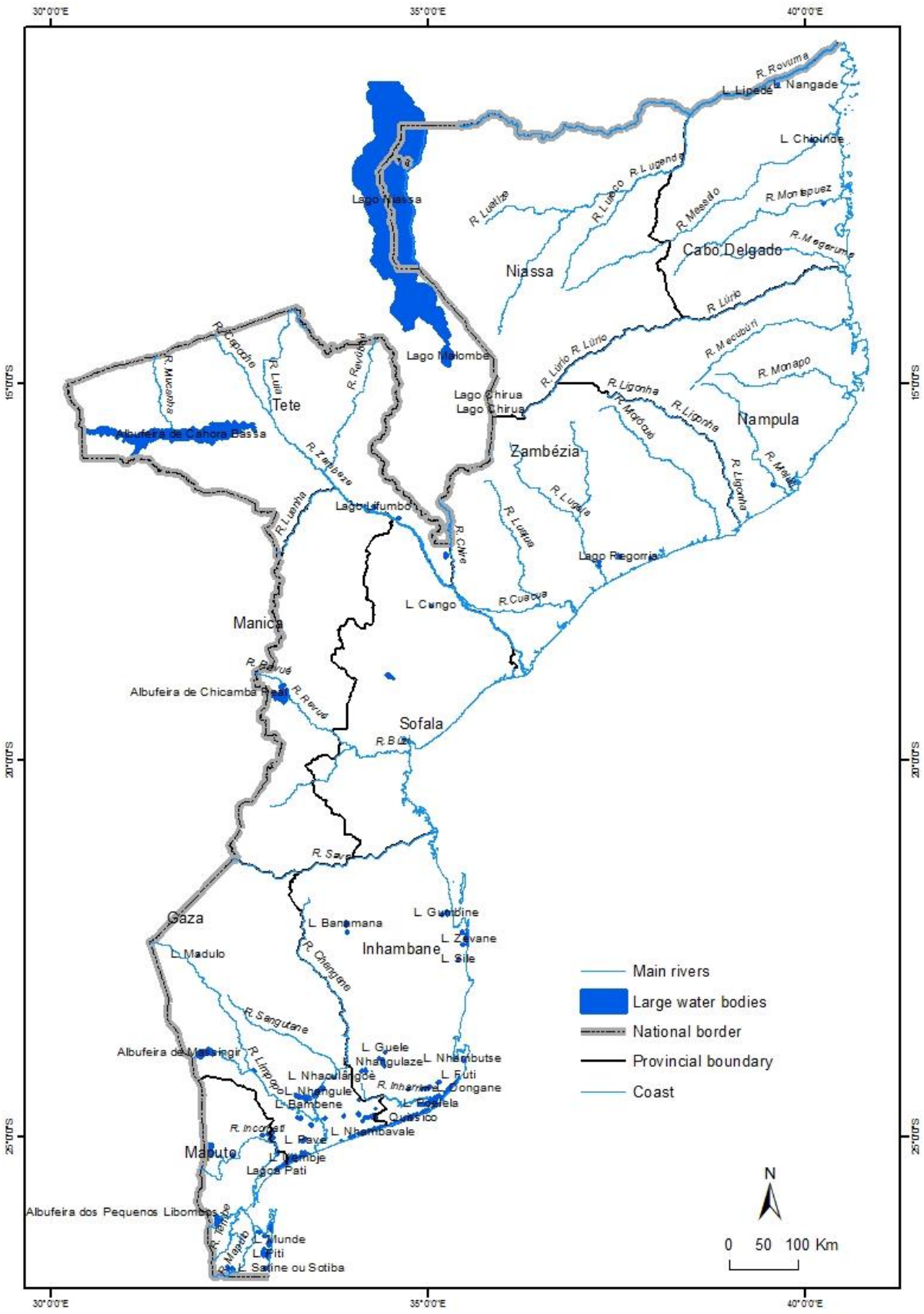

Figure 2. Hydrographic Network of Mozambique illustrating its major rivers, lakes and ponds.

1.3. Wildlife

Mozambique has a rich diversity of wild mammals, with the largest population of dugongs of the East African coast. About 50% of bird species in southern Africa occur in Mozambique. The variety of species and their habitats provides a tourist attraction (domestic and international) and stimulates the tourism industry. Tourism is the third largest sector investment in the country and a source of employment. It is estimated that the sector has contributed MZN 32.7 billion to the national GDP in 2013 and 6.4% of total employment (718,000 jobs) of the country, thus contributing to poverty reduction.

2. Significant changes and trends of biodiversity in Mozambique

2.1. Diversity of ecosystems

Natural ecosystems in Mozambique can be grouped into four main categories: (i) terrestrial, (ii) marine ecosystems (iii) coastal ecosystems and (iv) aquatic ecosystems. Figure 3 shows the major ecosystems and their conservation status.

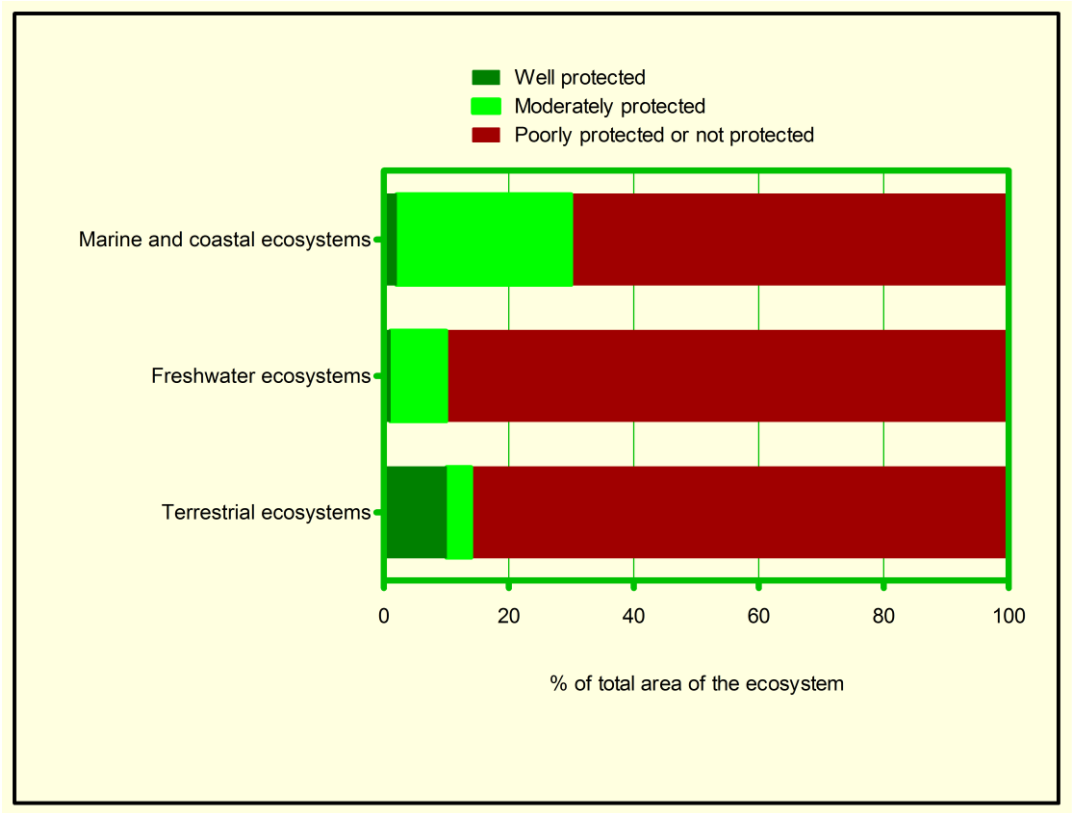

Figure 3. Conservation status of three predominant ecosystems in Mozambique

Over the past five years, the country has increased the network of protected areas to include the only aquatic (freshwater) protected area, Lake Niassa Partial Reserve, with 137,165,366 hectares.
Marine protected areas were also increased with the creation of Partial Reserve in Ilhas Primeiras and Segundas, comprising 1,040,926 hectares, and the Marine Protection Area of Maputo - Ponta de Ouro with 67,800 hectares. Some marine sanctuaries were also declared.
Land areas gained much more, with the establishment of additional national park, the National Park of Mágoè, with 350,000 hectares. Beyond this area, several *Coutadas* were created. Thus, the network of protected areas has increased substantially to include different aspects of biodiversity, representing currently about 26% of the country's surface (for details, see Figures 4, 5).

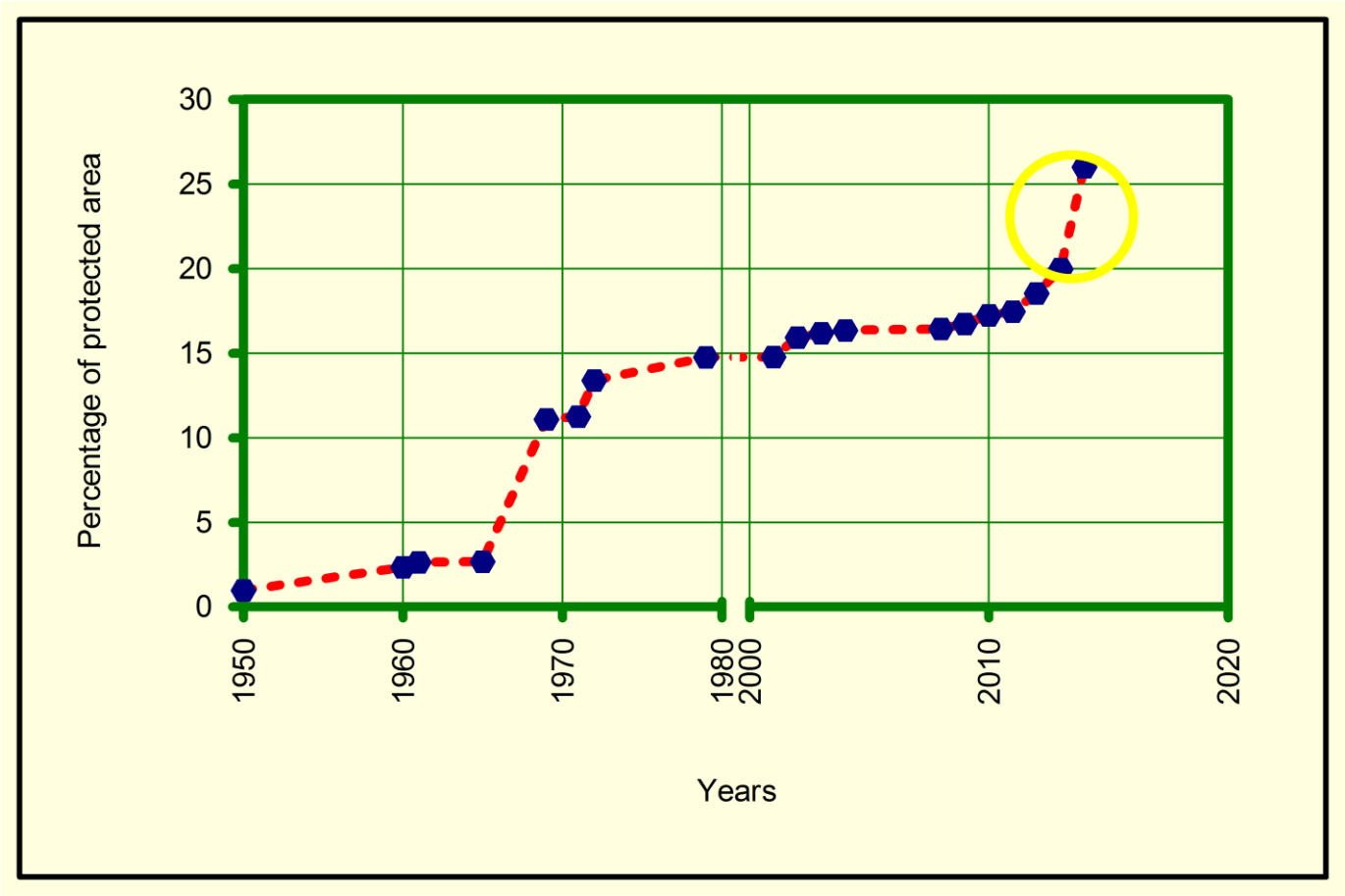

Figure 4. Growth of the Mozambique surface area protected for biodiversity.

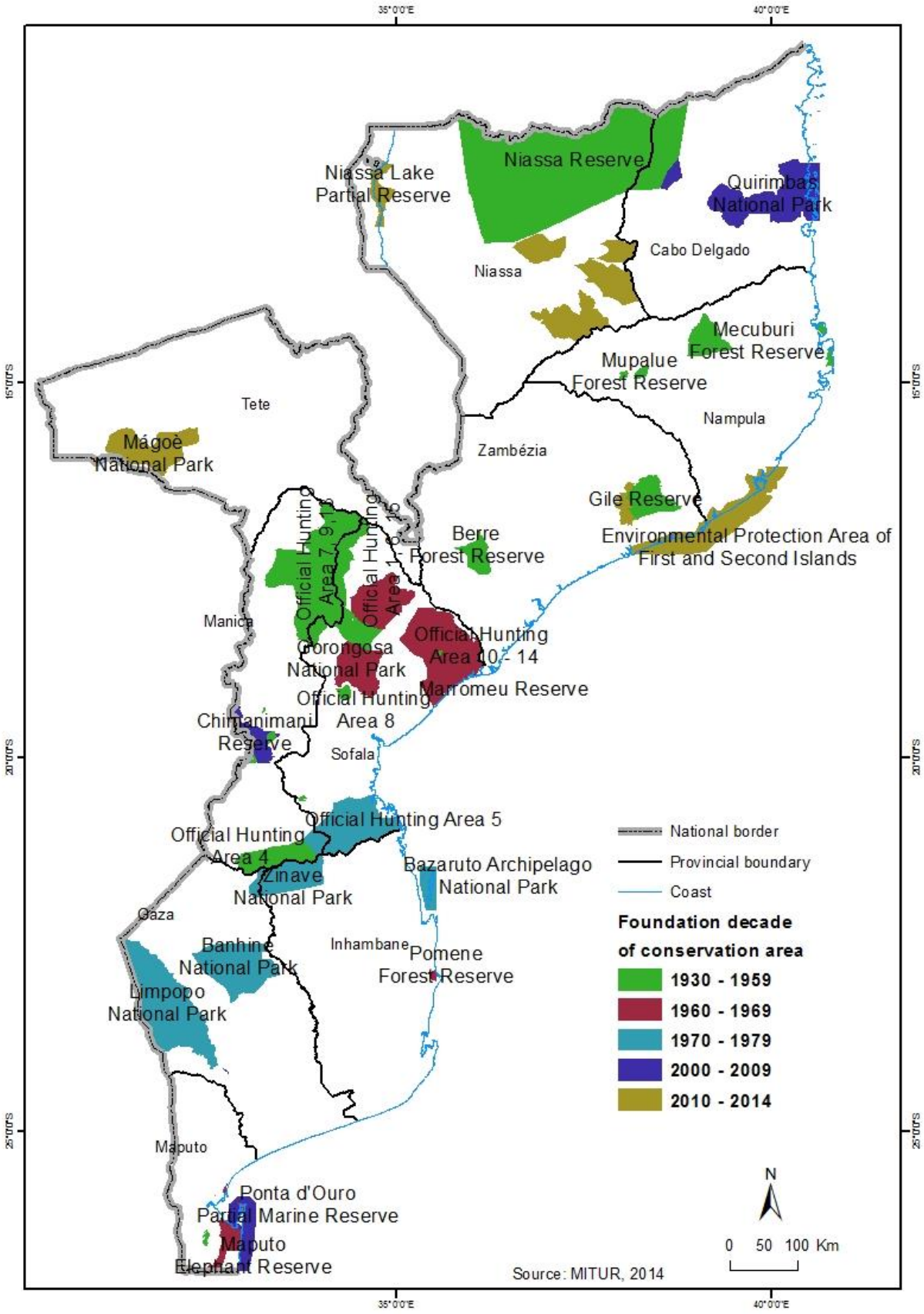

Figure 5. Distribution of protected areas in Mozambique and the validity period of their declaration areas.

2.1.1 Terrestrial Ecosystems

2.1.1.1. Major phytogeographic regions

The country has 4 phyto-geographic regions namely: (i) regional centre of endemism of Zambezi, (ii) regional centre of endemism of Swahili, (iii) Regional Transition Zone of Swahili-Maputaland and (iv) centre endemism of Maputalanad-Tongoland (Burgess and Clarke, 2000; Burgess et al, 2004.).

2.1.1.1. Terrestrial ecoregions

According to Burgess et al. (2004), Mozambique has 5 different biomes subdivided into 12 ecoregions. Table 2 presents the state of conservation of ecosystems in each biome.

2.1.2 Aquatic ecosystems and wetlands

Mozambique has wetlands and aquatic ecosystems whose importance is recognized at national, regional and international levels, of which Lake Niassa and the Zambezi delta are more obvious examples. The main types of aquatic ecosystems are rivers, swamps, deltas, natural and artificial lakes created by dams. Lake Niassa is located in the Rift Valley, between Malawi, Mozambique and Tanzania and 500 meters above sea level and has a depth of approximately 700 m (Vollmer, 2005) and a total area of 30,000 km^2, of which about 13,000 km^2 belonging to the national territory. The lake has rare habitats of global importance and is famous for its endemism, harbouring singularly cichlids (Ribbink et al., 1983).

Cahora Bassa is the largest artificial lake in Mozambique, formed by the dam of the same name on the river Zambezi. The artisanal and semi-industrial fishing developed in this area where kapenta (*Limnothrissa miodon*) is the main exploited fishery resource. Kapenta was introduced into Lake Kariba in the 60s from Lake Victoria, having successfully established at the Lake Cahora Bassa.

The Marromeu complex and the delta of the Zambezi are important wetland areas (Figure 6) recently designated as the Ramsar sites, supporting the largest population of waterfowl in Mozambique that includes species of pelicans, ibis, ducks and storks. Thousands of migratory species including flamingos depend on these habitats are used as breeding, refuge and feeding areas.

Some coastal lakes, swamps and wetlands that are temporarily flooded by the rains are located behind the coastal dune systems in southern Mozambique, the most important being the Bilene, Nhambavale, Quissico, Inharrime and Piti lakes. These are the major types of wetlands and habitat for fish species that are salt-tolerant (Hart & Boane, 2004).

Table 2. Conservation status of different ecoregions that occur in Mozambique (Burgess et al., 2004).

Biomes	Ecoregions	Conservation status	Localization
Tropical and subtropical rainforest	Mosaic of Coastal Forest of Southern Zanzibar-Inhambane	Critical	From the Rovuma River border of Tanzania in Cabo Delgado province up to Limpopo river in Gaza.
	Mosaic of coastal forest of Maputaland	Critical	Maputaland Region (from Canhana river up to Ponta de Ouro)
Prairies, savannas and shrublands tropical and subtropical forests	Shrubland Mopane of Zambeze	Relatively stable	Along the Zambezi Valley
	Southern Shrubland Miombo	Vulnerable	Western region of the country, including the Gorongosa region.
	Wooland-shrubland of Southern Africa	Threaten	Along the Elephant River
Flooded grasslands and savannas	Flooded savannas of Zambezi coast	Critical	Along the valley of the Zambezi, Púnguè, Buzi and Save Rivers.
	Flooded grasslands of Zambezi	Relatively stable	Occurs in a patchy form along the Zambezi Delta.
	Halophytes of Maksadgad	Relatively stable	Valley of the Chengane River (Gaza)
Grasslands and shrublands of the mountains	Forest and grassland mosaic of the Rift Austral mountains.	Threaten	Several chain of discontinuous mountains in the north and centre of the country.
Mangroves	East Africa Mangroves	Critical	Along the Zambezi Delta and Limpopo (Quelimane, Beira)
	Southern Africa Mangroves	Threaten	South of Maputo

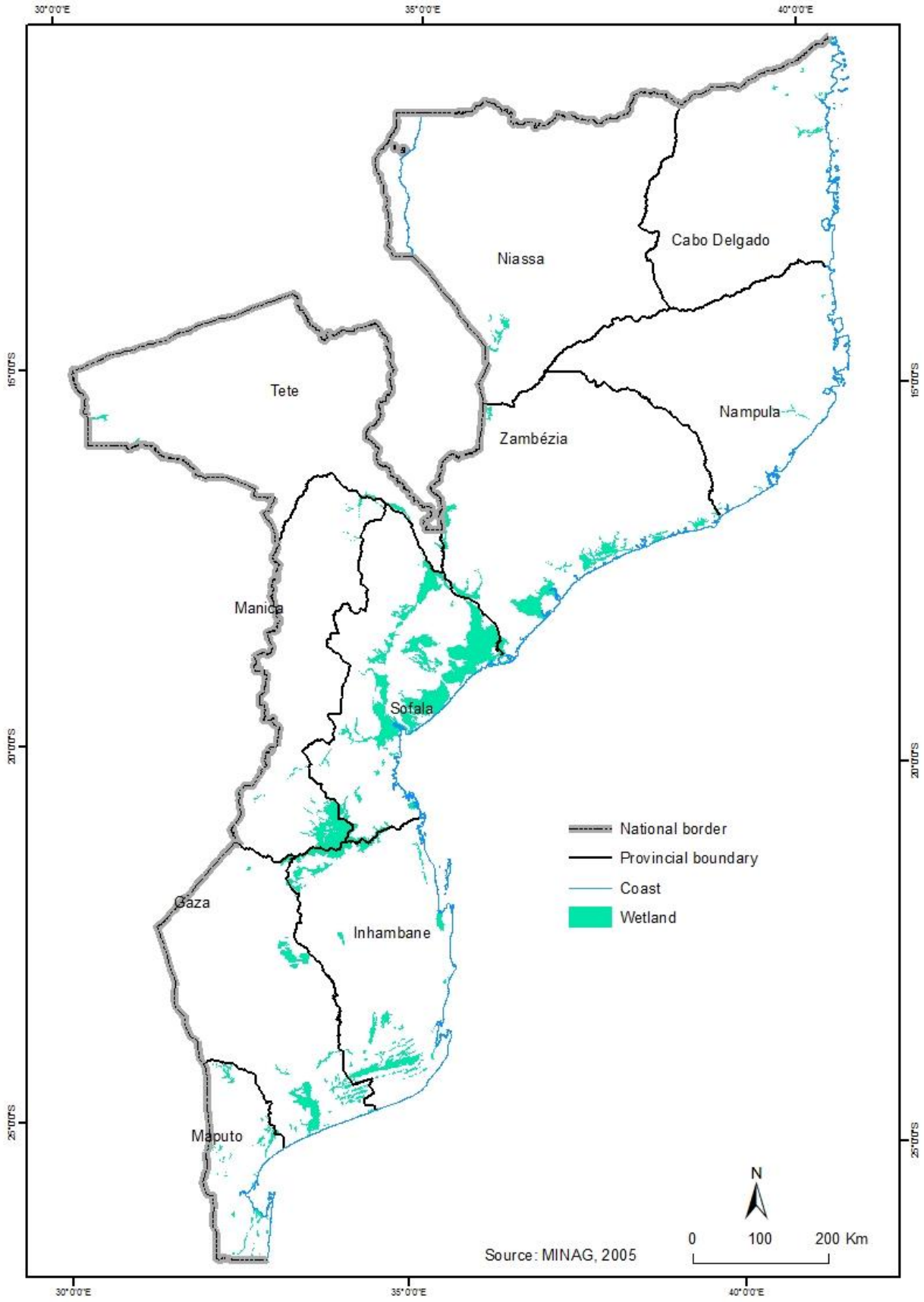

Figure 6. Localization of wetlands in Mozambique.

2.1.3 Marine and Coastal Ecosystems

Marine and coastal ecosystems occupy an area of approximately 572,000 km^2, about 42% of the country. These ecosystems include coastal dunes about 120 meters high that extend between Bazaruto Island and Ponta do Ouro, a distance of about 850 km. These dune systems are an important source of medicinal plants to local communities, some of which are endemic (Barbosa, 1995;. Bandeira et al, 2001). Associated with dune systems are the sandy beaches that cover about 120 km from the Mozambican coast line (Pereira et al., 2010).

The sandy beaches provide a suitable habitat for the reproduction of five species of endangered turtles. Hotspots for breeding sea turtles include the beaches of the Marine Reserve Ponta do Ouro, Bilene, Bazaruto Archipelago, Quirimbas Archipelago and Ilhas Primeiras e Segundas. The area between the dunes and sandy beaches is typically colonized by pioneer species of plants that hold the sand particles to form dunes.

With regard to the marine environment, it is estimated that seagrass ecosystems have a coverage of 439 km^2 in Mozambique, which mostly lie in the Quirimbas Archipelago in the Bay Fernão Veloso, the Bazaruto Archipelago and in Maputo Bay (Bandeira & Gell, 2003). Were already identified 13 species of seagrasses. Seagrass have an important role as breeding and feeding for many species, including commercially valuable species and threatened species such as turtles and dugongs.

Mozambique has coral reefs with a coverage area of 1,890 km^2 (Spalding et al., 2001). The reefs are distributed almost continuously along the northern coast from the Rovuma River to the Ilhas Primeiras e Segundas, northern the bank of Sofala (Rodrigues et al., 2000), and for the most part hard corals, although in some areas are soft corals. From the Bazaruto Archipelago to Ponta do Ouro, soft corals are dominant (Pereira, 2003; Celliers and Schleyer, 2005).

The conservation status of most corals is generally good although the abundance of fish species in these areas is reduced or dominated by small herbivorous fish.

Mangrove forests cover approximately 357, 000 hectares (Marzoli, 2007), mostly in the protected areas of the coast (estuaries and deltas of large rivers such as the Zambezi, Save and Púnguè) (Saket and Matusse, 1994; Barbosa et al. 2001). Other mangrove areas include the mouth of the Limpopo, the Angoche, Maputo and Inhambane Bays and the estuarine system of Good Signs in Quelimane and a continuous coastal belt in a northerly direction to the mouth of the Rovuma River. Were already identified nine species of mangroves in Mozambique. However, the mangrove area has been decreasing in recent years. Figure 7 shows the mangrove reduction levels in the last 40 years.

The degradation of some mangrove habitat constitutes a concern. The mangrove area decreased nationwide from 408,000 ha in 1972 to 357,000 ha in 2004, with a total loss of 51,000 within 32 years. Additionally, the decline increased from 67 hectares per year

(-0.2% per year) between 1972 and 1990 to 217 hectares per year (-0.7% per year) between 1990 and 2004 (Mazoli, 2007). The latest estimates are 446.712 hectares.

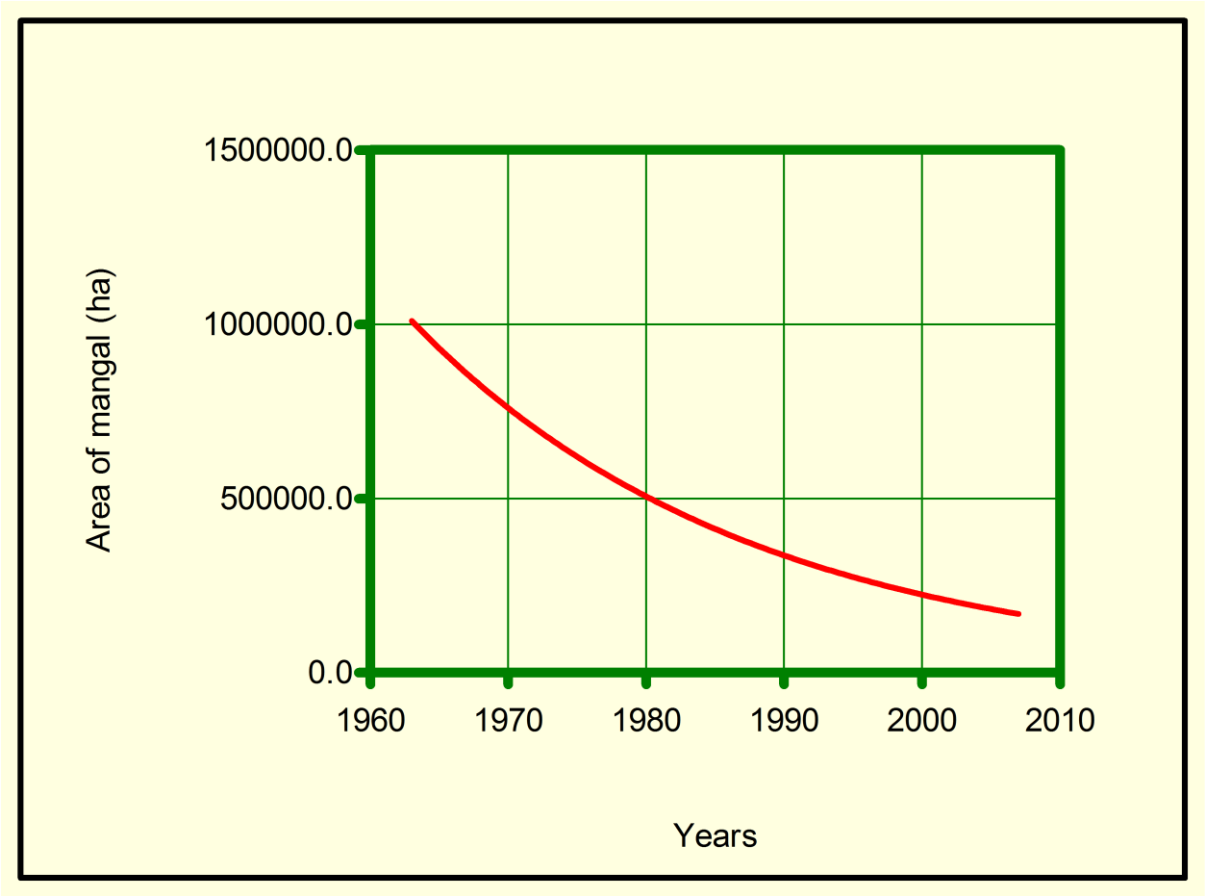

Figure 7. Evolution of mangrove coverage in Mozambique between 1963 and 2007.

2.2. Species diversity

The level of knowledge of the diversity of species which occur in Mozambique remains weak, given the recognized potential of the country as regards the wealth of ecosystems and habitats and their productivity (see Box 1). Figure 8 illustrates the number of species recorded within the main major taxonomic groups and their relative proportions. According to MICOA (2003) and Schneider et al. (2005), a total of 4,271 terrestrial species have been recorded, 72% of which are represented by insects, birds by 17%, with only 5% mammals and amphibians remaining 2%.

About one thousand species of cartilaginous fish were recorded, while for crustaceans and sea turtles are recorded 82 and 5 species, respectively (Fischer et al. 1990). The major groups of organisms of marine waters of Mozambique are listed in Table 3 below.

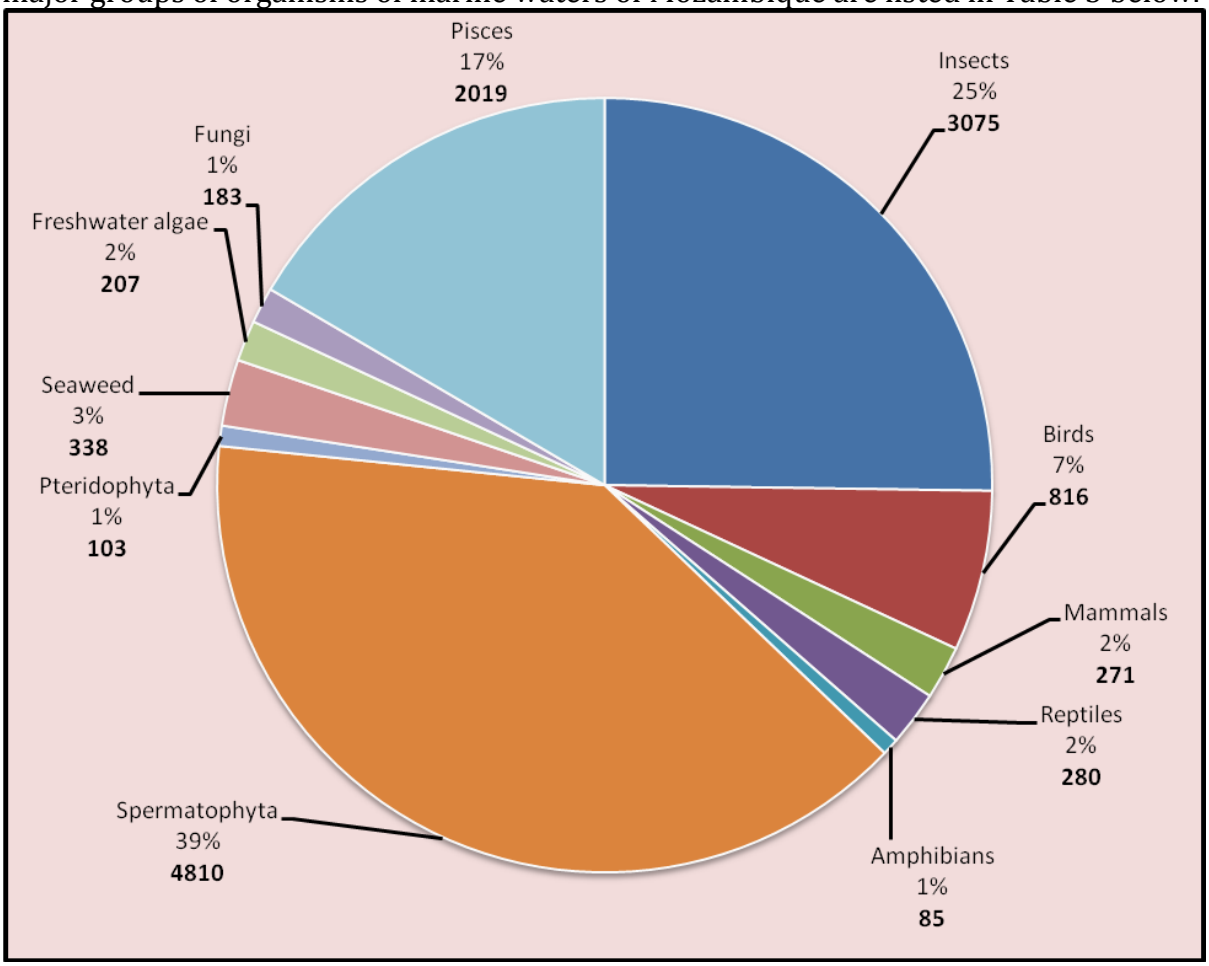

Figure 8. Diversity of species and their relative proportion (MICOA, 2003, Schneider et al., 2005).

Table 3. List of major groups of organisms in marine waters of Mozambique (Source: Fischer et al., 1990).

Group	Sub-group	Number of species
Fish	Finfish	1007
	Cartilaginous fish	93
Crustaceans	Crustaceans	82
Molluscs	Bivalve	24
	Gastropods	41
Echinoderms	Sea cucumbers and sea urchins	20
Cephalopods	Squid and cuttlefish	16
Reptiles	Sea Turtles	5

Concerning plants, the previous record (MICOA, 2009) indicates the occurrence of 5,641 species. The most recent expeditions covering the Montes Chiperone, Mabu and Namuli and the coastal area of Cabo Delgado (Timberlake et al., 2007, 2009 and 2011), increased the number to 5,781 species of plants, over 140 species, 35 of which constitute new taxa and 105 new records in Mozambique (to the diversity of insects, see Box 2).

2.2.1. Endemic species

Studies of endemic species in Mozambique are scarce. There are two centres of endemism for plants: Maputaland Centre of Endemism in the south and centre of endemism of Chimanimani in the central area. These centres have about 250 and 100 respectively endemic to Maputaland and Chimanimani (Wyk and Smith, 2001).
Recent studies conducted in the centre and north of Mozambique (Timberlake et al., 2009, 2011) show that there is a relatively high number of endemic species. For example, the number of plant species recorded in Mozambique, about 800 species are endemic and nearly endemic (Timberlake, personal communication, 2014). The mountainous areas of Mozambique are relatively rich in endemic species with at least 45 species of plants that are only found in Chimanimani (Figure 9).

Box 1. Biodiversity of Gorongosa National Park

The Gorongosa National Park, is located in central Mozambique. It is characterized by a recognized floristic and faunal diversity. Its ecological richness and biodiversity have been recognized by explorers from other countries for more than three centuries ago. In the 70s, the floodplain of the park recorded the most remarkable concentration of large mammals known in Mozambique. Unfortunately, the game that was moved to its fauna in the years that followed national independence of Mozambique until the 90s decimated its biodiversity. In subsequent years, I have just been brought a program of restoration that culminated in the recovery of their ecosystems, whose positive results are visible today. A scientific expedition conducted in 2013 (PNG, 2013) documented the presence of about 1,000 species of animals and plants in this region, bringing the total number of species recorded for the Gorongosa National Park to over 2,800. In some groups of organisms, mostly insects and plants, scientists are still participating in the identification of the material collected process and thus the exact numbers of species recorded from the park are likely to change. The top reasearch results for the major groups of organisms were as follows: Ants (Hymnoptera: Formicidae) - 125 species of 37 genera; at least five species are new to science; about 90 species are new to Mozambique, everything is new to the park (about 35% of the collected material continues to be processed). Beetles (Coleoptera) - About 100 species of dung beetles (Scarabaeidae), possibly up to 10 species are new to science (almost 50% of manure and 350 traps continue to be processed); other than scarabs (100 + additional samples) beetles continue to be processed. Grasshoppers (Orthoptera) - 137 species in 105 genera; 5 species are new to science; 109 species are new to Mozambique (about 30% of the collected samples continue to be processed). Amphibians (frogs and toads) - 33 species in 17 genera; Three species probably new to science. Reptiles (lizards, snakes, turtles, crocodiles) - 47 species in 36 genera. Birds - 189 species recorded, including six species of owls, six species of tutas, six species of hummingbirds and five species of woodpecker; Recorded 29 species of birds are species new to the park list. Small mammals (less than 10 kg body weight) - 24 species of bats (six new to the park, possibly for a new science); 15 other species of small mammals (Carnivora, Rodentia, Lagomorpha, Macroscelidea). Large mammals - 25 species, including first records of spotted hyena and zebra plains Cheringoma Plateau. Plants - at least 267 species of vascular plants (about 45% of the collected material remains to be identified).

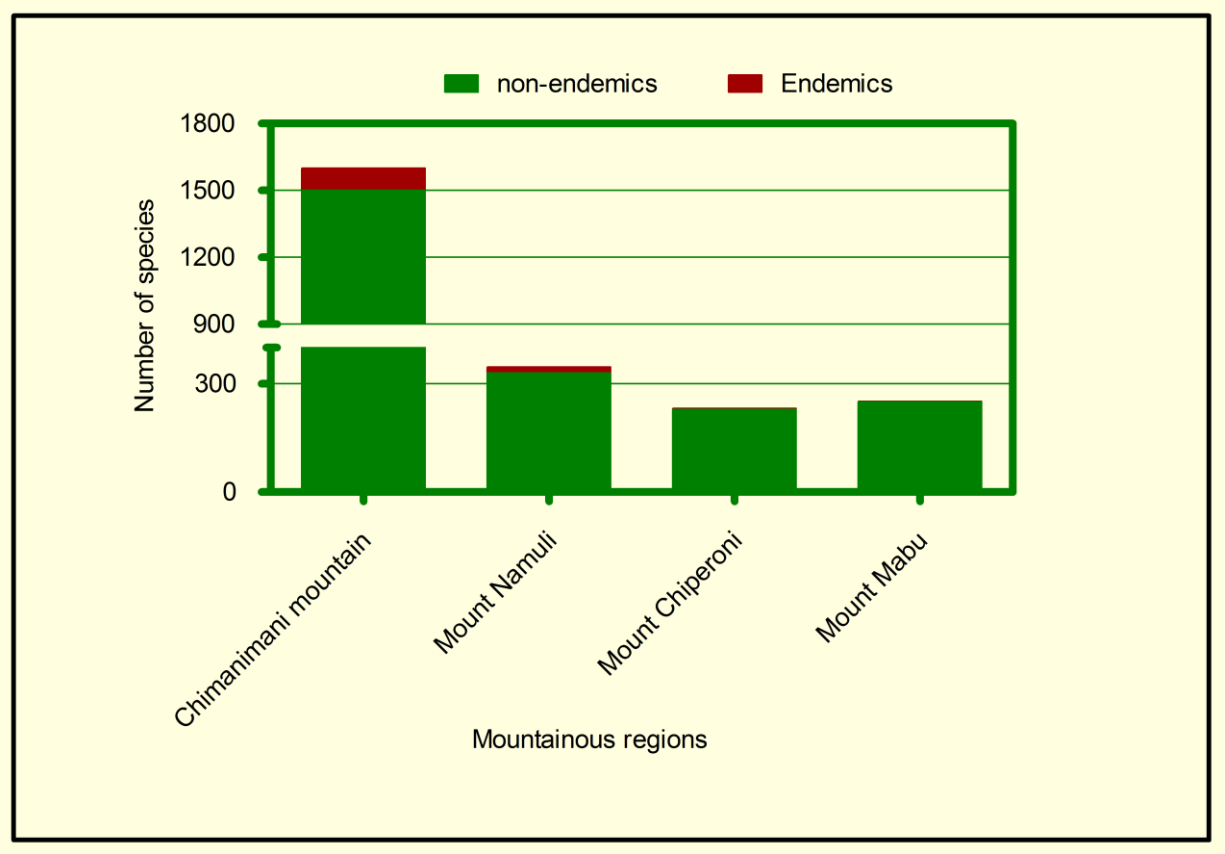

Figure 9. Diversity and endemism of the mountain regions of Mozambique.

Box 2. Insect biodiversity in Mozambique

As is the case globally, the species richness of insects of Mozambique is very poorly documented. Some information about the diversity of insects Mozambique comes from Ferreira (1961), Dias (1966), Muatinte (2000) and Garcia Flag (2010) and Chirindza (2014). Ferreira (1961) described 608 species of beetles (Coleoptera: Escarabaeidae) while Dias (1966) described 135 species of flies (Diptera: Tabanidae) in Mozambique. On the other hand, Muatinte (2000) estimated that over 25% of insect species of a group of 1135 species of animals inventoried the Collection of Zoology, Department of Biological Sciences. Garcia and Flag (2010) did a Biodiversity Survey of fruit flies of Mozambique. More than 1,500 insect species were inventoried in Insect Collection of the Museum of Natural History, Maputo, from this (Figure 1) number Chirindza (2014) found about 850 species of beetles. However, the challenge remains to estimate the contribution of beneficial or harmful insects in the provision of ecosystem services and prospects for its conservation in Mozambique. These challenges are even greater given the shortage of specialists in Entomology and the limited importance that society attaches to the beneficial socio-economics, ecology and culture insects. On the other hand, there is poor dissemination, sharing and use of results of scientific research done in this area in Mozambique. The absence of information on the diversity of insects in national publications also noted in oficais documents. However, the level of research and record the diversity of insects in Mozambique is rising (Figure 2). Nevertheless, new insect species were recorded. For example, Kondo (2006) noted the mealybug Pseudocribrolecanium gen. November (Hemiptera: Coccoidea: Coccidae). Lehman & Kioko (2005) reported Paraptychodes tenuis (Lepidoptera: Geometridae) as endemic to the coastal area in southern Mozambique. Clausnitzer (2006) noted that as a result of habitat degradaçãoo, Ceriagrion mourae (Odonata: Libellulidae) was to be confined to certain coastal woodlands from northern Mozambique to Tanzania. Clausnitzer et al. (2011) noted the occurrence of *Chlorolestes elegans* (Odonata: Libellulidae) in northern Mozambique, a species that has been assigned the status of vulnerable by the IUCN. Ran et al. (2010), Mawdsley & Sithole (2012) and Abdel-Dayem & Kippenhan (2013) have referred Mozambique as one of the areas of occurrence, distribution and habitat of various species of Coleoptera (Ciccindelidae) bearing their protection. The national parks and reserves are incubators and contribute to the protection and conservation of species of insects, particularly beetles (Coleoptera: Scarabaeidae) (Davis et al 2013.). Gressit (1974) examined the biogeography of insects and included Mozambique, particularly the coastal zone and the adjacent islands as dispersal zones, conservation and distribution of insects. Lawes et al. (2007) reinforced this view and considered these areas as centers of resilience of faunal communities along South Africa. Insect diversity of mountain ecosystems was currently operated by Timberlake et al. (2009) reported that new species of Lepidoptera in Chiperone lot with emphasis on endemic Cymothoe melanjae (Lepidoptera: Charaxidae) (Figure 3). Were recorded for the first time in Mozambique butterflies *Eurema senegalensis*, *Eurema floriculture* (Pieridae) *Bicyclus vansoni* (satyridae), *Anthene lunube* (Lyceanidae) and wide Platylesches (Hisperiidea) (Steve Collins with. Staff). Olmi et al. (2012) cataloged the wasps (Hymenoptera: Dryinidae) chiruanus Gonatopus and described as a new species in Mozambique. The role of insects as food (Figure 4) is little reported despite being relevant in the supply of proteins and fats, and as a source of income for rural populations, especially the central and northern parts of the country

(Kenis et al unpublished;. Muatinte, unpublished). The regulatory role of insects as pests is widely reported since Ferreira (1966) reported that most of longicornios Mozambique as agricultural and forest pests until Chiconela et al. (2003) on the estimates of the outbreak of the plague of locusts in Mozambique. In recent years, Cugala and Mangana (2009), reported the fruit-flies, Grobbelaar et al. (2010) Chaboo et al. (2010) Biology and host plants of trigonalis Oberea (Coleoptera: Cerambycidae) and Oncocephala promontorii (Coleoptera: Chrysomelidae), respectively. Ferreira (1961), French & Wilson (2012) made a general review of the state of knowledge of insect biodiversity in Mozambique, its socio-economic ecological and their conservation status.

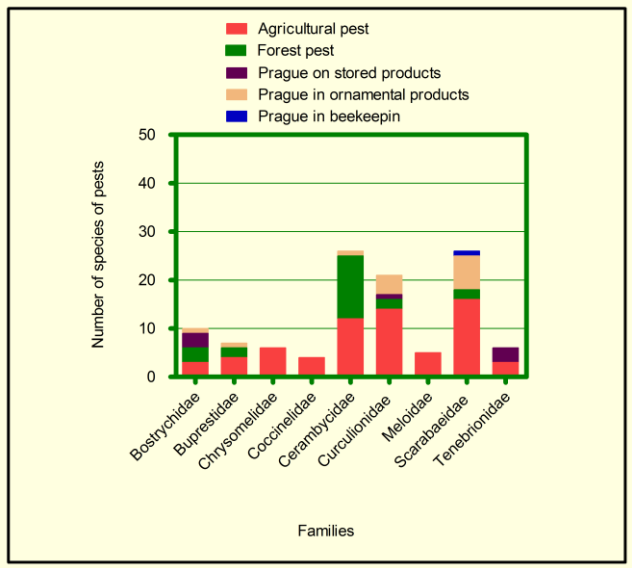

Figure 1: Diversity of insects represented in the Museum of Natural History in Maputo. To the right, Figure 3, illustrating a new species of Lepidoptera described in Mozambique.

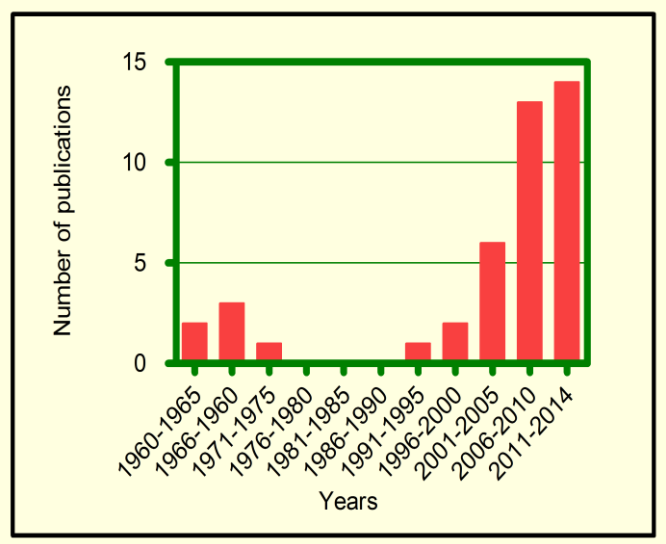

Figure 2: Evolution of the number of publications on insects in Mozambique. At right, Figure 4 a typical Mozambique plates using insect as food.

There are also three sub-species of large terrestrial mammals that are endemic to Mozambique, as *Equus burchelli* subs.boehmi (zebra); *Connochaetes taurinus johnstonii* (cocone) and *Aepycerus melampus* subs. johnstonii (impala johnstonii).

In the last five years new species were discovered in Mozambique as a result of new scientific studies and expeditions in previously inaccessible locations. Some of the species have been identified eg in Monte Inago and these include: pygmy chameleon (*Rhampholeon sp.),* Butterfly (*Cymothoe sp.),* Carrangueijo freshwater (*Potamonautes sp.*), and possibly a new species (*Encephalartos sp.)* (Bayliss, 2010).

2.2.2. Threatened and endangered species

The number of threatened species shows a tendency to increase in Mozambique and Figure 10 shows the trend since 2002. Figure 11 shows the proportion of threatened and endemic species relative to the total number of known species (threatened and not endangered) within the main taxonomic groups.

More than 300 species of plants are on the IUCN Red List, 22% of which are confirmed as being endemic. Some species e.g encefalartos that deserve attention include *Encephalartos munchii* and *E. pterogonus*. On the other hand, *E. senticosus* is critically endangered and *E. lebomboensis*, *E. umbeluziensis* and *E. chimanimaniensis* are threatened. Finally, *E. aplanatus* and *E. ngoyanus* are vulnerable (www.iucnredlistorg, 2014).

A recent study (Global conservation assessment) evaluated 20 species on the red list in the hills of Namuli; these three were classified as critically endangered including *Alloeochaete namuliensis*, *Crotalaria torrei* and *Plectranthus guruensis* by the criterion B1 and B2; *Aloe torrei*, *Senecio peltophorus* and *Exacum zombense* as threatened by the criterion B1. The species *Plectranthus gurueënsis* was observed only in two sites. The remaining were assessed as vulnerable and near-threatened (Timberlake et al., 2009). On the other hand, 31 species from Cabo Delgado were included in the Red List, 10 of these were threatened and the majority were vulnerable (Southern Africa Group Red list, in Progress Report, 2014).

A general assessment of plant diversity points to its decrease in the future due to pressure from agriculture, fires and roads (see Box 3). The Figure 12 shows the conservation status of plant species in the IUCN Red List.

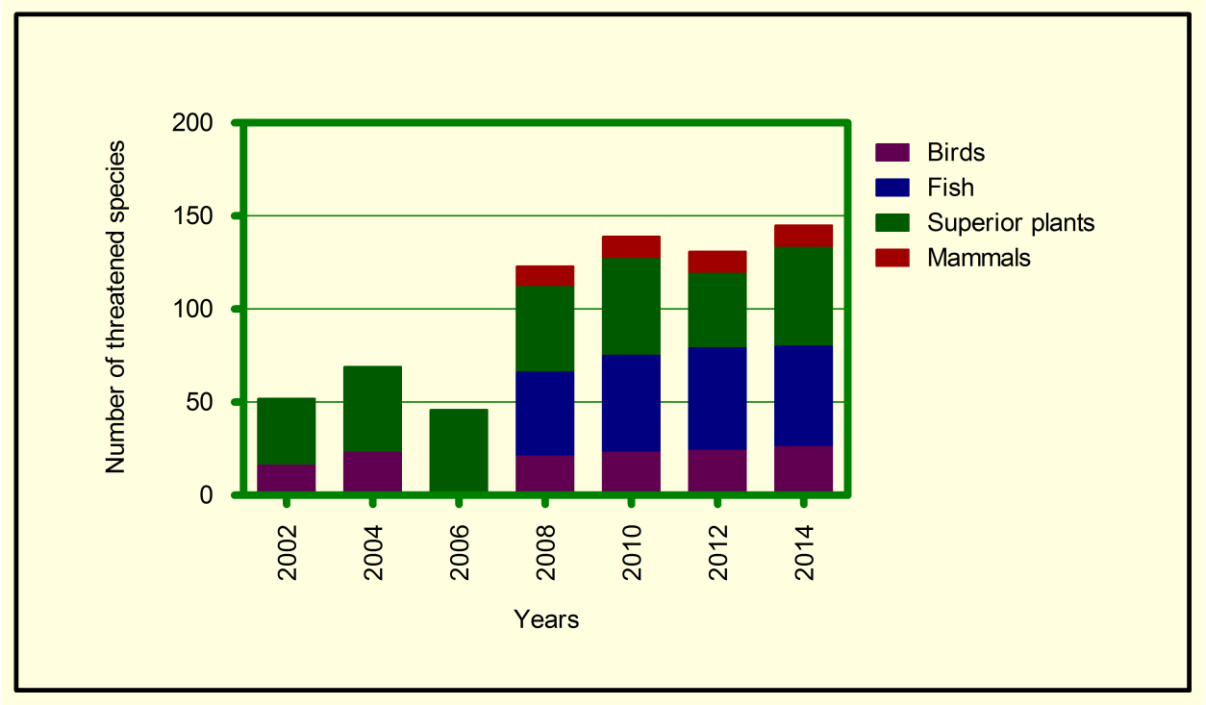

Figure 10. Record of threatened species in Mozambique between 2002 and 2014.

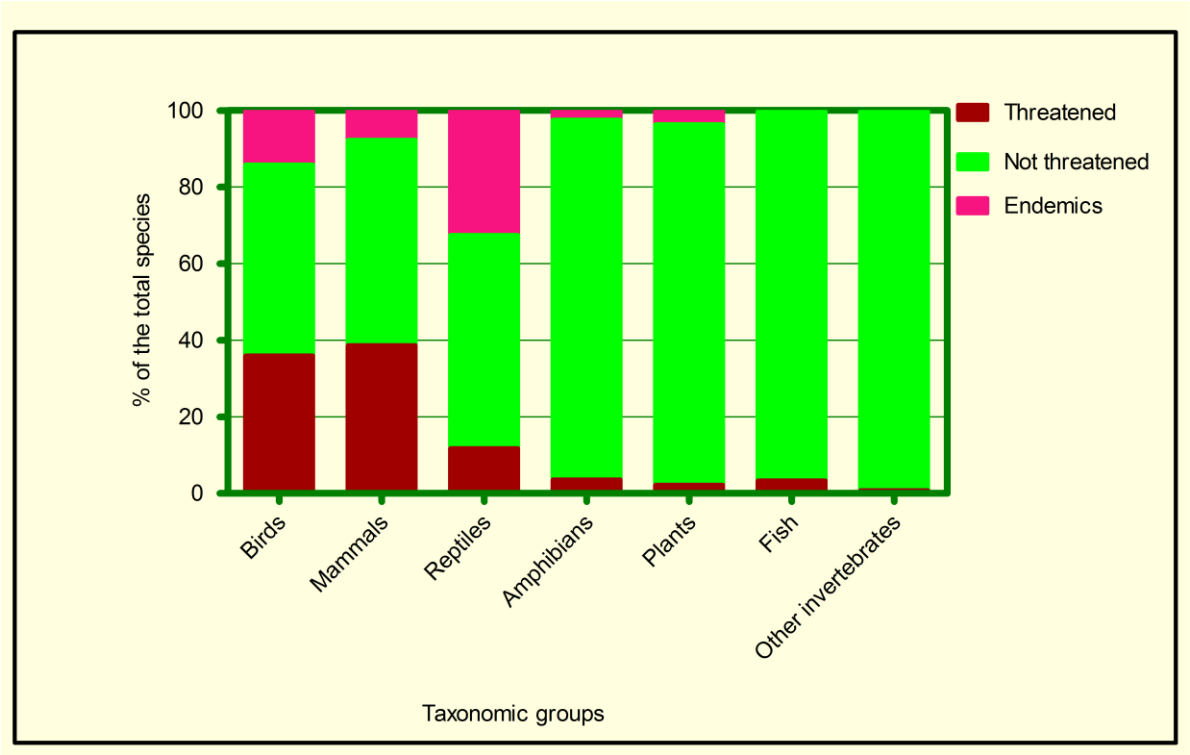

Figure 11. Percentage of threatened and endemic species by taxonomic groups.

The most endangered mammals in Mozambique include white rhino (*Ceratotherium simum*), common tsessebe (*Damaliscus lunatus*), sitatunga (*Tragelaphus spekei*), black rhino (*Diceros bicornis*), the giraffe (*Giraffa camelopardalis*), Grey Palapala (*Sable equinum*), reedbuck (*Redunca fulvorufula*) and the cheetah (*Acinomyx jutabus*). The white rhino, giraffe and Grey-Palapala were re-introduced in the Limpopo National Park and giraffes in the National Reserve of Maputo. Two hundred and sixty birds species are of concern due to its state of global and national conservation (Schneider et al., 2007).

There are five species of sea turtles along the coast of Mozambique *Caretta caretta* (*loggerhead turtle*), *Lepidochelys olivacea* (pacific ridley turtle), *Chelonia mydas* (Green turtle), *Dermochelys coriacea* (Giant Turtle) and *Eretmochelys imbricata* (hawksbill sea turtle). All sea tartugas are included in the IUCN Red List.
The dugongs are seriously threaten, and the population of the Bazaruto Archipelago probably represents the most viable population in Southern Africa (MICOA, 2006).

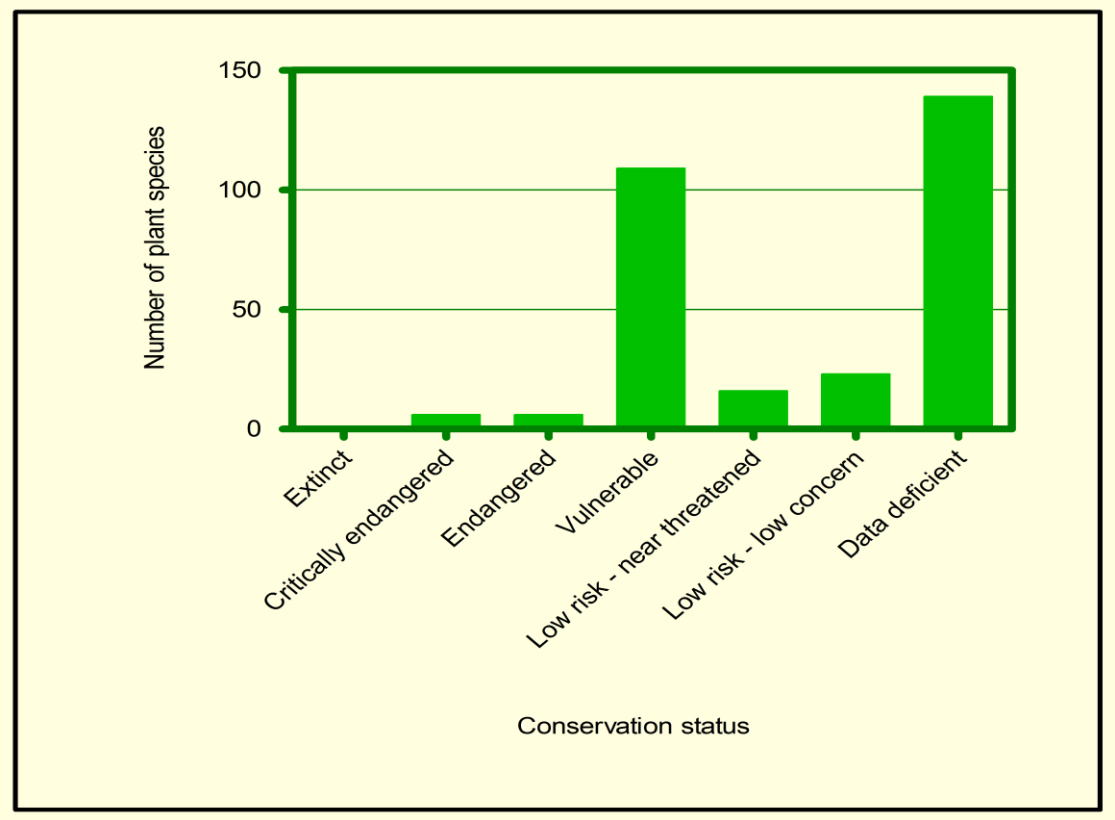

Figure 12. Conservation status of plant species included in the IUCN Red List in Mozambique.

Regarding the birds, Table 4 shows the species of birds that deserve special attention and Figures 13 and 14 show the areas of importance for the occurrence of birds and its endemicity.

Table 4. Species of birds that deserve particular atention in Mozambique.

Espécie	Level of Endemism	Occurence	Conservation status of the species
Modulatrix orostruthus	Endemic (Mz e Tz)	Mt Namuli	**Vulnerable**
Circaetus fasciolatus	---	Coastal and riverine forest (South of Maputo;Rio Save)	**Near Threatned**
Anthreptes reichenowi	---	Coastal forest and inland forest of ironwood	**Near Threatned**
Apalis chirindensis	Endemic (Mz e Zb)	Mt Chimanimani-Nyanga	**Least Concern**
Dendropicos stierlingi	Near endemic (Mz, Tz, Mw)	Brachystegia Forest	**Near Threatned**
Swynnertonia swynnertoni	Near endemic (Mz, Tz, Zb)	MtChimanimani-Nyanga	**Vulnerable**
Apalis moreaui* subsp. *Sousae	Endemic (Mz e Tz)	Njesi Plateau	**Critical endangered**
Nectarinia neergardi	Endemic (Mz e RSA)	Inhambane, Gaza, Maputo	**Near Threatned**
Ploceus olivaceiceps	Endemic	Inhambane (Northeast and Southeast)	**Near Threatned**
Grus carunculatus	---	Banhine National Park, Zambezi Delta	**Vulnerable**
Rhynchops flavirostris	---	---	**Near Threatned**
Gyps coprotheres	Endemic for Southern Africa	Mt Libombos	**Vulnerable**
Sheppardia gunningi	Mozambique, Tanzania e Quénia	Chinizuia; Mt Mabu	**Near threatened**
Alethe choloensis	Endemic (Mz e Mw)	Mt Namuli e Chiperoni	**Endangered**

Apalis lynesi	Endemic	Mt Namuli	**Near Threatned**
Apalis chariessa	Near endemic **(Tz, Mz)**	Mt Chiperoni	**Vulnerable**

Box 3. Diversity of Plants in Mozambique

The diversity of plants in Mozambique is poorly known. The first studies on the diversity of plants, were made within the activities of the Botany Expedition which began in 1942, which included projects like overseas Joint investigations and its Botany Centre. These activities had a huge breakthrough in botanical studies, culminating in the preparation of various series and issues Flora Zambeziaca and Flora of Mozambique in the late 60's, where several families and species have been described. The latest publications of the Flora of Mozambique were Jeffrey & Fernandez, in 1986 before the height of the civil war, during which there was little or no study on biodiversity. In 2001, was conducted by SABONET a large study in Maputaland center of endemism. In 2004, the LMA herbal and LMU were used to produce a checklist in order to estimate the diversity of plants. Palgrave Coates et al. (2007) published a study on plants in Cheringoma; Muller et al. (2008) for Serra da Gorongosa; another study also in the Gorongosa Wursten (2013); Timberlake et al. (2009) for the mountains of Chiperone Mabu Namuli, and Timberlake et al. (2011) on the coast of Cabo Delgado. Currently, follows a study in Monte Chimanimani. Most specimens are stored at the National Herbarium LMA and University LMU. Mozambique is a country rich in diversity of plant species however, remains a challenge to estimate the number of species of plants. On the other hand the country is rich in endemic and nearly endemic species. About 800 species are endemic and almost endemic, most of whom threatened, were described in 2014 by the Southern Africa Redlist Plants Group; 31 of these species occur in Cabo Delgado of which 10 are threatened and most vulnerable. For Montes Namuli, 20 species were classified as threatened between 2006-2009, and three of them are critically endangered. Exist in Mozambique reserves for plant conservation, highlighting the Bobole Forest Reserve that protects the *Raphia australis*, the Derre Forest Reserve in order to protect forest species of commercial value; the Matibane Forest Reserve to protect *Androstachys johnsonii* (mecrusse). However, challenges remain in efficiency and effectiveness in the conservation of these reserves. Plants are an important resource for communities; are a major source for obtaining various food products, timber, medicinal, construction equipment, power supply, etc. The use of forests in Mozambique contributes to social and economic development. There is no concrete numbers in the country of plant species of interest to humans, but data indicate that about 70% of the population uses medicinal plants for their health care. Plants of interest to humans are: *Adansonia digitata*, *Uapaca kirkiana*, *Vangueria unfortunate*, *Ziziphus mauritianus, Annona senegalensis, Sclerocarya birrea, Landophia kirki, Euclea natalensis, Berchemia discolor, Ricinodendron rautanenii, Parinari curatellifolia, Tamarindus indica*, and among other more. Nevertheless, the clearing of vegetation for agriculture which is mostly itinerant, mainly for the production of coal close to urban areas, and frequent uncontrolled fires are major threats to their conservation in Mozambique, to the extent that lower primary native vegetation.

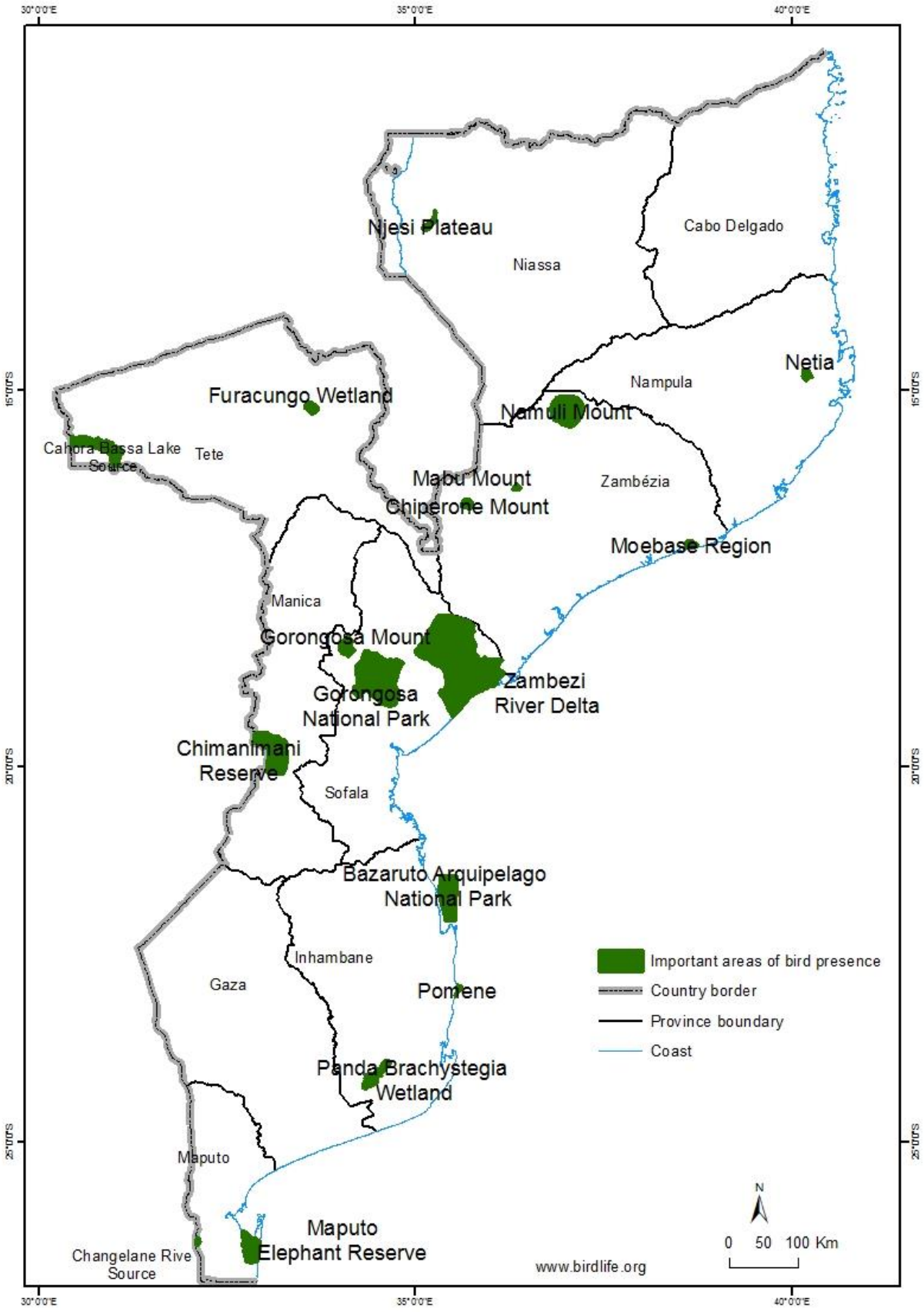

Figure 13. Location of Important Bird Areas in Mozambique.

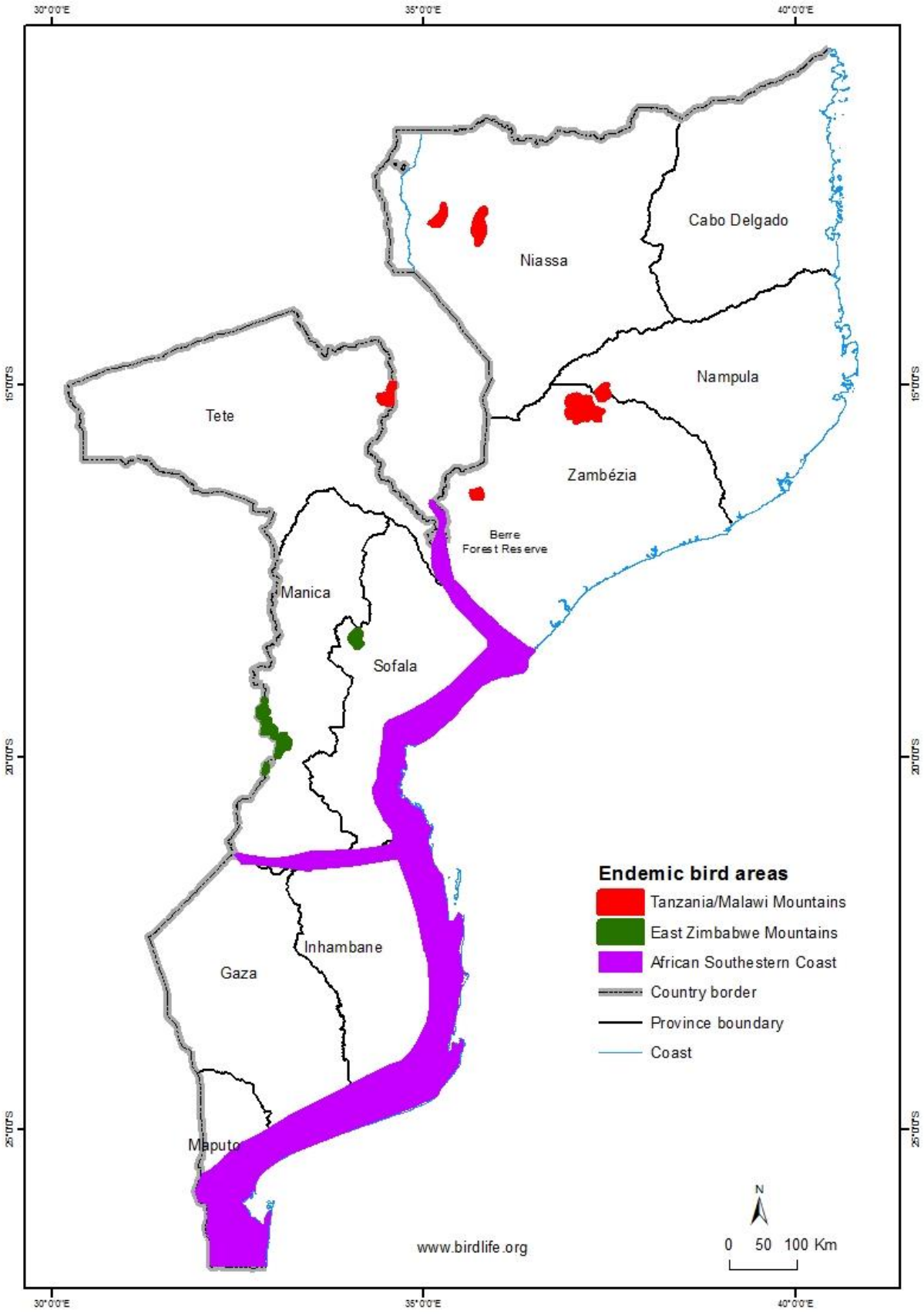

Figure 14. Areas of bird endemism in Mozambique.

3. Main threats to biodiversity

3.1 Main Causes

The proximal (or direct) causes of change of land use and hence the loss of biodiversity are human activities or immediate actions of the intended use and that directly affect land cover. They operate at the local level (individual portion of land, household or communities). They involve a direct action on the land cover (Hersperger et al., 2010). Thus, the proximal leading causes of loss of biodiversity in Mozambique are as follows:

- Conversion, loss and fragmentation of natural habitats
- Over exploitation of certain species
- Invasion by non-native species that damage ecosystems and native species
- Pollution or contamination of natural habitats or species
- Climate Change that damage natural habitats or species

3.1.1. Conversion loss and fragmentation of natural habitats

The conversion of habitats as a result of deforestation and practice of agriculture, especially the slash and burn agriculture has been the major precursor of conversion, loss and fragmentation of natural habitats.

Both uncontrolled fire and increasing human settlements are the main drivers of habitat degradation in Mozambique. The human population growth creates the need for new agricultural areas and deforestation due to high energy demand of woody biomass in the form of firewood and charcoal (Mazoli, 2007). The demand for firewood and charcoal around the major urban centres is one of the main drivers of deforestation and forest degradation in Mozambique (APEMETA, 2012).

About 80% of the energy consumed annually by households in Mozambique comes from biomass (firewood and charcoal), representing approximately 30.6 million hectares of forest (the country consumes about 600 million litres of fossil fuel per year mainly in the transport and agriculture sector (APEMETA, 2012).

This may result from, on one hand by the lack of management plans and effective forest monitoring. And on the other hand, the sale of firewood and charcoal is sometimes a

unique source of income for the family survival of the most vulnerable populations in peri-urban and rural areas (APEMETA, 2012).

Therefore, population growth and the consequent demand for land and energy will continue to be the main drivers of biodiversity loss in the major terrestrial biomes of Mozambique. Figure 15 shows the population growth in Mozambique.

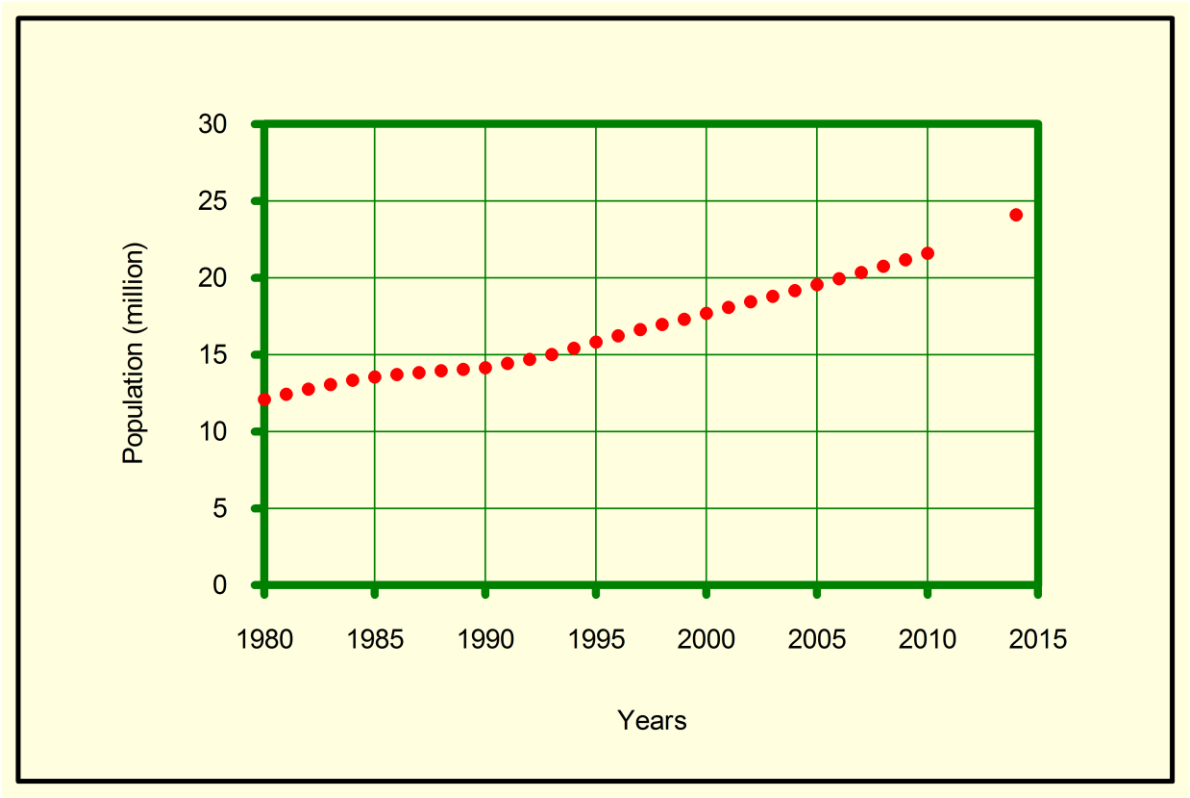

Figure 15. Population growth in Mozambique between 1980 and 2015

As it occurs in most African countries, the fires are used as a tool for cleaning the areas under cultivation and artisanal production of coal. Thus, it is evident the risk of wildfires with the growth of population and its natural dependence on agriculture and other forest resources. In general, over the last 10 years between 40-50 thousand hectares were burned annually. Slight decrease was observed after 2010. The table of increase of the burned area over the past 10 years in Mozambique is shown in Figure 16 In general, Savannah suffer much loss in area and biomass (Figures 17 and 18).

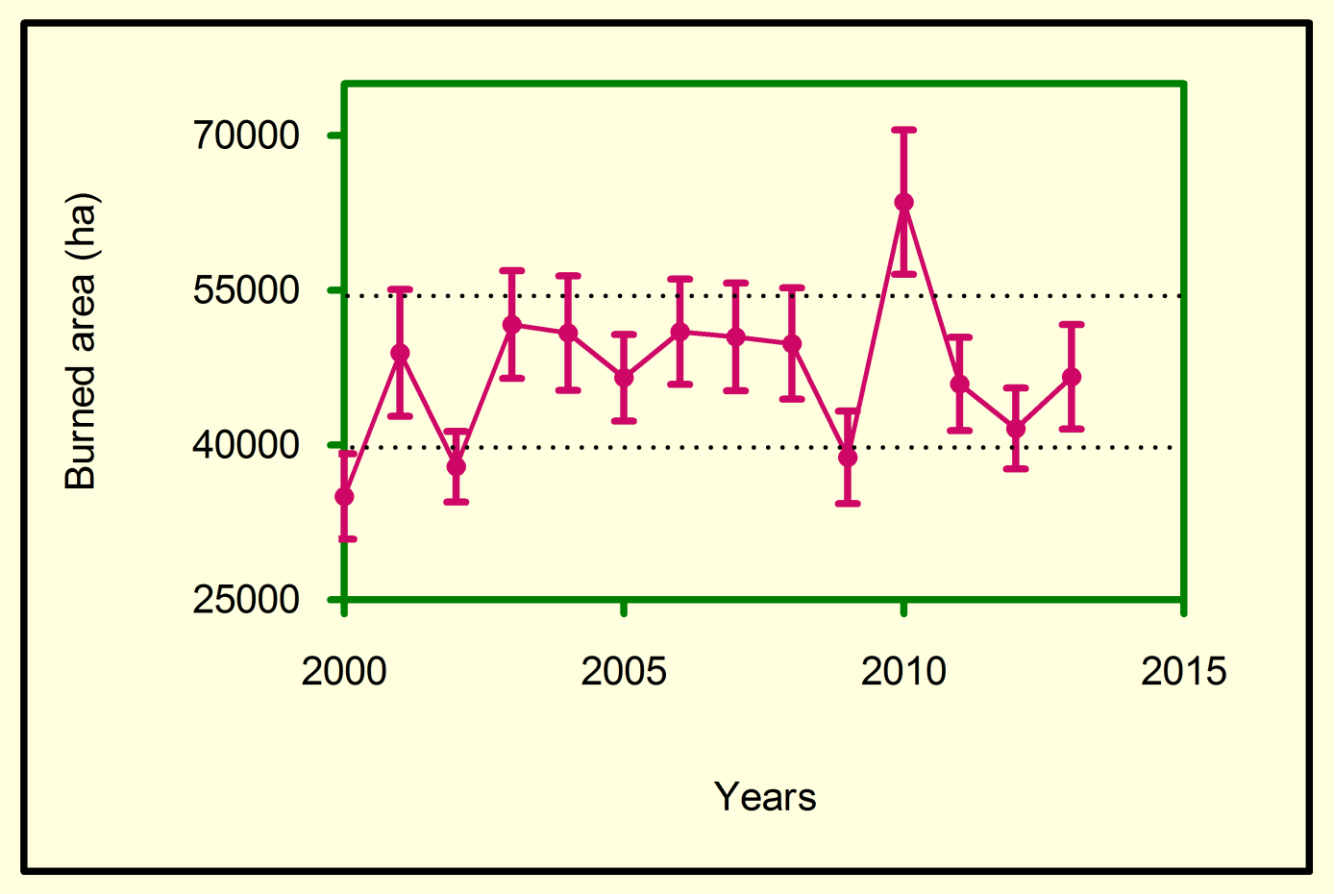

Figure 16. Evolution of the area burned in the last 10 years

The central area of the country is most affected by fires (Figure 19). Some case studies show that fires will continue to be a threat of loss of biodiversity in some biomes over the next ten years (Ntumi et al., 2012).

The battle against wildfires is still not effective in Mozambique, soliciting finding ways to control and seize offenders who commit infractions. These should include a greater empowerment of traditional authorities, so that they have the ability to apply the existing customary rules of prevention and control.

The cultivated area did not show a consistent trend, although in general has signalled an increase in recent years (Figure 20). Apart from the destruction of vegetation areas, the increase of agricultural areas is achieved at the cost of reduced grazing areas, as shown in Figure 21. In contrast, the populations of livestock (cattle and goats) have been growing (Figure 22). These contradictory trends show that the degradation of grazing areas will increase in the future if no measures of sustainable management of these areas are taken.

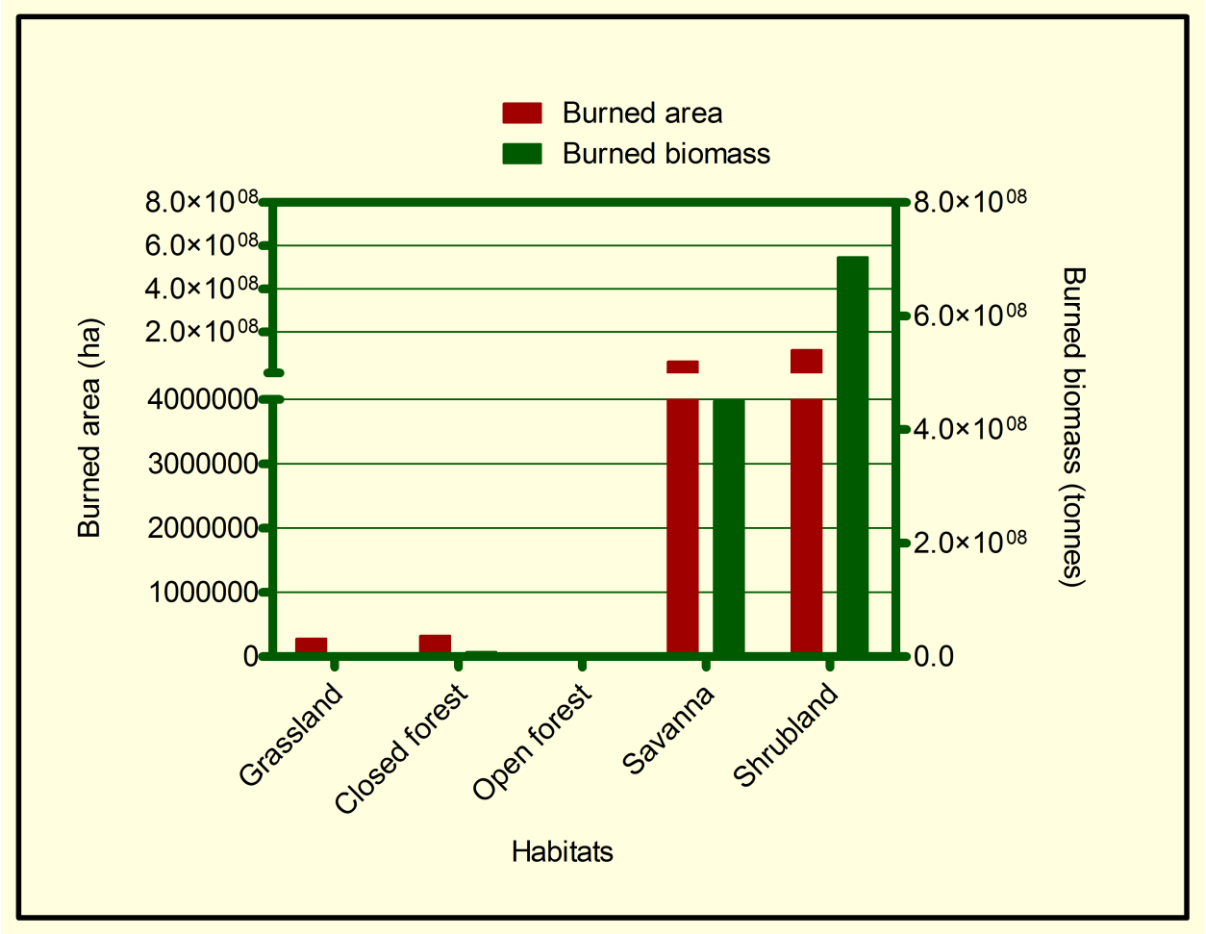

Figure 17. Habitats that were most affected and their burned areas between 2002 and 2012.

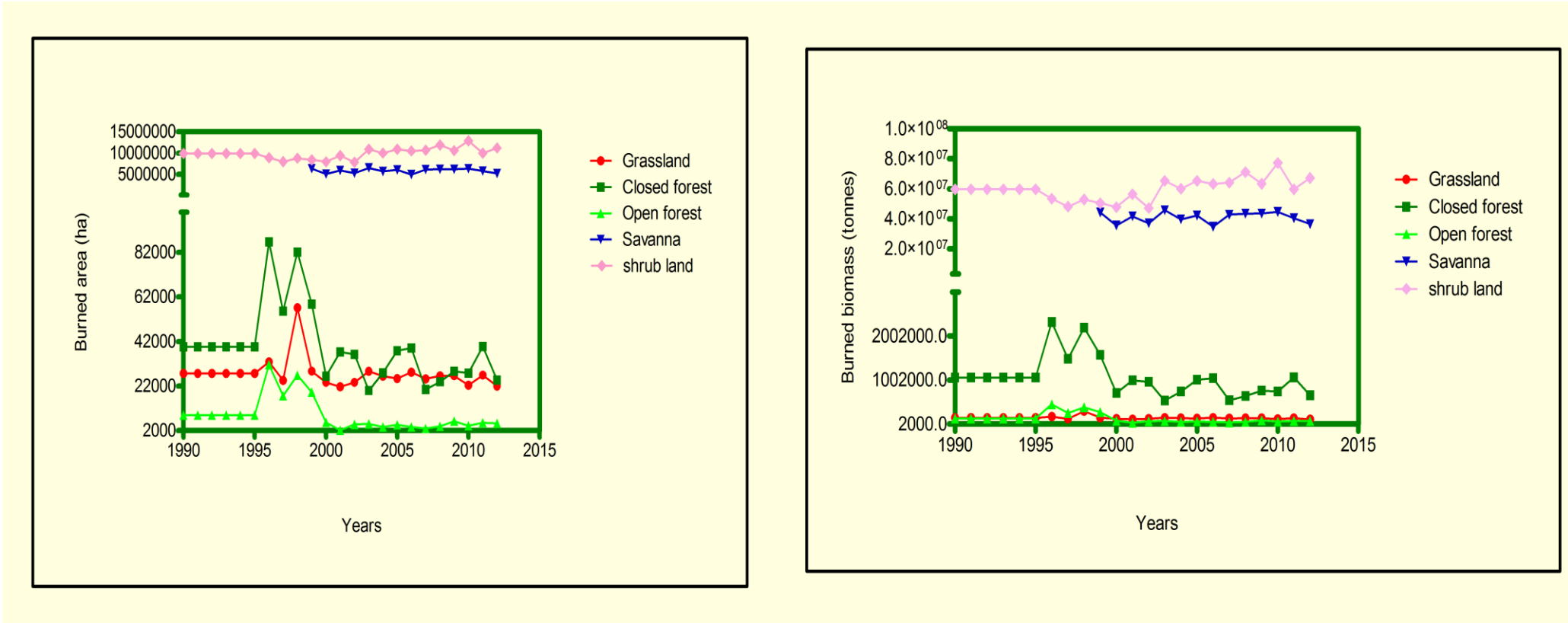

Figure 18. Comparison of burned area and biomass habitats of Mozambique between 1990 and 2012.

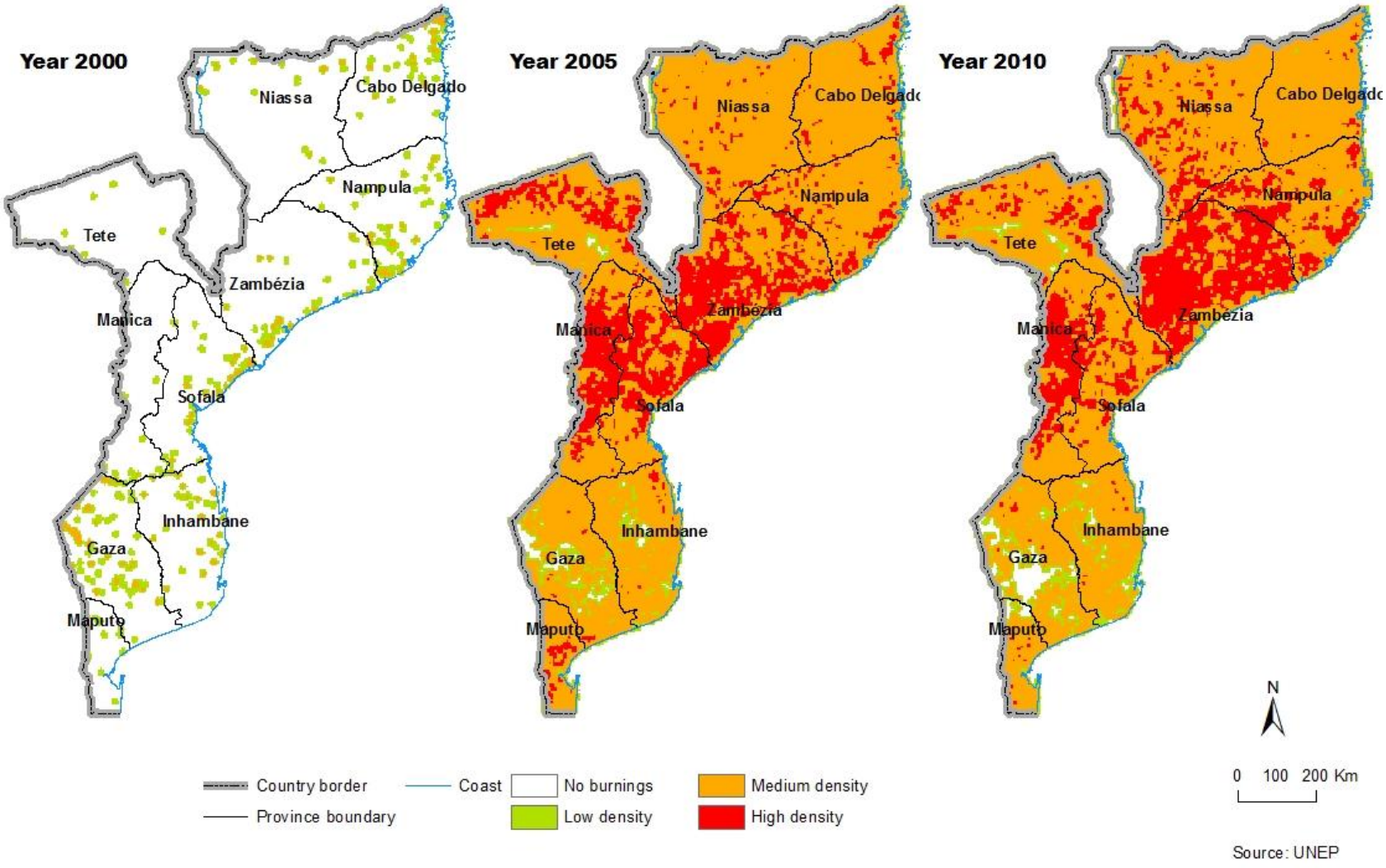

Figure 19. Frequency of fires in Mozambique. Note that the central region of the country tends to register higher frequency of fires Frequency of fires in Mozambique. Note that the central region of the country tends to register higher frequency of fires.

Figure 20. Evolution of the percentage of cultivated area (Source FAO 2012).

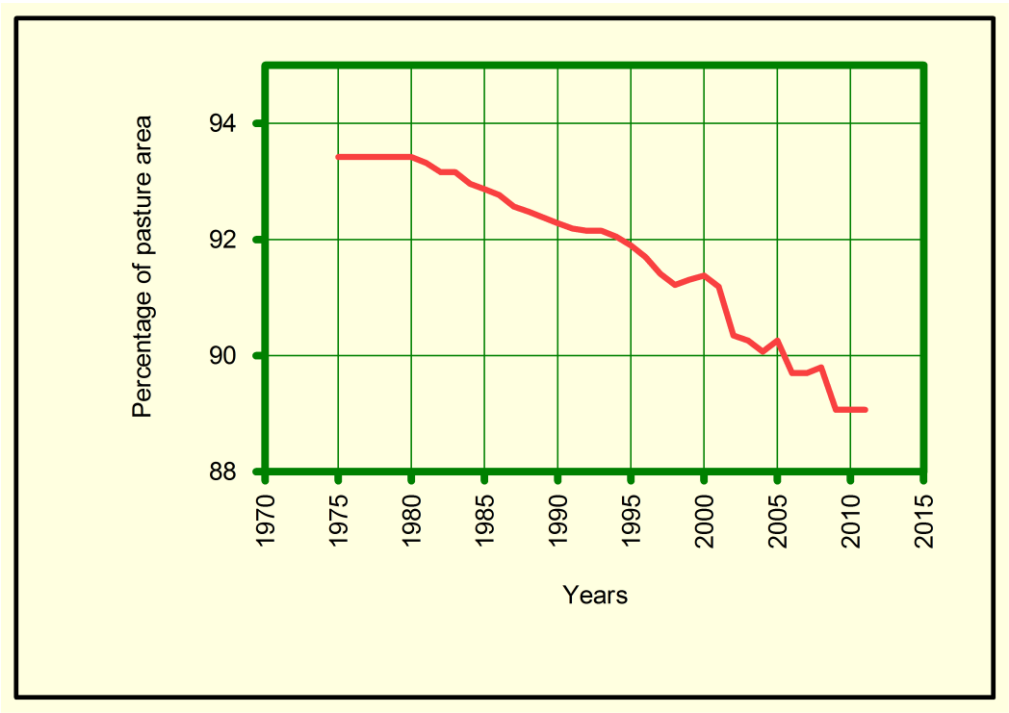

Figure 21. Decline in pasture area (Source FAO 2014).

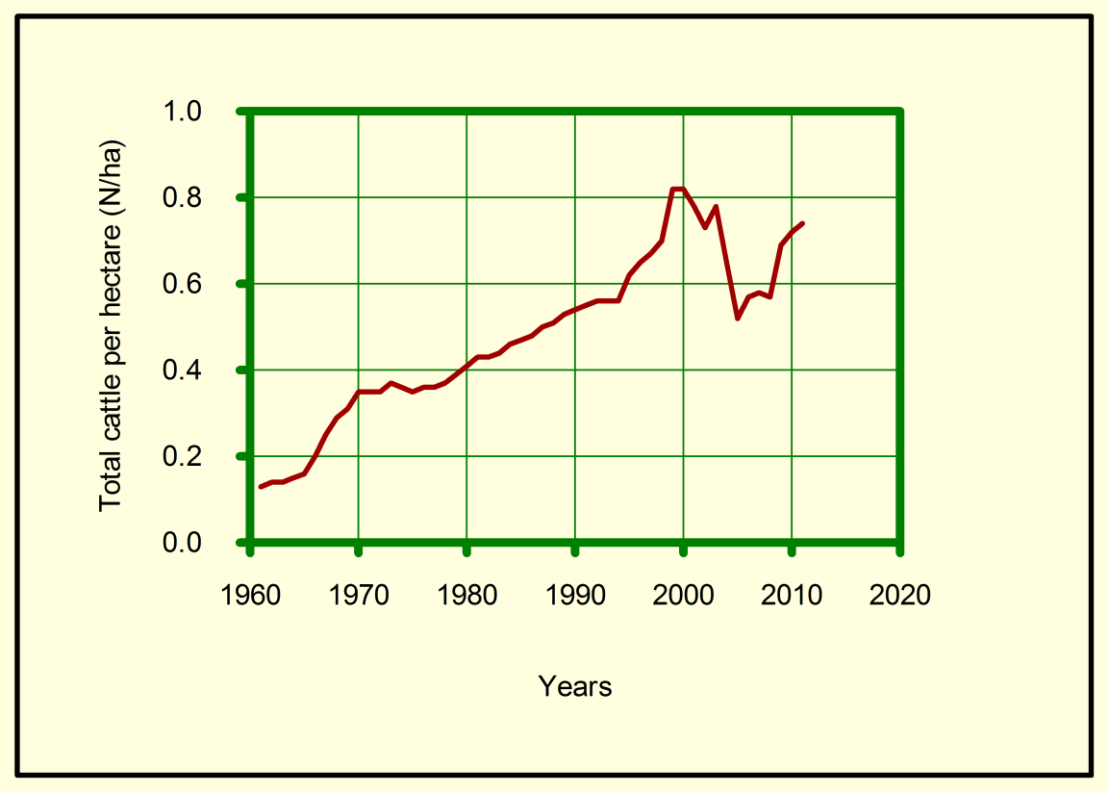

Figure 22. Growth of cattle in Mozambique between 1960 and 2010 (Source FAO 2012).

The annual rate of deforestation in Mozambique is estimated at about 219,000 hectares per year, corresponding to a rate of change 0.58% (assuming the value of 220,000 hectares, -0.58% per year) for the whole country. Thus, the coverage area of the natural forest reduced in recent years. Inhambane province has the lowest values with 11,000 hectares per year and Nampula province has the highest values of about 33,000 hectares per year. In relative terms, the lowest annual rate is found in Niassa (0.22%) where population density is lower. Maputo has the highest deforestation rate (1.67%) and is the densest populous province. The data indicate a clear relationship between the density of human settlements with the levels of habitat degradation The estimated national rate of deforestation indicated above, was based on the assumption that population pressure is the main factor behind deforestation (Mazoli, 2007).

Although there is a reduction in natural forest area, the total forest area increased with the development of plantations of exotic species forests (Figure 23), especially species of *Eucalyptus* and *Pinus*, in the provinces of Sofala, Manica and Zambezia. In these plantations, the management rights and responsibilities are conferred on individuals, corporations, private cooperatives, private institutions, NGOs, among others through contracts or long-term agreements (FAO FRA 2010/140).

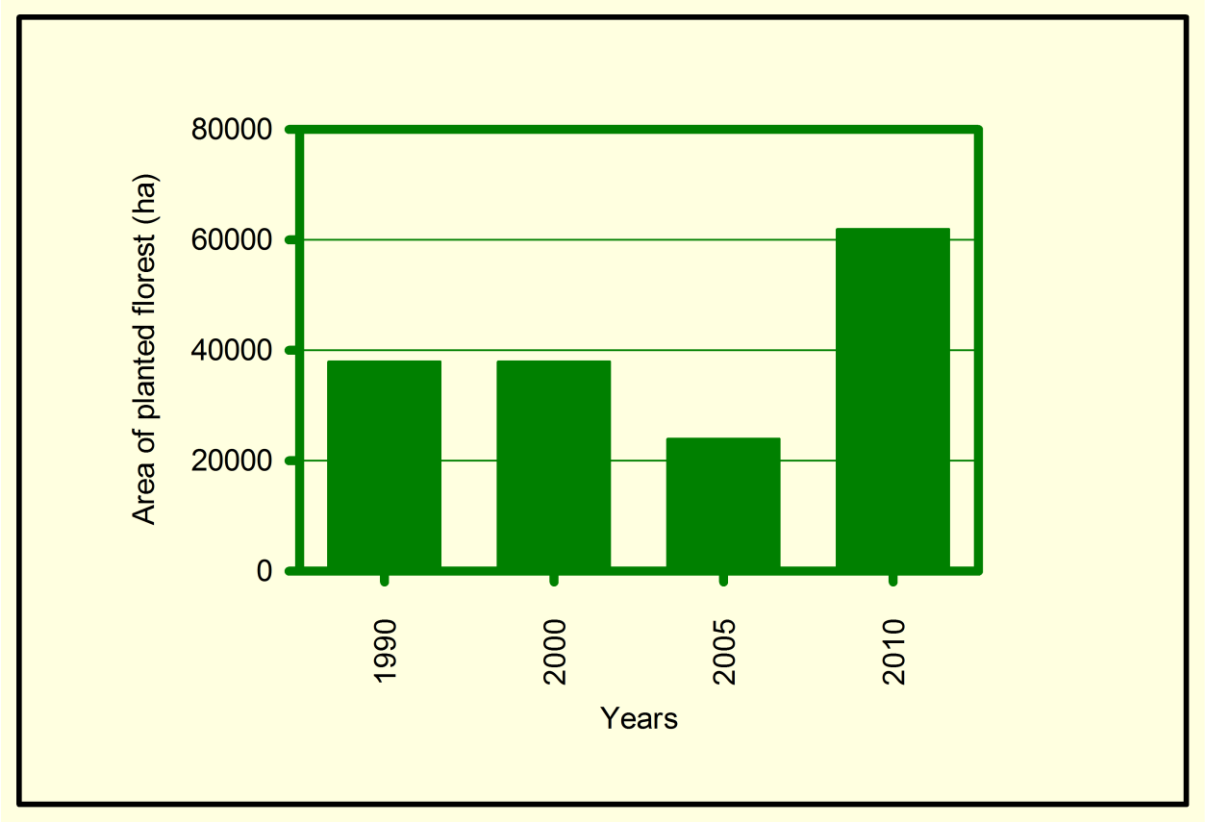

Figure 23. Evolution of forest area with exotic species in Mozambique.

The fourth report described in detail the major threats to plant diversity in some floristic areas and major consequences.

In 2012 the contribution of the mining sector to the economy of Mozambique was 1.5% and 5% the contribution of the energy sector. It is expected that these sectors grow at an annual rate of 10% due to increased exploitation of coal and natural gas.

The impacts of mining on biodiversity are not known in Mozambique. However, the potential threats to biodiversity may result from increasing discovery and exploitation of mineral resources, with special focus on the provinces of Tete and Cabo Delgado, a process that is accompanied by the transformation and degradation of the reserved mining areas.

The Figure 24 shows the distribution of the areas of mining in Mozambique. Taking as an example the experience of South Africa with regard to the development of restoration of areas degraded by mining programs, would be important to conduct monitoring of transformations that occurs on the ground in order to establish areas of reference against which will be possible to set goals of the restoration of degraded

areas. The mining companies Vale and Rio Tinto have also implement programs for restoration of degraded areas.

3.1.2. Overexploitation of some species

3.1.2.1. Overexploitation of plant species

In Mozambique, illegal logging of timber species of high or low commercial value is responsible for the overexploitation of some species of trees, contributing to their extinction in the long term. Commercial data indicate that in 2012, Chinese companies imported between 189,615 and 215,654 cubic meters of wood by means of illegal exportation, exceeding both licensed exports, as the levels of allowable logging through the legal forest licensing was 154,030 cubic meters. On the illegal exportation of timber in 2012, Mozambique has lost about 29 million U.S. dollars. The most sought after species for illegal logging include *Colophospermum mopane* and *Swartizia madagascariensis*.

However, official data indicate that the level of exploitation of timber species of commercial value through licensing is relatively low, corresponding to 26% of the Annual Allowable Cut (AAC); the tree species most exploited include *Pterocarpus angolensis* (bloodwood), *Milletia stulhmannii* (indian beech), *Afzelia quazensis* (pod mahogany), *Dalbergia melanoxylon* (Mozambique ebony) *Combretum imberbe* (leadwood), *Julbernadia globiflora* (African munondo). The level of exploitation of *Combretum imberbe* is undertaken the AAC with values above 100%, while the level of exploitation of other species is between 56% and 85% of AAC. What is striking and disturbing is that the data indicate that the wood exploration is concentrated in only few species, which can endanger their existence in the future. For example, according to www.iucnredlist, 2014 *Pterocarpus angolensis* and *Dalbergia melanoxylon* are near threatened / low risk. To reduce pressure on these few species would be important to set up a policy to targeted exploitation of other species, with an acceptable commercial value, that are not currently offered in the international market (Marzoli, 2007).

3.1.2.2. Overexploitation of species of fauna

The overexploitation of terrestrial fauna occurs mainly through poaching of wildlife. Local communities living in or around conservation areas, slaughter some species of wildlife for subsistence. In this activity, the species are caught using traditional traps that do not meet any criterion for selection of fauna; calves and females in breeding

condition can be hunted, which threatens the conservation and availability of wildlife resources in the medium and long term. This type of poaching for subsistence is carried out at night, especially in areas near Matutuíne, Moamba, Massingir, Vilanculos, Mabote, Mwanza Chiringoma, Marromeu, Chifunde, Chitima, Gile and supplies beef to large urban markets.

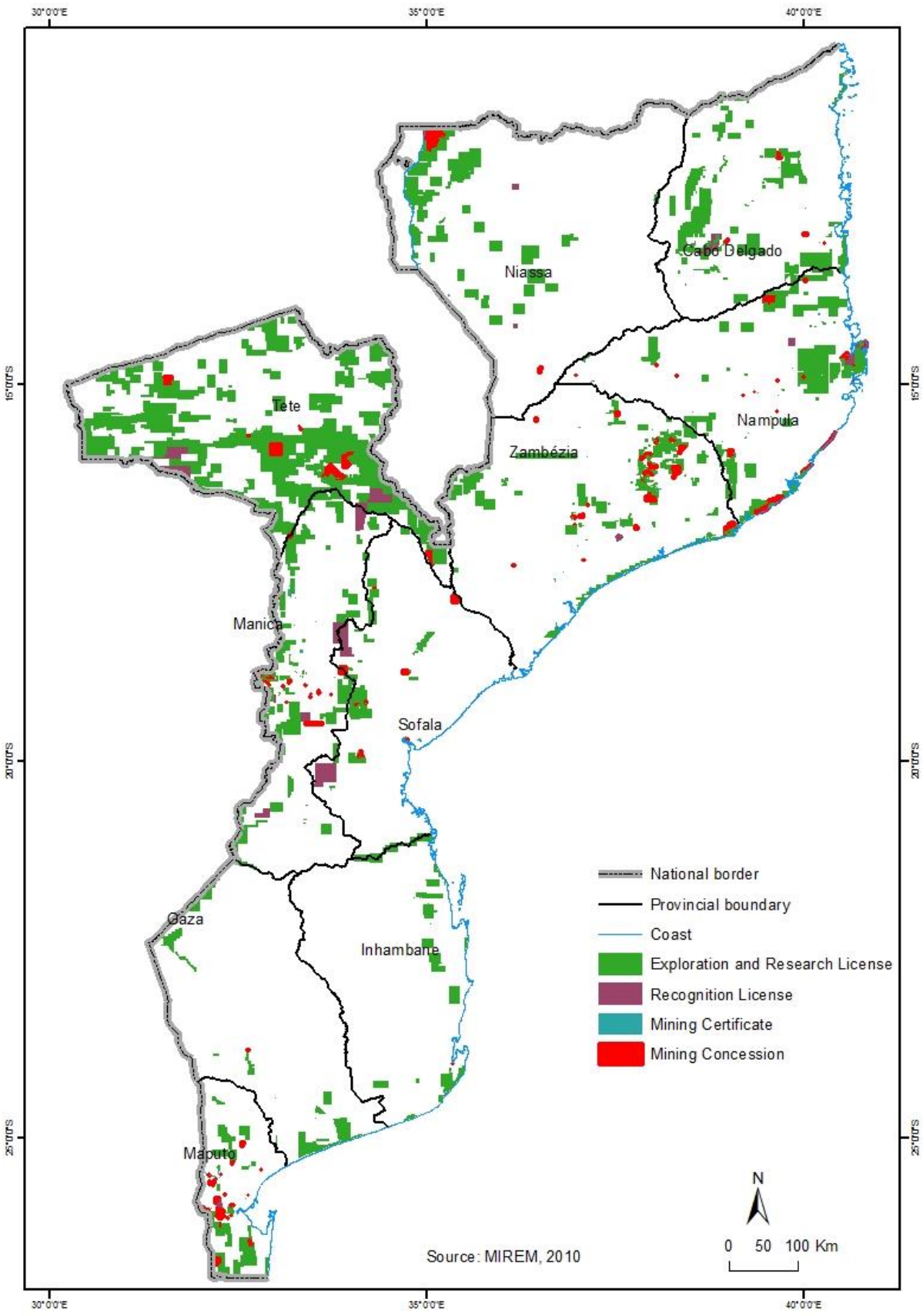

Figure 24. Licenses, certificates and existing mining concessions in Mozambique in 2010.

Another strand of poaching for commercial purposes, that is the most harmful to biodiversity, is the one targeting the threatened wildlife. This type of hunting is specialized in extraction trophies for illegal trade, with international traffic routes. The areas most affected by these illegal practices are those closest to the border areas, the provinces of Niassa, Cabo Delgado, Tete, Gaza and Maputo; international routes identified by the Mozambican authorities involve some Asian countries (see Box 4).

Box 4. Poaching in Mozambique

In Africa the wildlife in general and in particular the two of its icons (elephant and rhino) are going through an unprecedented crisis. In Mozambique, this is sparkling debates and multifaceted interpretations. As facts, the rhino is extinct and the number of elephants shows modal trend with alternating high and low peaks, fearing that are now on the way to collapse, especially in the northern region of the country due to poaching. On careful analysis by specialized agencies, Mozambique emerges as one of the main places of slaughter of ivory and rhino horn transit in Africa. Between 2006 and 2012, there was an increase in the number of records of slaughter of rhinos in the Limpopo National Park in Mozambique. Absence of this species in Mozambique, the few reported cases reflect the existing staff in the border line between Mozambique and the Kruger National Park in South Africa. The trends of elephant poaching are alarming (Figure 1). The ratio of carcasses increased significantly in areas of greatest elephant abundance. Between 2011 and the ratio of carcasses to Mágoè remained high (8.4 and 11%, respectively), compromising the sustainability of the population of elephants in this region; between 2009 and 2011, the number of carcasses sighted during the aerial counts in Niassa National Reserve tripled, from about 83 to 271 and, respectively, between 2011 and 2013 the number of carcasses seen in the Quirimbas National Park rose from about 14 to 84. Among other causes, local poverty, national governance and global demand for ivory and rhino horn are cited as the main, in a list that also includes the poor development of the conservation sector in Mozambique, weak capacity of state law enforcement, vulnerable borders, corruption, institutional uncoordination, legal and judicial framework, improving communication and connectivity, population growth within the parks and reserves and Human-Elephant Conflict. In a preliminary study by WWF Mozambique interventions at the level of enforcement, awareness and community initiatives are recommended.

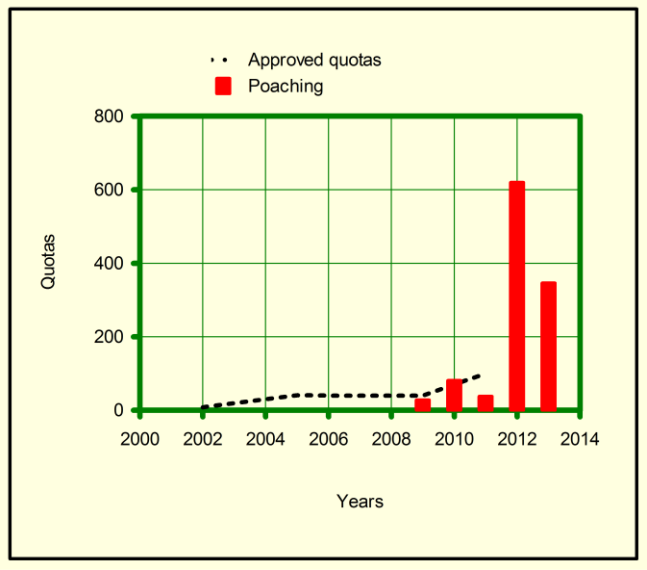

Figure 1: Trends of elephant killing through the legal system of quotas approved and minimum records of poaching in Mozambique between 2000 and 2014.

Mozambique is one of 178 countries that ratified the Convention on the International Trade of the Endangered Species of Wild Fauna and Flora (CITES).

It appears however, that with the exception of some species of high commercial value, in general, the minimum quantities killed by means of poaching, do not exceed the statutory annual quotas (Figure 25), which remits us to a reflection on the criteria used for setting quotas for hunting animals for tour operators as well as the possibility of misreporting information by operators.

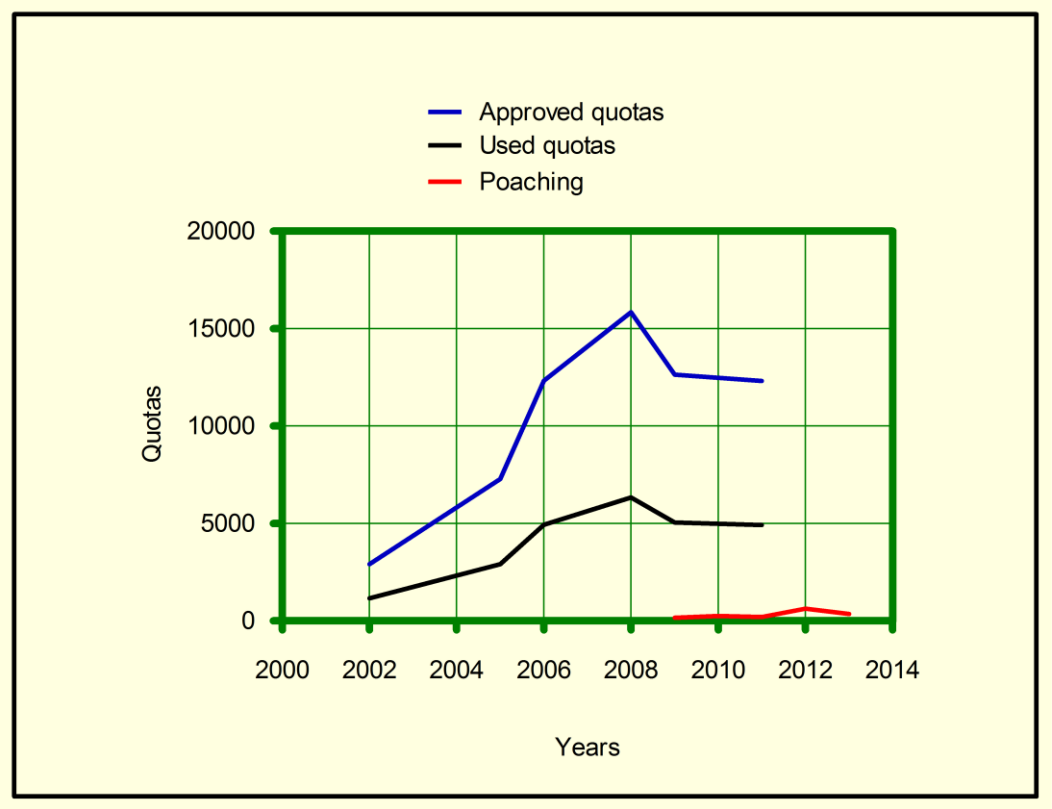

Figure 25. Trends of killing of species through official quotas approved and undertaken with the minimum levels of poaching in Mozambique.

Among other threats, human activities such as deforestation which eliminates habitats and refuge areas, hunting and pet trading of some species, are the main threats of avifauna. The degradation of wetlands and floodplains due to the exploitation of water resources for agricultural development and reserves has a negative implication on the population of birds (Parker, 1999; Beilfuss & Benedict, 2003; www.iucnredlist. org), which draws attention to the need for water resources management in order to integrate components of safeguarding the country's avifauna (Beilfuss & Benedict, 2003).

The main threat to marine mammals resides in incidental catches by fishermen when using bottom trawls and other fishing gear likely to catch them. When animals are captured, they are rarely discarded (especially dugongs) (MICOA, 2007).

However, habitat degradation of aquatic mammals, for example by driving along the beaches, which is common in Mozambique occur, and can cause the migration or mortality of sensitive species such as sea turtles. Sea turtles are captured to serve food, but also for other artisanal values. Both meat and eggs are highly after sought as food. The shell of the turtle is used for the production of handcraft jewellery and other ornamental products which are then sold in the market. The erosion and predation by ghost crab are other factors that lead to the loss of sea turtle species (MICOA, 2007).

All species of turtles are protected under the law. Species *Chelonia mydas* and *Dermochelys coriacea* are on the IUCN Red List as critically endangered. However, the nesting areas which are protected are those that lie within the conservation areas of the National Reserve of Maputo, the Bazaruto National Park, Quirimbas National Park and the forest reserves of Inhaca Island (MICOA, 2007).

Some dolphins are sometimes found dead along some Mozambican beaches. The reduction in habitat quality can be the cause of these deaths, since dolphins are also sensitive animals.

Mainly due to illegal fishing for international trade, with negative impacts on their populations, the below mentioned marine species were included in Appendices I, II of CITES in 2013:

(i) Largetooth sawfish (*Pristis microdon*), included in Appendix I for being a highly endangered species and have vanished from its habitats. It is a kind of target of illegal fishing, caught as bycatch in other fisheries. It is considered extinct in all areas of the world, with the exception of Australia where persist the only viable population of this species.

(ii) Hammerhead Shark (*S. lewini*) was included in Appendix II of CITES for being globally threatened. It has been targeted for fishing because the sole purpose of removing their fins which are then sold in markets. The species is caught as bycatch in other fisheries, representing about 42% of them. Two other species of shark *S. mokarran* and *S. zygaena* are considered endangered since data suggest its association with *S. lewini.*

(iii) Manta Ray (*Manta sp*.) was included in Appendix II, for being globally threatened, because of the high fishing pressure to obtain gills to trade internationally.

Regarding the harvesting of shark, the catchment data of industrial and semi-industrial fishing does not detail the species, while there is information on artisanal fisheries by species. Information on catches of rays is not available.

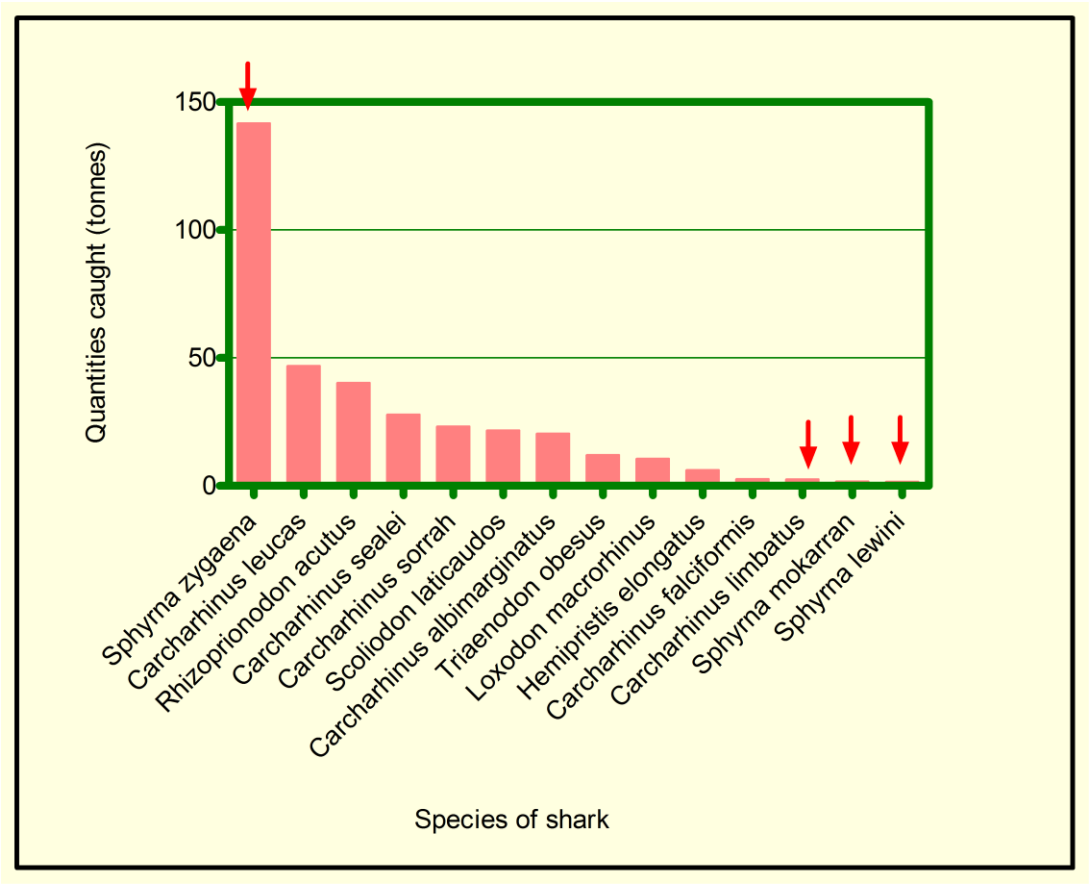

Figure 26. Represents the shark species caught, some of which (those highlighted in red) are endangered species according to IUCN.

The Figure 26 presents the shark species caught, some of them are endangered according to IUCN.

The Cop 16-2013 recommendations include the needs for the country to increase the implementation of CITES measures; the implementation of the action plan for CITES in Mozambique; the creation of a database on the stage of conservation species listed in the appendices; the creation of a database of sites of origin and destination of the products seized and offenders.

Constraints in monitoring the conservation of protected species include deficient law enforcement, poor dissemination of information with regard to irregularities; poor cooperation between the institutions involved in the implementation of CITES, the lack of knowledge of the distribution of species and low awareness in species identification.

In the budget allocated by the EU to developing countries in the sustainable management and implementation enhanced of CITES regulations for commercially exploited aquatic species, the Ministry of Fisheries proposes to carry out, among other activities, studies of the occurrence and distribution of sharks and rays; training in the

identification of sharks and rays; training of ship-owners in the register of data on sharks and rays.

3.1.3. Invasive species

Many species including aquatic and terrestrial plants, insects, birds were introduced in Mozambique over the years, and most of them of a deliberate manner and for commercial purposes (*Eucalyptus* and *Pinus*); agriculture, livestock, agro-forestry systems (*Leucaena leucocephala*, *Azidirachta indica*, among others), others for ornamental purposes (*Lantana camara*), pets, Indian crow (*Corvus corvus*) and even conservation (eg plantations of casuarinas along the coast) (MICOA, 2007). However, other species were deliberately trespassing in a natural way, and these include: *Parthenium hysterophorus*, *Ipomoea cornea*, *Opuntia ficus-indica*, *Parkinsonia culiata, Mexican Argemona, Ricinus communis* and others are observed in various regions of the country (MICOA, 2001, Howard, 2012).

On one hand, some introduced species do not cause damage and are important economically, socially and even ecologically; others cause imbalances in the ecosystems and result in the extinction of other species, and probably in the reduction of genetic diversity through hybridization. Among the plants, the water hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*), Salvinia (*Salvinia molesta*), fetal red water (*Azolla filiculoides*), parrot feather (*Myriophyllom aquaticum*), lantana (*Lantana camara*) are the most distributed in the country causing major impacts in terrestrial and aquatic, forest and agricultural ecosystems. However, the specific studies are lacking, which difficult to estimate the rate of invasive species in Mozambique.

In recent years, there have being also monitored two invasive species of shrimp (*Metapenaeus dobsoni* and *Parapenaeopsis sculptilis*), owing to their rapid spread and dominance between catches (for details, see Box 5).

Box 5. Exotic Species in Maputo Bay

Over the past 10 years, the stock of shrimp at the Maputo Bay has been experiencing a change in species composition. This phenomenon is attributed to the appearance of two new species of shrimp (*Metapenaeus dobsoni* and *Parapenaeopsis sculptilis*) with an ever-increasing contribution in the annual catches. With a little known temporal and spatial occurrence pattern, its contribution in the catches has been quite different for the different arts shrimp, being more significant in the commercial trawlers.

Metapenaeus dobsoni

According to the fishery operators, the occurrence of the species *Metapenaeus dobsoni* was first reported in 2006, on the artisanal and semi-industrial landings. Their monitoring began in 2007 as a result of the rapid spread across strata of fishing as well as the dominant trend over the native species. However, due to its relatively small size and texture of the soft tissue, the species awakened previously, a weak appreciation for the local trade and consumption. Its occurrence has become increasingly significant between 2009 - 2013 especially in semi-industrial trawlers, registering the largest contribution in catches (*Metapenaeus dobsoni*, 59%, *Penaeus indicus*, 21%; *Metapenaeus monoceros*, 7%, other shrimps, 9 %;. (IIP, 2013). Despite the record of its occurrence in all fishing gear, artisanal fishing, the species has a weak contribution in the annual catches, especially the art of drag, which represented about 10% of catches. Molecular methods confirmed its identification in 2014 as *Metapenaeus dobsoni* (Miers, 1878), also known by the synonyms *Penaeopsis dobsoni* (De Man, 1911) and *Metapenaeus dobsoni choprai* (Nataraj, 1942). Its natural distribution is associated with the waters of the Indo-West Pacific, extending from the west coast of India to Indonesia and the Philippines. This species occurs in marine and coastal ecosystems, between 1-37 m depth on muddy bottoms. The total length can reach a maximum of 118 mm (males) and 130 mm (females). Despite the relatively small size, its importance to the fishery varies between different geographical areas. The species support commercial fishing in coastal waters of the Eastern Indian Ocean (eg India, Sri Lanka, Malaysia, Indonesia, the Philippines and New Guinea) (Thirumilu & Pillai, 2013). In the state of Kerala (India), is in among the most important species for aquaculture in paddy system. In the Bay of Maputo (Mozambique), supplies the local markets in periods of low production of commercial shrimp (P. indicus and M. monoceros), helping to cushion the costs of operation of the commercial fleet.

Parapenaeopsis sculptilis

The species was first reported in 2012, in the artisanal and semi-industrial landings, but in very small proportions. Early 2013 campaign, their frequency in the catches proved quite pronounced followed by a rapid decline, probably due to high fishing pressure that characterized the early months of the campaign. Its monitoring began in 2013 as a result of its high occurrence in beginning of the campaign, as well as some due to morphological aspects as relatively pronounced size, very hard seed coat and a poor appreciation for consumption and local trade. The species was identified as *Parapenaeopsis sculptilis* (Heller, 1862) using molecular methods; is also known by the synonyms *Parapenaeopsis sculptilis cultrirostris* (Alcock, 1906) and *Parapenaeopsis cultrirostris* (Kubo, 1949). It is distributed along tropical seas (from Pakistan to Malaysia, Hong Kong, Philippines, New Guinea and Australia), supporting commercial fishing in some estuarine systems. Inhabits marine ecosystems at depths of 30-90 meters and has a total length ranging between 170 mm (females) and 130 mm (males). At the Maputo Bay, its contribution to the annual catch in relation to commercial species was estimated (*Parapenaeopsis sculptilis*, 4%, *Penaeus indicus*, 21%; *Metapenaeus monoceros*, 7%; *Metapenaeus dobsoni,* 59%, and other shrimps, 8%) (IIP, 2013). At present, little can be inferred regarding their appreciation for the trade and consumption by the population due to reduced time of occurrence of the species.

3.1.4. Pollution

3.1.4.1. Air Pollution

The main sources of air pollution in Mozambique are: Industry (manufacturing, services), transport, power generation (corporate utilities, households), agriculture and waste (Cumbane, 2011).

The sectoral analysis presented in the Second National Communication, making use of data from the National Inventory of Greenhouse Gases 1995-2004, indicates the Agriculture and Land-Use Change and Forestry as the sectors contributed with national emissions of greenhouse gases (GHG), respectively with 92.89% and 5.46%, while the Transformation Industry Sector had a very low expression. Taking into account the system of household production and the use of widespread practice of burning in Mozambique, agriculture is responsible for the emission of air pollutants, mainly greenhouse gases. Among other important sources of emissions of greenhouse gases in the agricultural sector it account as well for the increasing use of fertilizers, some management practices of soil, not least, the kind of practiced culture, being e.g. the cultivation of rice with the greatest potential emission of these gases. Another important source of emissions of these gases is livestock production, from the production of manure. Livestock production in Mozambique shows an increasing trend, despite being far from the levels of production of the region. FAO estimates show increasing trends with regard to emissions of greenhouse gases that are produced in the agricultural sector, including livestock production (Figures 27 and 28).

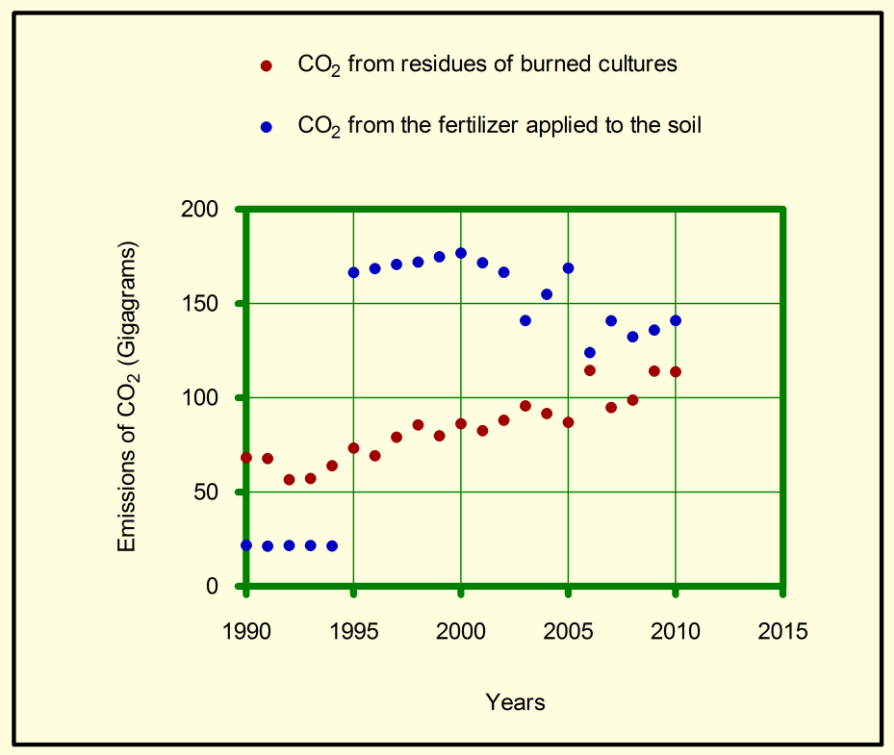

Figure 27. CO2 emissions due to burning of crop residues and forest conversion in Mozambique (FAO, 2014).

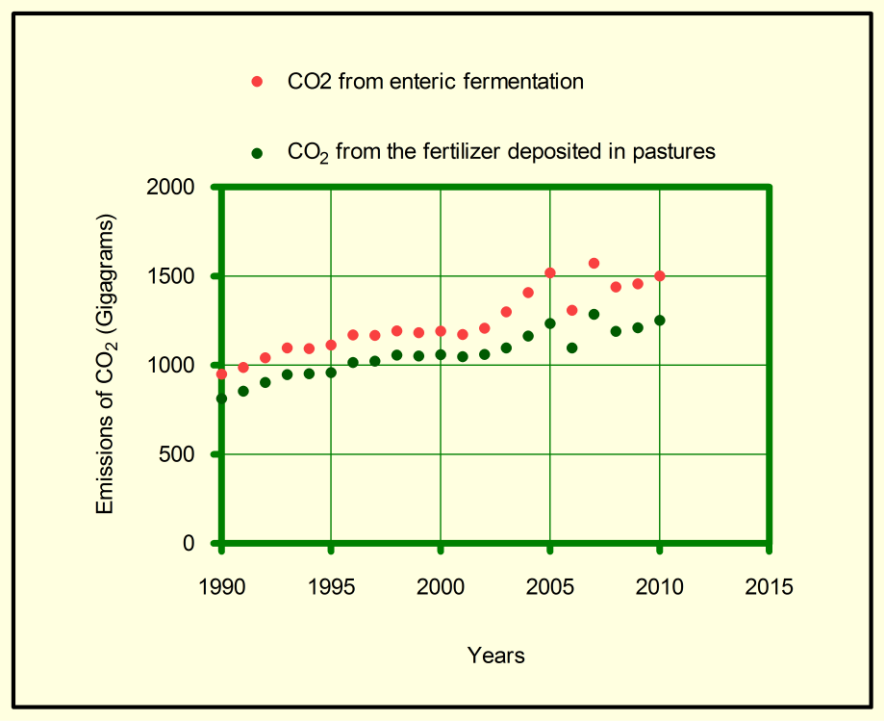

Figure 28. Trends of CO2 equivalent emissions from livestock, application of livestock manure in MozambiqueFigure 29. Trends of CO2 equivalent emissions from livestock, application of livestock manure in Mozambique.

Due to poverty, the use of fertilizers and other chemical products such as, for example, pesticides is low, and therefore it can be deduced that water pollution is not significant. However, there is a potential for fertilizers and pesticides that can drain into watercourses and wetlands, damaging fish, amphibians, insects, crustaceans and other species (AUSAID, 2012).

In the coastal areas, untreated sewage and sediments that result from agriculture and construction contaminate aquatic ecosystems, causing pollution and destruction of corals (Muthiga et al., 2008; AUSAID, 2012).

The research in the area of pollution and its impacts on biodiversity are still very scarce in Mozambique and that there are localized and do not allow to generalize for the whole country. Studies of the impacts of pollution on biodiversity must be expanded significantly to assess the impacts of pollution on biodiversity in the country.

3.1.4.2. Pollution due to the exploitation of mineral resources

Systematic studies aimed at assessing the impacts of pollution from mining on biodiversity are practically not existent in Mozambique.

However, it is known from studies elapsed elsewhere in the world that mining processes (metallurgical industry, hydrometallurgical) are by nature large consumers of water and increase the potential for contamination of water resources and consequently the biodiversity linked to these resources.

The negative impacts can range from the generation and sediment transport caused by poorly maintained roads during the exploration phase to the silting of watercourses and increased suspended solids in the water during the operation phase of the mine.

In Mozambique, the artisanal mining began secretly in the 80s once the mining company Manica Gold Mines (ALMA LONRHO) began exploring for gold in Manica. Therefore it has began within the licensed area of the company. Gradually, the mining activity spread to the provinces of Tete, Niassa, Sofala, Zambezia and Nampula (Muacanhia & Deniasse, 2007).

The artisanal gold mining provides financial resources to a large portion of individuals in rural areas, being involved more than 12,000 practitioners.

In the Manica province, artisanal gold mining poses serious environmental and health problems to miners and local communities resulting from mishandling of mercury that is carried out during the process of amalgamation of gold. The gold mining practices

cause significant damage to health and the environment with population exposure to mercury.

The miners burn the amalgams of gold in open fires spreading the mercury gases throughout the community. The average level of mercury exhaled by miner in Munhena was 8.23 μg / m^3. Some burners of amalgams have mercury levels above 50 μg / m^3 (50 times higher than acceptable levels by WHO for public exposure to mercury vapour) (UNDP / GEF / UNIDO / Blacksmith Institute (2005).

Besides harming human health by inhalation, mercury contaminates watercourses and the activity of mining causes siltation of water by the increase of solid particles in the water during the operation phase of the mine (Muacanhia et al., 2012). Due to pollution from mining, a South African gold mining company operating in Manica province, centre of the country, had their activities suspended because of being discharging waste into river Róvué without compliance with the basic rules of environmental safeguard (www.portaldogoverno.gov.mz).

The exploitation of oil and gas in northern Mozambique caused the death of fish and harmful algal blooms affecting the catching of fish by local communities. In the south, specifically in the province of Maputo, industrial activities cause increased contaminants in watercourses. For example, fluoride levels are five times above the recommended concentrations, endangering human health and biodiversity (ja4change.org).

The exploitation of coal mines poses other problems to the environment. Due to the burning of fossil fuels, the amount of carbon dioxide in the atmosphere has been increasing, there is also the potential for emissions of other greenhouse gases during combustion for electricity generation per year.

3.1.5. Global climate change

In the country, with regard to climate change, it is expected that the weather is more extreme, with periods of warmer and longer droughts and more unpredictable rainfall, increasing the risk of crop failures and droughts, floods and wildfires (INGC , 2009) and causing significant changes at the level of ecosystems and species. The consequences of the increase, both in the intensity and the frequency, of extreme events (such as floods, droughts and cyclones) are themselves highly visible, resulting each year, in Mozambique, in the loss of human lives and considerable socio-economic impacts, environmental degradation including loss of natural heritage. However, there is also a set of equally important gradual impacts, such as those resulting from the rising level of

the sea, the rising phenomena of coastal erosion, saline intrusion, acidification and warming of the marine environment.

Climate scenarios developed for Mozambique during the preparation of the First National Communication (PCN), indicate that by 2075 it will register an increase in average air temperature between 1.8 ° C to 3.2 ° C; reduced precipitation between 2% to 9 %; increase in solar radiation between 2% and 3%; increase in evapotranspiration between 9% and 13%; these results are supported by studies conducted by INGC in 2009. It is estimated that these changes will have profound impacts in terms of ecosystem functioning and patterns of species distribution, thus there is a need to undertake detailed studies on climate change vulnerability of ecosystems and species, especially those that are already threatened by other factors, so that they can support the design of more resilient conservation strategies and more effective conservation measures.

Some measures have already been advanced in the National Strategy for Adaptation and Mitigation to Climate Change (ENAMMC), approved in November 2012 by the Government of Mozambique, which includes biodiversity as one of its eight strategic areas of intervention. Among the measures listed in ENAMMC include the need to identify and implement adaptation actions to ensure the protection of flora and fauna at risk of extinction, the establishment of transboundary conservation areas in order to maintain ecosystem functions and allow migration of wildlife, implement management practices that increase the adaptive capacity of ecosystems, maximizing the utilization of habitats and biodiversity conservation, and even the resizing and reclassification of conservation areas, identifying areas of risk of loss of biodiversity.

It is important to note that the impact expected from climate change regime is not always negative. The 2009 study by INGC stresses that, for the northern region of Mozambique, environmental models are projecting the occurrence of abundant rainfall in the future, which is potentially positive. Thus, if on one hand it pose challenges to find management strategies for water conservation which will be in the future potentially more abundant in the north, on the other hand, the population growth expected in this region will lead to increased pressure on natural resources and risk of conversion of areas of conservation on agricultural land and environmental degradation (INGC, 2009).

In relation to coastal and marine ecosystems, it is estimated that the effects of climate change will result in changes in marine biodiversity due to the warming and

acidification of the water column and eventual bleaching and death of corals. At present, the coral reefs off the coast of Mozambique are still recovering from the losses incurred in 1988 due to the bleaching phenomenon induced by increases in sea temperature caused by the El Niño Southern Oscillation (ENSO) (Schleyer et al., 1999). However, the conditions of some reefs are still bad due to artisanal harmful fishing activities (Muthiga et al., 2008).

4.2. Main threats to conservation areas

With the exception of the National Reserve of Gile in Zambezia Province in Mozambique, there are populations living within Conservation Areas (CA) (Table 5). In some cases, Conservation Areas were established already with people inside and in other cases, populations occupied the CA after the establishment of these, especially during the civil war in Mozambique and in the period that followed the Peace Accords.

Table 5. Human Population living within Conservation Areas (WWW, 2007).

Conservation Area	Number of Inhabitants
Gorongosa National Park	**15,000**
Quirimbas National Park	**55,000**
Banhine National Park	**2,000**
Bazaruto National Park	**3,500**
Limpopo National Park	**20,000**
Zinave National Park	**2,000**
Maputo Special Reserve	**5,000**

The legislation regarding Conservation Areas doesn't clarify that humam population should or not live within CA, this makes that the socio-economic approach for managing CA in Mozambique receives significant attention. Thus, despite the government efforts in expanding the conservation areas, there is still need to find a definitely solution, although sustainable for the destiny of the population living within those areas.

The presence of human settlements within Conservation Areas is a phenomenon that affects significantly the conservation process due to the forms of land and biological resources use which are contrary to the conservation objectives. Cattle raising, itinerant agriculture, use of forest fire to prepare *machambas* to chase away wildlife among others, are common practices of the inhabitants of Conservation Areas. By the other hand, the communities themselves living in Conservation Areas are negatively affected by the presence of wildlife that enter their agricultural fields and destroy their houses. The threats and pressure analyses to the National Parks shows that uncontrolled forest fire, tree logging for several purposes, conversion of land use to grazing and the hunting and fishery are the main actual pressures. These, are also seen as the main threats to conservation in the next years.

The Table 6 illustrates the most seized fauna in the conservation areas as well as the type of instrument used in the seizure. The species more sought-after by the poachers include elephant, rhinoceros, buffalos, zebra, lion, reedbuck, kudu and duiker.

The reduction of species of high ecological and economical value affects negatively the tourism attractiveness of the some areas of the country, mainly the synergetic and eco-tourism.

Table 6. Most killed fauna in the conservation areas as well as the types of instruments used.

Most sought after species	Other species	Motivation	Objective
Elephant	Warthog, duiker and marine species	Existence of species and domestic and international markets, weakness of current legislation	Trophies for sale, meat for consumption and marketing
Rhinoceros	Duiker and other species of medium and small size	Existence of species and domestic and international markets, weakness of current legislation	Trophies for international trade Meat for consumption and trade
Dugong, sea turtle	Whale and other fish species	Fragility of the current legislation, the existence of species	Domestic and international trade
Elephant, buffalo, eland	Duiker, warthog and crocodile	Greater diver side, fragility of the current legislation, quality and quantity of species	Trophies for national and international trade and meat for consumption
Buffalo and eland	Duiker, warthog and crocodile	Greater diver side, fragility of the current legislation	Trophies for national and international trade meat for consumption
Elephant, buffalo, eland, lion, leopard	Crocodile, duiker, and other small and medium sized	Existence of species and domestic and international markets, weakness of current legislation	Trophies for trade and meat for consumption
Kudu, duiker, warthog, chipene, impala		Fragility current law, the existence of species	for meat consumption and trade

PART II: NBSAP, ITS IMPLEMENTATION AND THE INTEGRATION OF BIODIVERSITY

1. National Biodiversity Targets

The last Strategy and National Action Plan for Biodiversity (NBSAP) was developed ten years ago. After its adoption there were intense and rich actions for its implementation. For example, the Aichi targets for biodiversity conservation that have been defined for the period (2011-2020) have brought new challenges for the integration of emerging biodiversity issues from both national and international levels. This explains why at the time this report is being produced, Mozambique is revising its NBSAP 2003-2010 and the new NBSAP is scheduled for completion later the year 2014.

The new NBSAP will revisit the earlier goals, define and update the national biodiversity conservation targets. Given the cross-cutting nature and importance of biodiversity, the government of Mozambique implements programs, strategies and sectoral plans whose goals are aligned with the global targets for biodiversity conservation for the period 2011 -2020 and set out by the Parties during the X Conference held in Japan, as presented in Part III of this report.

2. Update of the National Biodiversity Strategy and Action Plan

The new NBSAP will take into account the fact that Mozambique is both rich in biodiversity, however having about 70% of its population living in rural areas and 54% of the total of about 24 million people living in poverty (MPD, 2010). These facts suggest that issues related to the fact that biodiversity conservation must ensure the equity in benefits should not be postponed. This was a gain achieved during the implementation of the previous NBSAP through a Ministerial Diploma n° 93/2005 of 4 May stemmed about the benefits of ecosystem services to local communities. In this sense, the alignment with the Aichi Targets (2011-2020) in setting goals, priorities and objectives will highly help to cement the paths that the country has been following over the last ten years.

To consolidate the progresses made in the implementation of the previous strategy and ensure effectiveness and efficiency in biodiversity conservation, the NBSAP under review will emphasize the integration of issues of biodiversity conservation in the priorities of the national policies and strategies. Relevant sectors such as agriculture, fisheries, forestry, tourism, wildlife and mining proved that the biodiversity valoration not only allows those sectors to become profitable but also give them the real power for their performance.

Human capital and the gained experience in the production and the incorporation of the environmental issues in various planning instruments (Agenda 20-25; PARPA I and II; sectoral programs; PDD and PESOD and many others) will substantially assist in producing a new NBSAP challenged by the discoveries and the exploitation of new

natural resources. Because of this, the production of the new NBSAP will involve a wide discussion and consultations to a variety of stakeholders, so that the targets to be agreed could gain consensus and increase the implementing government capacity.

3. Measures taken to implement the Convention and results

3.1 Undertaken initiatives

Since its independence in 1975, the government of Mozambique has been taken important measures to strengthen its capacity for biodiversity conservation. The most important steps culminated with the adoption of Resolution 18/81, of December 30, which ratifies the African Convention on the Conservation of Nature and Natural Resources and the Resolution 20/81 of 30 December, ratifying the accession of Mozambique to the Convention on International Trade in Endangered Species and endangered Wild Fauna and Flora.

Subsequently, the Ministry for Coordination of Environmental Affairs was established through the Decree Nº 2/94 of 21 December.

The creation of this ministry comes as a way to promote a greater coordination of all sectors of activities and encouraging proper planning and utilization of natural resources of the country in a responsible manner and for a long term. As a corollary of this, and by the Law Nº 10/99 of 7 July, the Government has established the basic principles and rules on the protection, conservation and sustainable use of forest and wildlife resources.

In the fourth report on the implementation of the CBD published by the Mozambican Govern in 2009, various policies, laws, strategies and action plans that have been supporting the implementation of the Convention and in particular biodiversity conservation initiatives were mentioned. Over the past five years, many more advancements in this area were registered. For example, a new policy, legislative and strategic initiatives were undertaken including Strategic Plan for the development of the agricultural sector (PEDA 2010-2019); IIAM Strategic Plan (2011-2015); Plan for the Reduction of Poverty (PARPA), (2011-2014); Climate Change and environment of Mozambique (2013); National Development Strategy (2013); National Climate Change Strategy (2013-2025); Agenda (2025) (for details, see Table 7). Other initiatives and their results include:

Institutional reforms and programs

Concerned about the mainstreaming of the environmental issues, already in 2008 (when the fourth CBD national report was being produced), the Government of Mozambique has created sectoral groups, namely the Technical Group for the

Environment and Sectoral Group of Partners for the Environmental Development (EDP). This institutional initiative has improved the intersectoral coordination and harmonization of public-private partners and other development initiatives.

Aware of its responsibility in the training of human resources to the level of demand of the proper management of environmental resources in general, but in particular biodiversity, in the following year (2009) the Government created the Institute of Physical Planning and Environment (IMPFA) and approved its organic constitution. Through the Decree Nº 80/2010 of December 31, created the National Agency for the Control of Environmental Quality (AQUA) dedicated to improve dynamics and defence interests of society to an increasingly better environment. Over the past two years, successfully created two new instruments: the Organic Constitution of the Environment Fund (FUAB) and the National Conservation Areas Administration (ANAC). The creation of the ANAC assumes of capital importance for biodiversity conservation in Mozambique; it confers robustness in the management and supervision of the actions that threaten the persistence of the species. Very recently, and to support the ANAC vision on biodiversity, the Law of Conservation Areas in 2013 (Law nº 16/2014, of 20 of June), was approaved, whose lines of force criminalize poaching.

Participatory management of natural resources and the sharing of benefits

Participatory management in natural resources is a strategy adopted by the Mozambican Government. In addition to the economic, ecological and the institutional development objectives the Government policy for the subsector of forests and wildlife incorporates social objectives, given the recognition that natural resource management is complex and involves the recognition of the decision making mechanisms held in the rural areas, upon which the exercise of power at the level of the rural communities is based.

In Mozambique, the main actors of CBNRM are: the State, the Private Sector, the NGOs and the Local Communities. Community participation is subject to various management models: i) Committees of Resources Management; ii) Informal collaborative management and iii) Constructive relationships and mutual benefit; iv) Conversion to plantations, agro forestry systems, game farming; v) Community forest concessions; vi) Promotion of products for local use and vii) Co-management with the private sector to promote market access (see Table 8 for details).

During the term of the previous NBSAP, over 500 initiatives in participatory management, which occupied 19% of the productive forest area, were implemented. The most referenced cases are the successful participatory management of the Bazaruto National Park; Covane Community Lodge; the villages of Sanhôte and Niviria; Chipanje-Chetu program; Sacred Forest of Chirindzene; Community Matondo - area of forest concession Catapu (Sitoi et al., 2007) (Table 8).

Table 7. Legislative policies and initiatives adopted.

Category	Description
Decree 24/2008, of July 1	Approves the Regulation on Management of Substances that Deplete the Ozone Layer
Decree 25/2008, of July 1	Approves the Regulation for the Control of Invasive Alien Species
Decree 23/2008, of July 1	Approves the Regulation of the Planning Act
Ministerial Decree No. 55/2009, of April 15	Creates the Higher Institute of Physical Planning and Environment, abbreviated as IMPFA and adopt its Organic Statute
Resolution Nr. 10/2009, of 4 October	Approves Energy Strategy
Resolution Nr. 22/2009, of 4 October	Approves Policy and Strategy for Biofuels
Resolution Nr. 58/2009 of 29 December	Approves Management Strategy of Human and Wildlife Conflict
Resolution Nr. 62/2009, of 14 October	Approves Development Policy of New and Renewable Energy
Resolution Nr. 63/2009 of November 2	Approves Conservation Policy and Strategy of Its Implementation
Ministerial Diploma No. 181/2010 of November 3	Approves Directive on the process of expropriation for the purposes of Land Management
Decree 56/2010, of 22 November	Approves Environmental Regulation of Petroleum Operations
Decree 25/2011, of 15 June	Approves Regulation on Environmental Audit Process
Decree 58/2011, of 11 November	Approves the Regulation of Biofuels and their mixtures with fossil fuels
Resolution Nr. 67/2011 of 21 December	Designates Lake Niassa as a site on the List of Wetlands of International Importance
Resolution Nr. 8/2012 of 13 April	Grant to Foundation for Biodiversity Conservation - Biofund, the status of Public Utility
Decree 16/2013, of 26 April	Approves Regulation on International Trade in Endangered Species of Wild Fauna and Flora
Law Nr. 16/2014, of 20 June	Approves Law of Conservation Areas

There are close to 165 Forest Concessions in the country, 81 of all Forest Concessions have management plans. The total land area in grants is approximately 6,266,500 ha which consumed about $ 40,500.00 investment (Hanlon, 2011).

Across the country, there are between 2 and 3,000 communities; of these, lands of about 500 communities were delimited, corresponding to about ten million hectares or 12% of the total area of the country (Hanlon, 2011). Given also the existence of 12 major land concessions for forestry and biofuels (about 948,000 ha) and 42 game farming, there are potential earnings expectations by the local communities from these investments.

Table 8. Initiatives for participatory management of natural resources (Sitoe et al., 2007).

System of forest use	Forest management regime (or primary user)		
	State	Private	Community
Protected areas	National Parks National Reserves		Areas of historical and cultural value
Multiple use areas			Multipurpose Community Areas
Concessions		Privately managed community forest concessions	Community forest concessions
Game Farming		Private Game Farming	Community Game Farming
Hunting areas	Official Hunting Areas		Official Community Hunting Zones
Plantations	Public forest Plantations	Private Plantations	Community Plantations and agroforestry systems

Under the Ministerial Order n° 93/2005 of 4 May, the state protects the rights of local communities over natural resources, ensuring the implementation of local initiatives to improve the lives of local communities, supporting and encourages local development. In this way, the state enforces the channelling of 20% of taxes revenues from the forest and wildlife exploitation to the local communities. Since the adoption of the Ministerial Decree Nº. 93/2005 of 4 May until 2011, about three and a half million dollars had been channelled to 861 beneficiary communities across the country (see Table 9).

Financial and other investments for the implementation

The implementation of the NBSAP in Mozambique benefited from the involvement of many government agencies, private entities, non-governmental organizations, specialized agencies and other conservation partners in the government. The Ministries for the Coordination of Environmental Affairs, Tourism, Agriculture, Fisheries, Public Works and Housing and Mineral Resources were directly associated with aspects related to the conservation of biodiversity. Although, in many cases their activities are not typified as biodiversity activities, these are masked in financing and in other investments under the terminology “environmental protection”.

Table 9. Balance of the implementation of the Ministerial Decree Nº. 93/2005 between 2005 and 2011; SI = no information (Chidiamassamba et al., 2012).

Province	Number of beneficiaries Communities	Number of organized Communities, 2005-2011	Number of organized Communities, 2011	Number of communities that received 2005-2011	Number of receiving communities, 2011	Delivered value (Mt), 2011	Delivered value (Mt), 2011
Maputo	43	41	0	28	28	1,074.121	1,074,121
Gaza	97	59	12	47	0	0	159,000
Inhambane	132	88	20	55	38	613,662	4,655,527
Sofala	92	22	0	43	SI	SI	20,729,662
Manica	98	75	13	75	20	808,859	7,289,686
Tete	55	69	0	69	39	4,635,438	15,877,115
Zambézia	118	125	0	127	0	411,239	28,088,052
Nampula	168	321	0	321	47	874,623	7,970,191
Cabo Delgado	215	72	0	72	0	4,361,927	17,319,145
Niassa	71	24	0	24	0	0	745,865
Total	1,089	896	45	861	172	12,779,869	103,908,364

In general ministries traditionally associated with environmental protection have evolved significantly in the allocation of resources to the environment. For example, there was a huge tendency to allocate resources to environmental protection (average 50%) and a relative shift of resources from wastewater management (42% in 2008) to protection, biodiversity and landscaping projects (50% in 2010).

The environmental projects included in the national budget totalled 1,273.2 million MZN from 2008 to 2010, which is equivalent to 0.5% of the state budget and 0.2% of GDP. The amount has funded a total of 240 projects in the environmental sector in more than 30 institutions of government. On average, about 53% of spending is for projects of Environmental Protection. MICOA ran about 70% of the projects, followed by the Ministry of Public Works and Housing (MOPH), which represented 26% of project expenditure since 2008.

External funding to MICOA and its sub-agencies represented 47% of investment expenditure since 2005, having reached up to MZN 55.3 million in 2010, much of this

amount is funded by DANIDA. On the other hand, external financing from the World Bank of about 42 million USD to the area of biodiversity has been allocated to the Ministry of Tourism, while approximately USD 3 million was allocated for the protection of flora and fauna in the Ministry of Agriculture.

The external funding included in the state budget offered a little less than 100 million USD per year to the environmental sector. This funding consisted of 115 projects registered in the state budget, which represented approximately 3% of the total state budget and 1% of GDP. There was however, external funding that was not included in the budget. This represented an average of 23.0 million USD per year from 2007 to 2010, which were implemented through 125 environmental projects. The total amount of external funding that was allocated to the environmental sector is 471.3 million USD (for details, see Table 10).

Table 10. Budget Allocation to the environmental area in the State Budget (APEMETA 2013).

Budget unit	Investment		Total
	Intern	Extern	
Structural area of the environment	43,891.96	4,500	48,391.96
Support of administrative institutions	5,114.81	620.00	5,734.81
Environmental management	25,520.00	970.00	27,490.00
Spatial planning	2,794.00	459.00	3,253.00
Climate change	2,841.45	1,173.00	4,014.45
Intersectoral coordination	1,266.00	360.00	1,626.00
Education, communication, and environmental disclosure	4,605.70	459.00	5,064.00
Environmental quality management	750.00	459.00	1,209.00
Management of water and sanitation infrastructure	150,000.00	393,407.00	543,407.00
Southern Regional Water Management	150,000.00	538,247.00	688,247.00
Heritage fund and water supply	100,000.00	639,866.74	739,866.74
Housing promoting fund	112,000.00	0.00	112,000.00
Management of water resources	187,522.00	667,415.00	854,937.66
Electricity	262,059.82	339,391.82	601,451.64
Renewable energy	560,108.42	0.00	560,108.42
Management of natural resources	495,133.52	31,180.11	526,313

Revenues from the implementation of the NBSAP

Continuou a executar taxas de pescas, taxas de mineração e de caução ambiental para a actividade mineira; duplicaram-se as taxas destinadas ao FUNAB e houve agravamento das taxas das áreas de conservação e abate (para detalhes, veja a Tabela 11).
O total das receitas do sector ambiental foi de 1,048.8 milhões MZN de 2008 a 2010, o que equivale a 0.4% do orçamento do Estado e a 0.1% do PIB.

In the implementation of the NBSAP, the Government has taken measures to protect the environment by introducing fines and fees. Specifically, the Government continued to charge fishery fees; mining fees and environmental caution for mining activities, doubled the rates of FUNAB and aggravated the rates for conservation areas and hunting (for details, see Table 11). In total, the revenues of the environmental sector

amounted 1,048.8 million MZN 2008-2010. This equates to 0.4% of the state budget and 0.1% of GDP.

Table 11. Revenues from the environmental sector derived from fees and fines (2008-2010) (MICOA, 2011).

Source	Revenue (1000 MZN)		
	2008	2009	2010
Total of fees and fines	**169,795**	**368,460**	**510,543**
Direct revenues from environmental sector	**9,000**	**10,992**	**26,624**
National Environmental Fund fees and fines	9,000	8,662	23,291
Revenues from the touristic Conservation Areas	--	--	630
Slaughter fines - SPP	--	2,330	2,703
Revenues from the land	**11,077**	**29,791**	**30,176**
Land fees	--	--	4,829
Land use fees	11,077	27,800	21,908
Land use annual fee	--	1,385	2,343
Land use fines - SPGC	--	606	1,097
Fishing and hunting revenues	**149,718**	**113,049**	**218,096**
Fees from Fishing Development Fund	--	--	92,678
Fishing licenses	119,159	85,333	98,001
Fishing fees	30,560	24,573	22,900
Hunting fees – SPFFB	--	1,643	1,518
Hunting fees – DNTF	--	1,500	3,000
Revenues from Mining Sector	**0**	**0**	**13,900**
Registration Fee - Application for Mining Concession	--	--	700
Rate Extension of Mining Concession	--	--	2,200
Fines of mining activities - 60%	--	--	10,000
Emission rate of mining concession title	--	--	500
Filing fee out of term request for extension of Mining Concession	--	--	500
Revenue from wood and coal	**0**	**165,674**	**199,146**
Rate of mining, coal and firewood – SPFFB	--	16,843	21,128
Extraction rate of wood – SPFFB	--	134,621	163,905
Certification of wood – SPA	--	14,210	14,113
Revenues of oil	**0**	**48,954**	**22,600**
Fees and fines from the National Institute of Petroleum	--	48,954	22,600

Since 2008, 46% of income is derived from fishing and hunting. This total account for nearly all fisheries value and the fishing license provides the most revenue. One third of the revenue comes from wood and coal exploitation.

Revenues from the Parks and Wildlife are presented in the Table 12. Revenues from the tourism sector (from the parks, protected areas and game reserves) have seen a steady

increase during the 2005-2010 period. The main source of income is from the hunting taxes, representing 45% of all sources, then the entry rates (41%) (MICOA, 2011).

Table 12. Revenues from Tourism Parks and Protected Areas (2005-2010) (MICOA, 2011).

Area	2005	2006	2007	2008	2009	2010
Hunting areas	6.3	10.7	6.5	9.6	14.5	10.6
Parks	2.8	5.6	6.3	7.5	10.0	11.1
Gorongosa NP	0.1	0.8	1.8	0.7	0.6	1.3
Bazaruto NP	2.6	3.0	1.2	0.0	0.0	0.0
Limpopo NP	0.0	1.4	2.7	4.9	8.0	7.1
Quirimbas NP	0.2	0.3	0.6	1.9	1.4	2.6
Zinave NP	0.0	0.0	0.0	0.0	0.0	0.0
Protected areas	4.1	3.4	7.0	9.2	10.2	14.6
Maputo NR	0.8	1.1	1.8	1.5	1.8	3.1
Banhine NR	0.0	0.0	0.0	3.2	1.5	5.2
Chimanimani NR	0.0	0.0	0.0	0.0	0.0	0.0
Tchuma Tchato	3.3	2.3	5.1	4.5	6.2	6.3
Q. p/ Communities	0.0	0.0	0.0	0.0	0.7	0.0
Total (millions MT)	13.3	19.7	19.7	26.3	34.7	36.3
Area	2005	2006	2007	2008	2009	2010
Hunting areas	6.3	10.7	6.5	9.6	14.5	10.6
Parks	2.8	5.6	6.3	7.5	10.0	11.1
Gorongosa NP	0.1	0.8	1.8	0.7	0.6	1.3
Bazaruto NP	2.6	3.0	1.2	0.0	0.0	0.0
Limpopo NP	0.0	1.4	2.7	4.9	8.0	7.1
Quirimbas NP	0.2	0.3	0.6	1.9	1.4	2.6
Zinave NP	0.0	0.0	0.0	0.0	0.0	0.0
Protected areas	4.1	3.4	7.0	9.2	10.2	14.6
Maputo NR	0.8	1.1	1.8	1.5	1.8	3.1
Banhine NR	0.0	0.0	0.0	3.2	1.5	5.2
Chimanimani NR	0.0	0.0	0.0	0.0	0.0	0.0
Tchuma Tchato	3.3	2.3	5.1	4.5	6.2	6.3
Q. p/ Communities	0.0	0.0	0.0	0.0	0.7	0.0
Total (millions MT)	13.3	19.7	19.7	26.3	34.7	36.3

New and Renewable Energies

The demand for new energy sources is growing in the country. While firewood and charcoal are being used, the use of clean energy is being multiplied. The commitment of the government allowed the approval of the Resolution nº.62/2009, the Development Policy of New and Renewable Energy. This document helps the country to promote the use and exploitation of renewable energy resources to reduce energy demand, especially in rural areas.

In response to the challenge of promoting biofuels, the Government approved through the Resolution nº. 20/2009 of 21 May, the Biofuels Policy and Strategy in Mozambique. As a result of this, there are 33 ongoing projects on biofuels, with an investment exceeding 100 million dollars. In 2011, the government approved the Renewable Energy Strategy which convert the policy into concrete actions. Since July 2011, the FUNAE is developing the "Renewable Energy Atlas of Mozambique" project. This project aims to identify priority projects for renewable energy. Between 2012 and 2013 gas-powered vehicle fuelling stations, the factory of solar panels and the power electricity production from the natural gas at Pande and Ressano Garcia as well as the distribution plan of cooking gas to urban networks of the cities of Maputo and Matola went into operation.

Traditional knowledge and biodiversity conservation

During the implementation of the previous NBSAP many practical knowledge and local institutions were identified, documented and stimulated. These practices included the traditional and adapted techniques for natural resource management in local communities, especially in the management of species, varieties, soil fertility and related aspects. The country is implementing decentralization mechanisms, conferring an increased value and weight of local institutions.

Local institutions of access and use of natural resources such as land tenure systems and cultural practices that interact with the degradation of biodiversity and land are being strengthened and used for the development of sustainable management systems for natural resources and biodiversity.

Traditional management methods such as taboos, sacred and profane forests are being implemented with substantial gains in the level of effectiveness of biodiversity conservation. The model of the Chirindzene Reserve in Gaza province, where predominate supernatural forest management practices with rituals, spiritual and sacred elements is being replicated in the country and in other cases the "One leader,

one forest" initiative is driving the emergence of the protected forest that are functional for community needs.

Waste Management

In response to the increased production of municipal waste, important steps were taken in the regulation and the implementation of specific programs, especially in order to increase and diversify the recycling techniques. Although the average amount of solid waste produced per individual is at low levels (about 0.4 kg /person /day) in Mozambique (APEMETA, 2013), compared with the average for developing countries in Africa, their management challenges the capacities of the local institutions.

For example, 60% of the waste produced in the city of Maputo are collected and deposited in the existing open trash areas. A portion of the dumped waste is placed and incinerated in the open; another part undergoes decomposition during storage and still another, consisting of old paper and glass trash, is collected by the population and companies interested, for further sale and / or recycling. The domestic refuse, organic materials, office waste, not infectious medical waste and industrial waste are all mixed together and deposited at the open trash area (APEMETA 2013).

Urban sanitation systems cover 47.3% of the urban population against the target of 80% in 2015 (ICPD, 2012) and, in most cases already require renovation.

Despite the weak industrial base for recycling activities, since 2010 the number of industries involved in assessment of cleaner technologies and the promotion of different options that contribute to reducing emissions and waste as well as the rational use of resources in terms of utilities and raw materials have increased.

In 2012, the Wastewater Treatment Station started to operate at Beira city. It is set as a challenge to promote more investment in this area that 10% of the investments made should be oriented towards water and sanitation systems networks in order to outpace the current construction capacity of about 20, 000 improved latrines and 40, 000 traditional latrines per year to about 90,000 improved latrines per year (ICPD, 2012).

Environmental conservation programs

Several programs aiming at improving the conservation of biodiversity are being implemented in priority ecosystems such as Lake Niassa, First and Second Islands, Mount Mabu. The government, through the Presidential Initiatives instituted the "One Leader, one forest", which resulted in about 22, 000 community forests; Initiative “One child, one tree" which resulted in 14,138,253 planted trees throughout the country by 2010. Funds from various Government partners (for example GEF) assisted in the implementation of biodiversity conservation projects. For example, through the Critical Ecosystem Partnership Fund in 2011 and about two million dollars and four million dollars from the Small Grant Program, SGP, see Box 6) where allocated to biodiversity conservation. In these initiatives there was a specific focus on the activities impacting

on the improvement of the human livelihoods and in the conservation and restoration of biodiversity in Mozambique. As a result of the implementation of these programs, the state of biodiversity in the targeted ecosystems has improved. This performance resulted in an increased percentage of protected areas as referred above, (see Table 13).

Table 13. Protected areas created by the Mozambican government between 2009 and 2014.

Protected area	Year of establishment	Extension(ha)
Marine Protection Area of Maputo - Ponta de Ouro	2009	67,800
Incorporating Gorongosa ridge into the Gorongosa National Park	2010	330,000
Nacuma oficial hunting area	2010	271,375,272
Nipepe oficial hunting area	2010	138,286,864
Futi Corridor	2011	24,000
Lake Niassa Partial Reserve	2011	137,165,366
Environmental Protection Area of the First and Second Islands	2012	1,040,926
Malhazine Ecological Park	2012	568
Mágoè National Park	2013	350,000
Lureco oficial hunting area	2013	226,166
Messalo oficial hunting area	2013	122,700
Mulela oficial hunting area	2013	96,400
Nungo oficial hunting area	2013	328,800
Micaúne oficial hunting area	2014	24,030
Luabo oficial hunting area	2014	55,750
Total		140,242,168.1

Environmental strategies

Several strategies have been formulated and are being implemented among others, the National Strategy for Climate Change (2012), which aims to enable the country to effectively adapt to climate change and participate in the global efforts to mitigate climate change, in order to achieve sustainable development; The Strategy for Development (2013) which aims to improve the living conditions of the population through the structural transformation of the economy, expansion and diversification of the production base in respect to environmental quality; the Strategy and Action Plan for Food Security and Nutrition 2008-2015 (2007) that aims to help in planning, budgeting, implementation, monitoring and evaluation of actions that contribute to improving food and nutrition security within the vulnerable populations, taking into account the various areas of existing food economies in the country.

This strategy acknowledges that forest and wildlife resources are available capital that contributes to the increase of the exportations, the national and household income. In rural and peri-urban areas these resources constitute an important subsistence and

survival alternative in times of food shortage; Strategic Plan of the Institute of Agricultural Research of Mozambique (IIAM) (2010) which aims to contribute to the productive and sustainable use of natural resources by encouraging the use of natural resources, ensuring the conservation genetics of plants and wildlife and preserving biodiversity and the integrity natural ecosystems.

4. Barriers to the implementation of the Convention

Despite all the policies and measures that were instituted by the Government to implement the Convention, the Convention's implementation was hampered by the following obstacles:

i) insufficient resources to fully implement the obligations of the Convention;
ii) insufficiency to perform comprehensive study of country biodiversity resources;
iii) the difficulty in the adequate integration of biodiversity concerns into sectors and local government plans and budgets;

iv) limited capacity for research and precise data generation as well as the value of biodiversity;
v) Low level of public awareness;

vi) Deficient participation of communities in biodiversity conservation.

5. The integration of biodiversity into relevant sectors and strategies for poverty reduction and other key transversal policy instruments

5.1. Institutional arrangements for environmental management

Aware of its responsibilities and the need to ensure the economic development is not done in detriment of the environment, the government has created national forums that coalesce different sectors and relevant to the conservation of biodiversity. Formal mechanisms of communication, coordination and of integration of actions are being ensured at the CONDES (National Council for Sustainable Development) level; mechanisms of government funding and incentives for environmental/biodiversity issues are ensured through specialized institutions established as FUNAB (Environment Fund), NRF (National Research Fund) and FUNAE (National Energy Fund). There are also several other initiatives made by NGOs (Non-Governmental Organization) and CBO

(Civil Community Based Organization) who by their actions help to incorporate biodiversity into the national development agenda. Fundamental and applied research in the context of environmental protection /biodiversity is performed by specialized research institutes such as the Centre for Sustainable Development (CDS), colleges and universities. The integrity and functionality of the ecosystems are guaranteed through the mandatory procedures of environmental impact assessment (EIA) on the development projects.

Finally, the Government is operationalizing the country's development through integrating tools such as ODM and PARPA, which ensure (in its design and implementation) the institutional coordination, the integration of all sectoral policies and programs, and the geographical and thematic focus representativeness in order to achieve a balanced and sustainable development.

In the implementation of the NBSAP there is a sharing of responsibilities among the ministries and according to the biodiversity/thematic areas: (i) most of the sanitation projects and of the management of residual waters is implemented through the MOPH; and (ii) almost all projects labelled under biodiversity protection and landscape are executed by the Ministry of Tourism by the National Directorate of Tourism.
(iii) in general the centres for sustainable development and the tertiary education institutions are responsible for the research and the development of the environmental protection and (iii) MICOA and the DPCA are in charge of the protection projects.

5.2 The integration of biodiversity into national strategies and plans

The vision of Mozambique economic development (Agenda 2025)

As it was stated above, in the most of the strategies and plans, biodiversity protection is masked under the terminology of environmental protection. For example, in the main document that expresses the vision for the development of Mozambique, Agenda 2025 the expression “environmental protection” is mentioned 26 times while the term biodiversity is mentioned only twice and the expression “natural resources” is referred 49 times.

Throughout this document, the destabilization and disruption of biodiversity cycles is considered to be a threat or an inhibitor element for the development, and the regulation of settlements in order to protect natural resources (including water, air, biodiversity, energy and land) are considered to be challenges to the vision of Mozambique.

Agenda 2025 considers Mozambique as an attractive country thanks to its richness in natural resources, but the long-term competitiveness of the country is dependent on maintenance of the natural cycles ensured by a healthy environment. Thus, the Agenda advises the need for biodiversity conservation and its sustainable use and it consider these to be crucial in the maintenance of the levels of the economic growth of the country.

Box 6. Grants programme of the Global Environment Fund in Mozambique

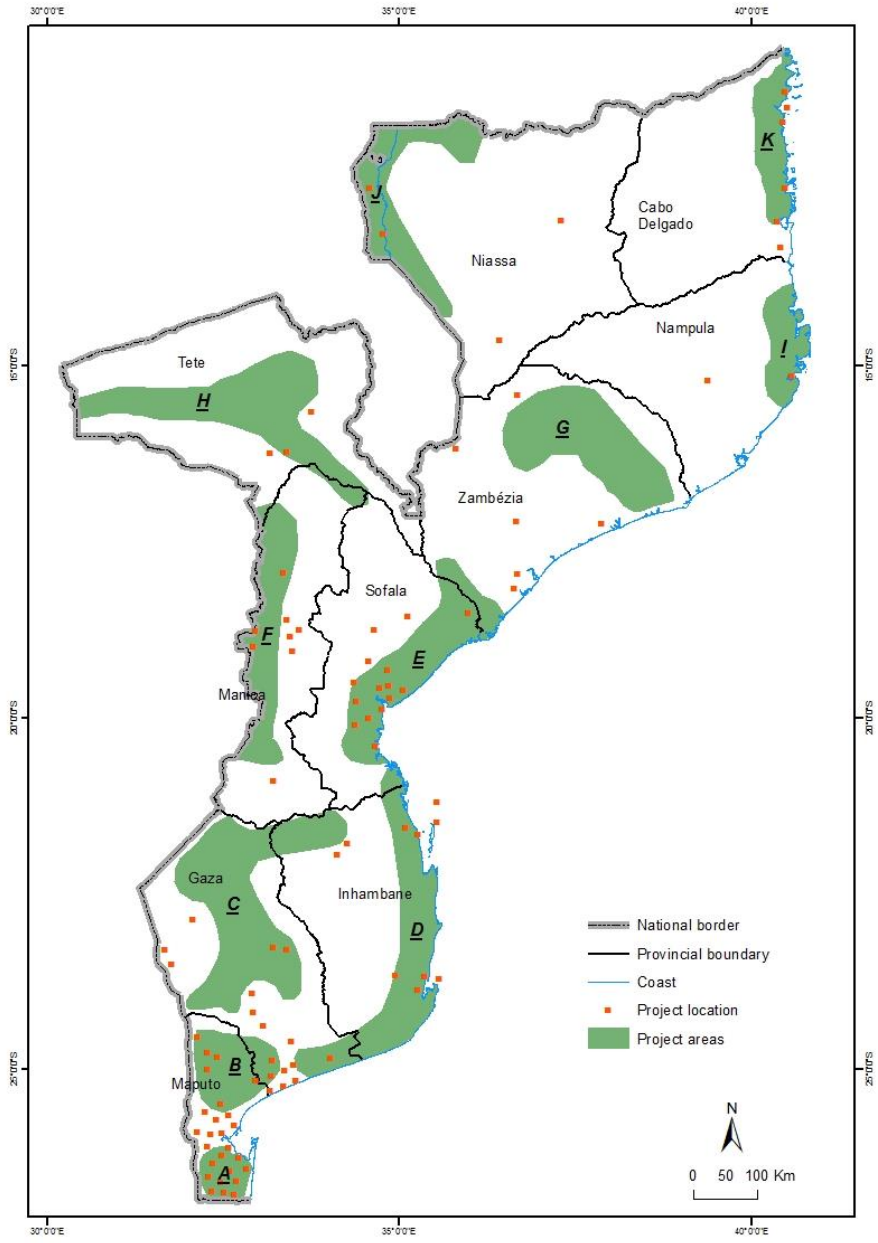

Figure 6.1: Areas of geographic focus and those where projects are being implemented.

The Small Grant Program (SGP) was established in Mozambique in October 2003 as a request of MICOA to the Global Environment Fund and began its activities in 2004. The SGP implementing committee prepared a strategic program responding to a geographical and thematic coverage. Subject areas include biodiversity, climate change, international waters, land degradation, persistent organic pollutants and climate change adaptation, while the geographical coverage includes the areas of Mozambique where the thematic approaches find themselves represented as illustrated in Figure 6.1. Between 2003 and 2013, 195 projects representing a financial coverage of about 4 million U.S. dollars distributed among the thematic and geographic areas were implemented (for details see Figure 6.2).

Some projects such as those listed below are exemplified as a successful implementation:

- Pilot Initiative of small solar freezers for fishing communities of Machanga in Sofala Province:
- Mangrove rehabilitation project by the community of Nhangau in Sofala Province;
- Protection of land in the city of Vilanculos to control degradation and coastal erosion;
- Protection, conservation and maintenance of integrity of natural resources in the village of Mabalane, Gaza Province;
- Local sustainable development in Gurué District, Zambezia Province

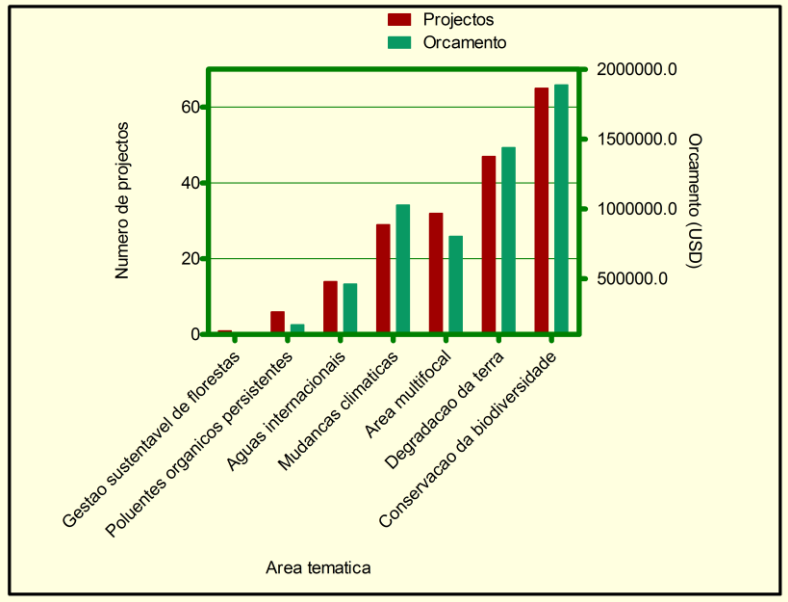

Figure 6.2: Financial coverage of projects by thematic area between 2005 and 2013.

The Plan for Poverty Reduction (PARPA 2011-2014)

Within the Plan for Poverty Reduction (2011-2014), the Government assumes as an objective the promotion of a productive and sustainable management of natural resources and of the environment and prioritizes sanitation, land use planning, prevention of land degradation, management of natural resources, including the control of fires; the plan also observes the legal and institutional aspects, the environmental education, the law enforcement as well as training, the reducing the air water and soil pollution as well as the prevention and reduction of natural disasters.

The Five-Year Government Programme (QGP 2010-2014)

In the QGP (2010-2014), the rehabilitation of the conservation areas and the biodiversity protection are associated with the incentive to the involvement of local communities in the management of natural resources and as well as in ensuring the implementation of the Human-Wildlife Conflict Management Strategy in those areas (see Box 7 below).

The Action Plan for Food and Nutrition Security (PASAN) (2008-2015)

Environmental concerns are reflected in the PASAN as cross-cutting aspects. For example and among others, the PASAN expects to implement the activities for reducing wildfires; to organize the artisanal miners in mining associations, to create and develop the Management Committees of Natural Resources, to eliminate the in discriminated felling of trees and to integrate the environmental dimension in all activities related with food and nutrition security. To illustrate the attention that PASAN is dedicating to environmental aspects, it suffices to note that of the approximately USD 29 million of the annual expenditure, approximately 2.7% is consigned to the environment.

National Development Strategy (2013)

This strategy recognizes that the the environment protection ensures the quality of life and desirable health. Therefore, in the line of the implementation of Sustainable Management of Natural Resources the strategy stresses a correct use of renewable natural resources; recommends an optimal economic use of non-renewable natural resources, as well as it ensure that the levels of exploitation and utilization of natural resources are compatible with and do not exceed the regenerative capacity of ecosystems.

5.3 The integration of biodiversity across sectors

Education sector

Although in the Education Strategic Plan (2012 - 2016) the word biodiversity is not

mentioned, within the curricula of both pre-school, primary school, secondary school and the higher school, aspects of biodiversity are well covered. Being a country that is persistently plagued by natural disasters, the concepts of environment, climate and resources go beyond the formal education and are therefore covered in other initiatives of environmental awareness.

Box 7. Conflict between humans and wildlife in Mozambique between 2007 and 2013

The conflict between humans and wildlife is one of the threats facing conservation today, in Africa in general and in Mozambique in particular. In Mozambique, such situation achieves political, economic and social boundaries. Crocodiles, elephants, hippos and buffaloes are the species that most often come into conflict with humans, wounding or causing death, destroying their crops and livestock. Between 2007 and 2013 more than 630 people were killed; 2,887.25 hectares of crops were destroyed and more than 1,294 problematic animals were killed. 64.5% of people were killed by crocodiles, 82.1% of ha were destroyed by elephants, while 55.7% of slaughtered animals were crocodiles and elephants (18.9%) (see Figure 7.1 below).

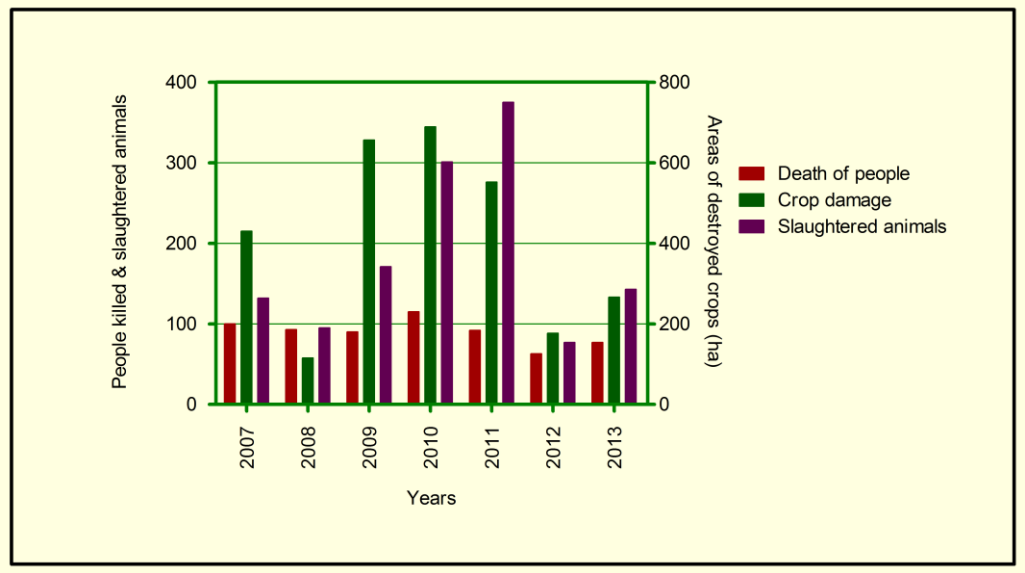

Figure 7.1. Deaths of people, destruction of crops and total problem animals killed each year (Source: DNTF, 2014).

Agriculture sector

The Strategic Plan for Agriculture Sector Development (PEDSA) (2010-2019), recognizes the impact of agriculture on biodiversity and draws some actions for its reduction. The IIAM Strategic Plan (2011-2015) provides a strategic objective to environmental issues. The plan emphasizes the need to encourage the use of natural resources, ensuring the genetic conservation of wild plants and wild animals,

preserving biodiversity and the integrity of natural ecosystems. The National Policy on Forests and Wildlife focuses on the sustainable use and conservation of biodiversity; it describes the actions to mitigate the conflicts between humans and the wildlife. In the agriculture sector, the Government has several initiatives that envisage the conservation of forest resources, including the community based management of forest and wildlife resources and the sustainable management principles in forest concessions.

Tourism Sector

The Strategic Plan for the Tourism Sector (2005-2013) considers the development of sustainable tourism as being crucial and to be developed with respect to conservation and protection of biodiversity. The plan encourages eco-tourism activities as a means to sustain the biodiversity. For the Mozambican government, there is a strict link between tourism and wildlife conservation. Therefore, tourism activities based on the protected areas is of paramount importance: it strengthens biodiversity conservation through their sharing in the resources generation that are needed by protected areas themselves.

The law of conservation areas recently approved punishes with fines raging from 50 to 1,000 minimum wages to all carrying out the operation, storage, transportation or illegal trade of the species listed as protected in the country (includes the species listed in Annex I of CITES). This law also introduces types of offenses that are subject to minor imprisonment (up to two years and a corresponding fine) and to major imprisonment (eight to twelve years and a corresponding fine), the latter is applied to the persons who illegally happen to slaught any protected species.

Mineral resources and energy sectors

The recent discoveries of mineral resources and hydrocarbons challenge the mineral resources sector to adopt good environmental practices for their operation. Therefore, the norms governing the hydrocarbons industries (Decree Nº. 56/2010) mention the obligatory observance of environmental conservation practices by the companies. The Policy of the Extractive Industry Sector (2013) contains the principle of environmental protection.

The richness in water resources and natural gas, puts the country ahead in the use of clean energy sources. The 2009 national plan of renewable resources justifies the need for renewable energies especially clean energy and therefore recommends the promotion of use of renewable and alternative energy sources, as in the case of wind

solar and water energy and natural gas as well as it recommends minimizing the use of charcoal and firewood.

Fisheries sector

The policies of this sector recommend the use of the potential of the fishery resources in a sustainable way and under a strict environment respect in order to promote economic and social development. The Artisanal Fisheries Strategic Plan 2012 includes the principle of the necessity of the strengthening of the existing good practices of the traditional fishing and of the marine conservation areas and the co-management with the communities. On the other hand, the Strategic Plan for Tuna Fishing, 2013 contains the principle of the obligatory observance of the agreements ratified by the country with regard to scrupulous compliance of the measures to protect the species.

The Government is implementing the National Strategy on Aquaculture with which it intends to establish the monitoring systems of the potential threats to biodiversity and to the environment that are posed by aquaculture activities as well as to ensure the environmental integrity of aquatic ecosystems, the promotion of the ecosystems and mainly the ecological processes.

Water sector

The National Assistance Strategy for Water Resources in Mozambique (2007), has as one of its strategic objectives to contribute to productive and sustainable use of natural resources and biodiversity. In this sense, the strategy prioritizes the assessment and monitoring of biodiversity loss and degradation of the environment in order to protect, rehabilitate and manage the ecosystems; the development of collection, characterization, conservation and use of germplasm to support the effort of the improvement of the propagating materials and of the biodiversity; the development of the knowledge of management of sustainable use of natural resources; the development of knowledge of the biodiversity products and their economic and sustainable use as well as to increase the potential use of timber and non-timber species by the development of agro-industrial processing technologies.

5.4 The integration of biodiversity in various transversal sectors

Integration of biodiversity into planning processes

Mozambique is much preferred destination for foreign investment for the extractive industries, tourism and agriculture. These three areas require the use of land, which should be planned and tailored to the needs of the users. The process of land use planning is multisectoral and requires consultations with various stakeholders. For example, in the sub-regional context of Mozambique, tourism is both inter-sectoral and of cross-border nature, where a regional strategic approach is needed. Biodiversity conservation needs to build strong partnerships and include key stakeholders to increase the effectiveness of protection of ecosystems and community-based management. Thus, the vision of biodiversity conservation is welcomed into this participatory planning process. Moreover, the vast majority of resorts are located in the coastal zones, which by definition are environmentally sensitive areas. Biodiversity ends up to becoming part of the intersectoral discussions for the establishment of sun and beach tourist areas.

Since 2013, the Mozambican government has embraced the program of territorial planning according to which, in its practical form, all districts must establish their District Plans of Land Use (PDUT). By doing this exercise, each district must allocate the areas for biodiversity protection.

Environment sector

In its Strategy and Action Plan for Gender, Environment and Climate Change for 2010-2015, the Ministry for Coordination of Environmental Action (MICOA) assumes as a strategic action, the use of natural resources and in this context encourages the participation of women and the communities to access the natural resources, to combat deforestation and desertification and to promote biodiversity conservation. Moreover, in its National Programme of Action for Adaptation to Climate Change (NAPA) 2007 the Government recognizes the negative effect of drought and floods in the loss of biodiversity. Therefore, the long-term objectives are to ensure the protection of shoreline and biodiversity; protect biodiversity throughout the major river basins and to control the water pollution, protection of riparian ecosystems and to develop the instruments governing the control of water pollution.

Science and technology sector

The Strategy for Science, Technology and Innovation of Mozambique (2006-2011), believes that the conservation of the environment and particularly the management of natural resources, waste and biodiversity should be incorporated in all policies and strategies.

This strategy extensively stresses the need to associate the natural resources to the agriculture and recommend the following research lines for until 2015: the inventories, the sustainable management of natural resources (flora, fauna, micro-organisms, soil, water, ethnobotanical resources); the shared systems of data collection for natural resources and biodiversity; the systems of characterization of the production and its impact on agro-ecology, and the socio-economic issues as well as the inventory and the preservation of the local genetic material resources and adaptable systems.

Extractive industry sector

In this sector, the Government is aware of its responsibilities towards biodiversity conservation. The regulatory instruments of reconnaissance, prospecting and exploration, concessions and mining licenses certificates are associated with the regulation of the mining and environmental safety. To ensure that mining is developed with the use of efficient technologies and with respect to the preservation of the environment, the Government has regulated the oil operations with environmental restrictions and has created the basic environmental management norms.

5.5 The integration of biodiversity into the programs of other actors

Non-governmental organizations run several programs and projects with high impact on biodiversity conservation. Some of these, implement conservation projects (eg ABIODES), others promote public awareness for environmental protection (eg CTV; Livaningo, Environmental Justice) and others (eg SGP) promote demonstration projects in order to promote and enhance good attitudes towards the environment. (see box 8).

A brief description of some of these programs is given below:

i) Small Grants Programme (SGP): this is a corporate program launched in 1992 and funded by the global environment, with power to stimulate development through biodiversity conservation in particular and through environmental protection in general. The program has six components related to biodiversity conservation such as biodiversity, climate change, international waters, land degradation, persistent organic pollutants and climate change adaptation. Its portfolio comprises 60% of the global resources for biodiversity, 20% climate change, 6% for international waters and 14% for multifocal areas. The implementation of these components ensures that biodiversity is being conserved.

ii) Mozambique freshwater Program: This program is implemented by WWF Mozambique and focuses on the conservation of biodiversity of Lake Nyassa and the lower Zambezi basin, including the Delta. In 2011, the government designated the

Mozambican side of Lake Niassa as a Wetland of International Importance, including the designation of 150 km^2 as partial reserve in accordance with the national legislation. This program allowed the organization of fishing communities and to build their capacity in order to reduce illegal fishing practices, create alternative income generating activities and implemented environmental education to protect freshwater biodiversity, including freshwater coral reefs and about 700 endemic fish species.

iii) Marine Program: this program is also being implemented by WWF aiming to conserve marine habitats and biodiversity in priority locations, such as the Quirimbas National Park, Bazaruto Archipelago and the First and Second islands. With this program, scientific research and monitoring of dugongs, local turtles, artisanal fisheries, coral reefs, turtle tagging are carried out, as well as the development and monitoring of marine sanctuaries as well as supporting the development of sustainable fisheries.

6. Tools used for the integration of biodiversity

The inclusion and respect to the diversity of species in any sector, project or development activity is in accordance with the norms and regulations contained in the various legal frameworks: the principles of Environmental Impact Assessment Studies that is applied to the development projects, the principle and the government program on spatial planning through the District Land Use Plans (PDUTS), and other planning instruments including the principle of allocating 20% of the benefits to the local communities. The country adopted in its regulations and other laws the CBNRM principle (Community Based Natural Resources Management) for the use of natural resources.

7. Synergies in the implementation of the conventions and related agreements

The Government has created several synergies for the implementation of agreements and conventions. It has created and enhanced many specialized institutes such as the Institute of Traditional Medicine, the Land Planning Institute, the National Administration of Conservation Areas. In 2010, the Government approved the National Strategy and Action Plan for the Management of the Elephant, in order to improve the conservation of this species in the country. In 2011 the Government has created a specific Task Force composed by the representatives of the nine ministries relevant to the protection of biodiversity resources, in order to look into specific measures concerned with the protection of the natural environment. In the same year, the Task

Force has prepared a program to combat natural resources depletion which provides an analysis of the depletion of natural resources of the country, and proposes the measures to combat illegal exploitation of natural resources. This program was updated in 2014, and it is now called the National Program for the Protection of Natural Resources and Environment (Couto, 2014).

In 2014, Mozambique ratified the London Declaration on the Illegal Trade of Endangered Species, in response to the an increased regional and transfrontier coordination through the Transfrontier Conservation Areas; the country has joined the MAB (AfriMAB) initiative in order to promote regional cooperation in the fields of conservation biodiversity and sustainable development, and, specifically for this purpose, has signed a memorandum of understanding with the Republic of South Africa (Couto, 2014).

8. The state of the implementation of the National Biodiversity Strategy and Action Plan (NBSAP)

Being the Convention on Biological Diversity cross-cutting, that is, of interest to a wide variety of sectors and actors, the integration of biodiversity issues into the sectoral and cross-sectoral plans, programs and policies goes beyond the scope of action of the focal point of the Convention, being MICOA, in the case of Mozambique. The development vision of Mozambique expressed in its Agenda 2025 recognizes that the country is rich in biodiversity, and thanks to it we are witnessing economic growth of its economy around 7%. But the future of Mozambique, as occurs today depends largely on the value of biodiversity and its sustainable use.

The development vision of the country, expressed in the 2025 Agenda acknowledges that the country is rich in terms of its biodiversity and that thanks to that the country has an economic growth of about 7%, however, the future of the country depends on the value of the biodiversity and its sustainable use.

The NBSAP had two components namely: (i) the conservation of the biological diversity and (ii) the sustainable use of the components of biological diversity. Within the NBSAP for 2003-2010 there are 17 priority actions. Table 14 below summarizes the implementation of the priority actions proposed for the two components above indicated.

Table 14. Status of implementation of the National Biodiversity Strategy and Action Plan (2003-2010).

Component of biodiversity	Priority actions	State of implementation (2010 - 2014)
Conservation of components of biological diversity	1.1 To identify and analyse the components of biodiversity and their relationships within ecosystems, as well as the processes and activities that can have an adverse impact on them.	- Conducted 2 studies (birds); 2 (marine biodiversity); 4 (plants); 8 wildlife inventories; - Created three Centers for Sustainable Development - Established a Marine-Coastal Research Center
	1.2 To determine the state of conservation of species in Mozambique and to identify and implement the appropriate conservation measures for threatened and endemic species.	-Increased from 11% to 26% percent of the protected area - 2 new National Parks were created; three National Reserves; 8 Coutadas and 8 Game farming - Restored the Gorongosa National Park - Declared 2 RAMSAR Areas - Approved the Conservation Strategy - Approved the Law of Conservation Areas - Approved the Conservation Fund
	1.3 To determine the country's native breeds of livestock, their state of conservation and implementation of appropriate measures for their preservation.	- Identified three native breeds cattle and goats - Trend replacement by exotic - Ongoing a national breeding program - Incorporated artificial insemination program
	1.4 To determine the state of conservation of ecosystems and habitats in Mozambique, identifying and implementing appropriate conservation and ecosystem management measures, with an emphasis on the most fragile.	- Increased the percentage from 11% to 26% occupied by conservation areas with the creation of new national parks and reserves, including marine areas and coastal area - Proclaimed three transboundary areas (Lebombo, Great Limpopo, Chimanimani) - Restored Gorongosa National Park - Proclaimed the Marromeu Complex (Marromeu National Reserve and 4 hunting areas) as Ramsar area.

		- Created the Lake Niassa Reserve and Ramsar Area - Declared the Ponta do Ouro area as world Heritage - Approved Conservation policy and the Law of Conservation Areas - Created Conservation Fund
	1.5 To establish and manage a representative system of protection areas.	- Almost all protected areas have management plans - Amended and fixed appropriate limits of some conservation areas - Approved the Conservation Strategy -Approved Law of Conservation Areas
	1.6 To develop and strengthen the national potential for ex-situ conservation of the components of biodiversity with a view to supporting and complementing in-situ conservation.	-Implemented the Project to promote the use of agro-biodiversity of local crop varieties - Made regular inventories and germplasm collection of the Plant Genetic Resources (gene bank) Centre (IIAM) - Conducted a census by the IIAM Centre for Plant Genetic Resources to identify the needs of reintroducing germplasm in areas that suffered genetic erosion - Assembled germplasm conservation especially cereals and pulses in the gene bank of the Centre for Plant Genetic Resources IIAM food crops - Systematized all information on the material preserved in "SADC and Documentation Information System (SDIS). " - Established a garden of medicinal plants in Ethnobotany Research Centre in Namaacha - Cemented partnership between the Centre for Plant Genetic Resources and IIAM CGIAR centres to

		share germplasm - Built partnership between the Regional Centre for Plant Genetic Resources IIAM and similar institutions of SADC countries in order to share technical training on germplasm - Fortified the botanical garden of the University Eduardo Mondlane which works with ex-situ conservation of native plant species
	1.7 To recover and rehabilitate degraded ecosystems and, where applicable, to develop species recovery plans.	- Projects implemented by FUNAB - Rehabilitation of mining areas of Tete - Rehabilitation of mangroves - Recovery of Mount Gorongosa - Restoration of areas of rice production in Zambezia - Rehabilitation of the coastal strip
	1.8 To limit the introduction and propagation of species which cause damage to native biodiversity and establish measures to control and eradicate exotic species that can affect ecosystems, habitats and native species.	- Approved the Regulation on the management of alien and invasive species in 2008
Sustainable use of components of biological diversity	2.1 To promote the sustainable and integrated use of flora resources (timber and non-timber), ensuring the creation of benefits for all those involved in their exploitation, with an emphasis on local communities.	- Adopted in 2007, the environmental strategy for sustainable development - Approved the Regulation which states that 20% of the profits from exploitation of resources (flora and fauna) are delivered to communities - Settled various committees of community management of natural resources
	2.2 To guarantee the sustainable use of agricultural resources in the aim of improving the living conditions of Mozambique's rural population, while avoiding aspects relating to the loss of the	- Adopted in 2004, the Traditional Medicine Policy, which protects and promotes the traditional knowledge of local communities - Established marine sanctuaries in the Quirimbas

	specific and genetic variability of the main crops.	National Park - Set out several projects for community management (Madjedjane, Gala, Limpopo, Mecula etc.) - Established community farms (Mahel, Txuma Tchato, Chipannje Chetu) - Established in Ethnobotany Research Center Namaacha - Established the Center for Community Research Madjedjane
	2.3 To guarantee the rational usage of wildlife, so that it can contribute to the well-being of rural populations and the development of the country.	- Created more than ten game farming - Created Community game farming - Implemented the principle of 20% of revenue for communities
	2.4 To promote the sustainable use of fisheries resources for the benefit of the population, prosperity of the economy, conservation of resources and maintenance of biodiversity.	- Establishment of Sanctuaries in the Quirimbas - Established partnerships for co-management of fisheries resources in Cabo Delgado
	2.5 To promote the integrated management of hydrographic basins, ensuring the minimum run-off necessary for the prosperity of downstream ecosystems.	- Designed the integrated management of Púnguè basin - Designed the integrated management of the Zambezi basin
	2.6 To ensure that the development of the tourism industry is based on respect and the sustainable use of biodiversity.	- Adopted in 2007 the environmental strategy for sustainable development - Approved the Regulation which states that 20% of the profits from exploitation of resources (flora and fauna) are delivered to communities - Settled various committees of community management of natural resources
	2.7 To promote sustainable development in areas adjacent to protection areas with a view to providing additional protection for protected areas.	- Pilot projects resulting in Gorongosa National Park -The National Reserve of Gile Project - Project Chipande Chetu in the Niassa National Reserve

		-Project Buffer Zone of the Limpopo National Park
	2.8 To regulate the handling, use and transfer of GMOs to minimise the potential risks to human health and biodiversity.	- Adopted in 2007, the regulation on the management of GMOs - Implemented the draft list of exotic and invasive species in the country carried out in 2003 - Approval of the Regulation on the management of alien species and invasive in 2008 - Prepared a proposal for a regulation on biosafety
	2.9 To assess the economic, social and environmental contribution of business developments and create a national accounting system integrating all three components.	- Some resource evaluation studies were conducted in the field - National Institute of Statistics, in coordination with MICOA started designing a proposal to make some environmental issues in national accounts - Website of Agriculture and Forestry, Faculty of Engineering (EMU) inserted some studies on resource valuation

The 17 priority actions included in the NBSAP 2003-2010 and listed in Table 14 were analyzed in order to assess the degree of their implementation. Each priority action was classified into one of the four categories: fully achieved/accomplished (4) substantially achieved/accomplished (3), achieved/accomplished to a limited extent (2) and not achieved/accomplished (1).

The results of the analysis of the degree of implementation of NBSAP 2003-2010 are shown in Figure 29. The results indicate that, overall, 17.65% of the priority actions in the NBSAP have been fully met.; 29.41% substantially met; 41.18% were accomplished, but in a limited way, and 18.8% have not been accomplished. All priority actions fully achieved refer to areas of conservation of components of biological diversity. In general, the area of sustainable use of components of biological diversity has had an unsatisfactory performance. However, the significance of this partial review of the NBSAP 2003-2010 should still be taken with caution, since in the time of writing this report, a deep review of the previous NBSAP was going on while preparing the new NBSAP. In general, Mozambique and briefly reached the following measurable results (see Box 8 below):

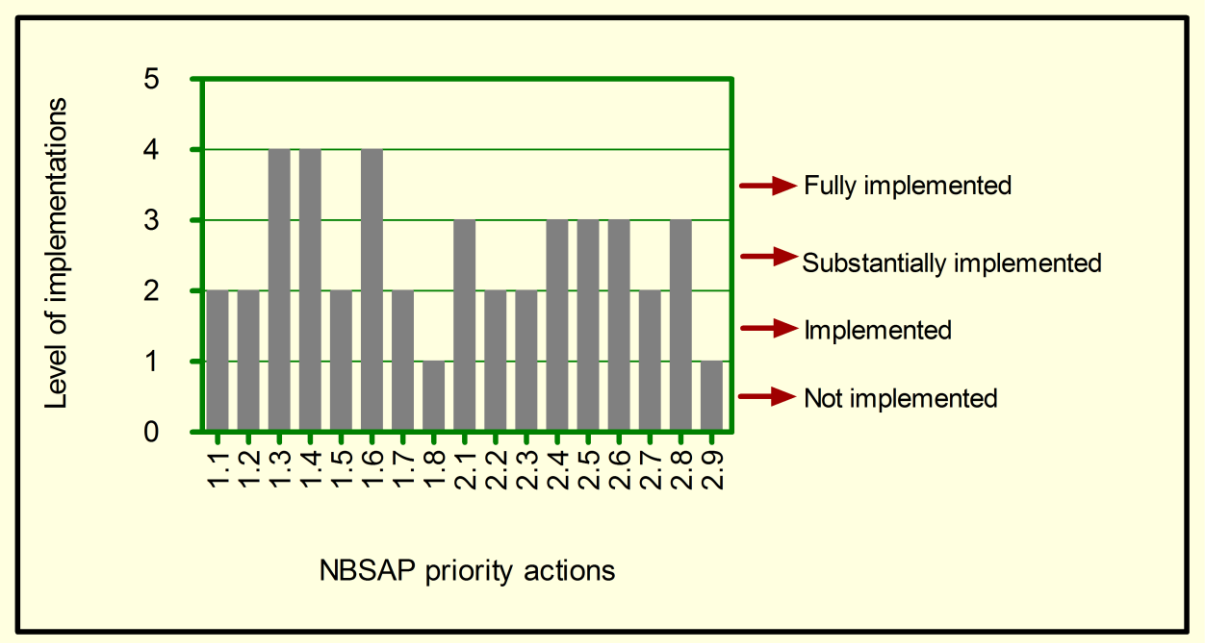

Figure 30. Level of implementation of the 17 priority actions in the NBSAP 2003 -2010.

Box 8. The goals achieved in the implementation of NBSAP 2003-2010 in Mozambique

- The increase of the percentage of protected areas from 11% to 26%, creating new national parks and reserves, including marine and coastal;
- Implementation of projects for restoration of the areas with degraded biodiversity and training projects funded by the GEF and others: the project of biodiversity and management of coastal and marine areas in northern provinces; restoration of the Limpopo National Parks and Gorongosa National Park;
- Genetic Biodiversity is registered with the ex-situ conservation (botanical gardens, arboretum, seed banks, germplasm collection and in-vitro) systems;
- Integration of issues related to the environment, including biodiversity into sectoral, provincial and district plans;
- Inclusion of environmental and biodiversity issues into the school curriculum (primary, secondary and university);
- Launched the program "One student, one tree" to promote the conservation attitude;
- Prepared various laws for preserving biodiversity (Law and Regulation on forest and wildlife; Law of Protected Areas);
- Declared and implemented the principle that 20% of the revenues from operators or dealers who exploit the resources must be delivered to local communities;
- Approved the policy of traditional medicine.

Source: MICOA (2010)

Despite efforts done by various institutions in order to implement the NBSAP, some priority actions were or partially implemented or even were not implemented. Several reasons may have contributed to it, as in the case of:

i) Biodiversity issues are not yet sufficiently integrated across sectors and within local government plans and budgets; there is a poor valuation of the conservation sector;

ii) There is a relatively low level of public awareness about the socio-economic value of the biodiversity;

iii) The participation of the communities in the management of biodiversity is still deficient;

iv) The resources to fully implement all priority actions identified for each of the components of biodiversity are scarce which ultimately results in a weak enforcement capacity by the state;

v) Inadequate or poor sharing of biodiversity data; still limited capacity to conduct scientific and management of biodiversity research and its dissemination as well as poor mechanism for collaboration among the institutions holding biodiversity data.

vi) Corruption and vulnerability of the country borders and the institutional coordination remains weak.

PART III - PROGRESS MADE TOWARDS ACHIEVING THE 2020 AICHI BIODIVERSITY TARGETS AND CONTRIBUTION TO THE RELEVANT 2015 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS

1. Introduction

This chapter analyzes the progress made by the country to achieve the 20 targets of the Biodiversity Strategic Plan 2011-2020, known as Aichi Targets.

The 2011-2020 Strategic Plan of the CBD (Aichi targets) contains 20 targets spread across five strategic goals. The Mozambique NBSAP was designed for 2003 – 2010 period, therefore did not include the Aichi biodiversity objectives and targets.

2. The Aichi targets

The table below describes the various activities carried out in the country, to achieve the Aichi Biodiversity Targets as well as the level of achievement. It also includes a column with Mozambique NBSAP 2003 – 2010 targets which are in line with the Aichi Biodiversity Targets. The level of achievement was coded using a colour system as described below:

Green = achieved,
Red = not achieved or very low probability of being achieved
Yellow = in progress.

Mozambique fully achieved the Aichi Biodiversity Target 11, which deals with the percentage of coverage and representativity of protected areas. Eleven targets were considered to be in progress and eight targets as "not achieved or very low probability of being achieved".

Table 15. Summary of the progress made by Mozambique to achieve the Aichi Biodiversity Targets.

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society			
Global Target	NBSAP 2003 - 2010 and the Aichi targets	Progress made in Mozambique	Level of achievement
Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	The NBSAP 2003 - 2010 did not set any target on the level of knowledge on the values of biodiversity	We do not know the level of knowledge of several sectors of society, on issues related to biodiversity. However, there are some examples that show improvement: i) The number of news articles and reports related to biodiversity published in newspapers "O Pais", "Noticiais" and "Averdade" rose from 21 in 2012 to 26 in 2013. ii) The number of visitors to national parks and reserves have been increasing over time. For example visits to Gorongosa National Park rose from 1,500 people in 2007 to 6,500 people in 2012. iii) Increase in university courses dealing with issues on biodiversity. For example, since 2010 the UEM has introduced the following courses that deal with issues related to biodiversity: Ecology and Conservation of Terrestrial Biodiversity; Marine, Aquatic and Coastal Biology; Environmental Education; Marine Biology at College of Marine Sciences of Quelimane. The Pedagogical University introduced a course on Environmental Management. The UDM introduced the Environmental Management course. The UNILURIO introduced a course in Biological Sciences. Other courses dealing with biodiversity issues were introduced by Unizambeze, the Polytechnic Institute of Manica and the	

		Institute of Ecotourism. iv) In 2009, the Mozambican Government launched the Program of Environmental Education, Communication and Dissemination which aims to educate rural communities on environmental issues. v) In 2010 a program for planting trees in schools (Program "one student, one tree") was launched. vi) in 2010 was launched the program " one community leader, one forest "	
Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) In-depth knowledge about the components of biodiversity. ii) Establishment of a system of satellite national accounts for environmental accounting	Several floristic and faunal surveys have been made in the country, especially in conservation areas and areas of high value for biodiversity ("hotspots"). such are the cases of the study of the biodiversity of the Gorongosa National Park in Sofala province and the study of Biodiversity in the inselbergs in the provinces of Zambezia and Nampula. However, there are few studies about the value of biodiversity and ecosystem services, and the majority of biodiversity surveys are restricted - to some ecosystems. Although it was a target established in NBSAP 2003 - 2010, the National Accounts still not reflecting the state of biodiversity and ecosystem services. However, the Five-Year Government Program for 2010-2014 calls for the development taking into account the sustainable use and conservation of biodiversity. The sustainable use of biodiversity was also incorporated in the strategic plans of different sectors such as: the IIAM Strategic Plan 2011-2015, The Environmental Strategy for Sustainable Development of	

		Mozambique, The Action Plan for the Reduction of Absolute Poverty, The National Strategy for the Promotion of Integrated Community Management of Natural Resources, The Fisheries Master Plan 2012 - 2019, The Environmental Regulations for Petroleum Operations. The Government also approved The Action Plan for the Green Economy (PAEV) for the period 2013/2014.	
Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	This target is partially incorporated into the NBSAP 2003- 2010 and include the following national target: Creating incentives for adoption of techniques for exploitation of natural resources and investments in its value by private sector and other economic actors	Despite having been incorporated into the NBSAP almost nothing has been done in the country to achieve this target	
Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) forest concessions operated in full, with integrated management plans, tailored to the actual circumstances of each type of forest including	Since 2004 the country has a Regulation on the Environmental Impact Assessment, which provides the framework for managing the environmental effects of development. This instrument is the main tool for the mitigation of the impacts of natural resource use. In 2010, the government approved The National Strategy for the Promotion of Integrated Community Management of Natural Resources. The approval by the Government in October 2013 of The	

	the reintroduction of species ii) Existence of a monitoring system (criteria and indicators) of the biodiversity in the forests managed for timber production. iii) Improvement of the system of exploitation of forests for firewood and charcoal production. iv) Adoption of measures for the rational use of forest resources through licensing of operators and rural communities. v) Existence of integrated management plans that incorporate non timber forest products. vi) Increase the number of initiatives on the wildlife community management, and of benefit sharing initiatives. vii) Increase the number of wildlife ranches and improve its management.	Action Plan for the Green Economy (APGE) for 2013 - 2014, aimed to the rational and sustainable use of natural resources. Some initiatives towards sustainable consumption and production in the country include: i) The green business project , launched in 2010 by the Investment GAPI, in partnership with the organization Nature Challenge and the WWF in order to promote the sustainable use of natural resources and biodiversity, through funding to small and medium business companies for business that promote ecosystem restoration, organic farming, reforestation and carbon sequestration activities ii) Promotion of ecotourism activities with the creation of "Chimanimani Highland Camp" in 2011 iii) The Government approved the Regulations for Reducing Emissions from Deforestation and Forest Degradation (REDD +). iv) Programs to disseminate the use of improved stoves and alternative sources of energy for cooking in order to reduce the use of firewood and charcoal and its impacts on vegetation. Between 2005 and 2009 about 13,500 improved stoves were produced. A factory of sustainable ethanol production for kitchen opened in 2010. The use of solar energy is being consolidated in the Millennium Villages Project. v) Over 150 committees of co-management of fisheries	

	viii) Establishment and full, operation of fisheries management committees that include artisanal fishermen	created in the country. vi) Project: "supporting forest resources for people and the environment in the Niassa National Reserve" was launched vii) Survey of Agroecological zones is underway which in addition to identifying the areas available for agricultural investments will define the areas that should be protected.	
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use			
Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) Development of appropriate strategies and conservation measures that take into account the actual state of biodiversity in Mozambique. ii) Knowledge of the diversity and dynamics of important and/or more fragile ecosystems iii) Knowledge of the interaction between adjacent ecosystems. iv) Reduction of ecosystems fragmentation through	Several studies show that forest cover has bee reducing in Mozambique. i) According to FAO (2005) there was a reduction in the extension of areas of natural forests and other woody formations from 62,431,000 hectares in 1990 to 60,181,000 hectares in 2005. ii) The rate of forest conversion was in 1990 of 219 000 hectares/year and reduced to 211, 400 hectares/year in 2010 (FAO 2010). iii) The rate of charcoal production, a major factor of forests reduction, has increased from 100 000 tons in 1990 to 849 000 tons in 2012. iv) There was a reduction in mangrove area from 1,500,000 hectares in 1963 to 446.712 hectares in 2007. However, in 2011the area of Maputo Special Reserve increased with the inclusion of Futi corridor as a way to create biological corridors and reduce ecosystem	

	appropriate connection systems (biological corridors). v) Existence of a program of rehabilitation and restoration of degraded ecosystems. vi) Existence of rehabilitation plans (including species) for specific degraded ecosystems. vii) Use of knowledge during the process of decision making	fragmentation.	

Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) Recovery of surface water shrimp stocks in Sofala Bank to the 1980s level ii) Establishment and functioning in full, all along the coast, of the fishery resources management committees, that include artisanal fishermen iii) Reduction of destructive fishing practices along the coast.	Several studies have shown reduction in fisheries catches in Mozambique. According to USAID (2010), commercial fish catches declined from 30,210 tons in 2004 to 18,437 tons in 2008. At the same period, surface water shrimp, considered fully exploited resource, catches reduced from 11,889 tons to 7,482 tons. MacBride et all (2013) also reported a reduction in fish catches from 185 210 tons in 2000 to 154, 305 tons in 2010 For the same period, this author reported a reduction in catches of Penaidae (taxonomic group of Shrimp) from 24,915 tons to 9,825 tons. In terms of legislation, the Government approved The Master Plan for Fisheries (2012-2019) and a new fisheries law passed in 2013, Law 22/2013, which recognizes the fishery research as an area of support of fisheries management. Another measure taken by the Government to reverse the situation include, for example, not issue new licenses for surface water shrimp fishing.	

Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	This target is partially incorporated into the NBSAP 2003- 2010 and includes the following national targets: i) Existence of adequate mechanisms to control and reduce forest fires. ii) Improve the knowledge of the diversity and cultivation of pastures	i) The country has increased its agricultural production. However this increase was due mainly to the increase in agricultural areas, which puts pressure on forests. Given this factor, in 2011, The Strategic Plan For The Agricultural Sector was approved (PEDSA2010 - 2019), which among other, has the objective to increase the productivity of agricultural areas and control the use of agrochemicals. ii) The country recorded an increase in the extension of the area of arable land that suffered uncontrolled burning from 68,070 hectares in 2010 to 185.665 hectares in 2011. However several initiatives have been developed to reduce the burning: Launched in 2013 the National Campaign for the control of fires in order to empower communities on improved techniques of exploitation of forest resources. Program to promote conservation agriculture in the Quirimbas National Park in Cabo Delgado as a way to reduce the use of uncontrolled burning practiced by the population. iii) Legislation on aquaculture establishes the standards, parameters and restrictions for this activity.	
Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	The NBSAP 2003- 2010 did not set any target about pollution and its effects on biodiversity	Pollution levels in the country are not detrimental to ecosystem functioning with exception on urban centers and mining areas. The biggest advanced made by the country on this subject was the ratification in 2014 of the "Protocol on the Protection of the Marine and Coastal Environment of the Western Indian	

		Ocean Region, from land based sources and activities.	
Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	This target is partially incorporated into the NBSAP 2003- 2010 and includes the following national targets: i) Identification and knowledge of the invasive specie with major impacts on biodiversity ii) Establishment of measures and strategies for eradication of major invasive species iii) Reduce the introduction of new species	The country already has a list of invasive species (2003), but almost nothing has been done to update this list. Little is known about the distribution of these invasive species. For example, only in 2013 the first study on the distribution of invasive aquatic plants in rivers of southern Mozambique was carried out in the country (Langa, 2013). The study also includes a socioeconomic impact assessment of invasive plants on the Incomati River. In terms of legislation, strategies and plans nothing changed since the Fourth National Report of Biodiversity.	
Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	The NBSAP 2003- 2010 did not set any target on the impacts of climate change on different ecosystems.	The country has approved the National Strategy for Adaptation and Mitigation to Climate Change 2013 – 2025. This strategy recommends the implementation of management practices that increase the adaptive capacity of ecosystems and the identification of areas at risk of loss biodiversity, as some of the measures to protect biodiversity from climate change. However, no action plan exists. As mentioned earlier, the country ratified in 2014, the "Protocol on the Protection of the Marine and Coastal Environment of the Western Indian Ocean Region, from land based sources and activities". Proclamation of the Environmental Protection Area of the	

		First and Second Islands that will help to protect coral reefs.	

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity			
Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	This target is partially incorporated into the NBSAP 2003- 2010 and includes the following national targets: i) In-depth knowledge about the state of protected areas. ii) Definition of strategies for rehabilitation of protected areas and development of management plans. iii) Establishment of technical capacity to manage protected areas and improvement of infrastructures. iv) Existence of a network of protected areas representative of different ecosystems in the country.	The coverage of protected areas in the country habe been increasing. In 2009 was 15.8%, went to 16.2% in 2010 and 17.6% in 2011. Currently is estimated in 26%. Since the publication of the fourth report on biodiversity, were created or extended the following conservation areas of greatest importance: i) 2009: proclamation of the Marine Protection Area of Maputo - Ponta de Ouro. ii) 2010: inclusion of Mount Gorongosa on Gorongosa National Park iii) 2011: Extension of the limits of the Maputo Special Reserve with the inclusion of the Futi corridor. iv) 2011: proclamation of the Lake Niassa Partial Reserve and Buffer Zone of Lake Niassa Partial Reserve. v) 2012: Proclamation of the Environmental Protection Area of the First and Second Islands in the provinces of Zambezia and Nampula. This area is the largest area of coastal and marine conservation in Africa with 1,040,926 hectares. vi) 2013: Proclamation of the Mágoè National Park. It should be noted however that despite the great advances made by the country in this target, there is still a lot do for the protection of marine and coastal areas.	

Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) Existence of a deep knowledge of the conservation status of species in Mozambique, mainly of endemic and threatened species. ii) Improvement of the conservation status of the most important, threatened and/or endemic species. iii) Recovery of wildlife numbers, particularly the largest and most vulnerable	Lack of evaluation and updating of red data lists of plants and animals of Mozambique. Lack of studies to assess changes in the conservation status of threatened species. Increase on illegal poaching. For example from 2009 to 2013 were slaughtered 9,345 elephants in the Niassa Reserve. Reintroduction of several wildlife species in Maputo Special Reserve, National Reserve of Gile, Zinave National Park and Gorongosa National Park.	
Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species is maintained, and strategies have been developed and implemented for	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) Maintenance of genetic	Establishment by the Ministry of Agriculture of a committee to control emission of varieties in order to protect local varieties of livestock. Establishment of the National Committee of plant genetic resources with the function of protecting plant genetic	

minimizing genetic erosion and safeguarding their genetic diversity.	variability of crops. ii) In-depth knowledge about the breeds of livestock. iii) Strategies to measure and preserve native breeds of livestock. iv) Restocking with native breeds.	resources of the country. Approval in 2007 of the Regulation on Biosafety on the Management of Genetically Modified Organisms	
Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services			
Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) Existence of a program for the rehabilitation and restoration of degraded ecosystems. ii) Existence of rehabilitation plans (including species) for specific degraded ecosystems	Little has been made in terms of rehabilitation of degraded ecosystems. It should be noted here: i) The re-introduction of wildlife species in Zinave National Park, Maputo Special Reserve, National Reserve of Gile and Gorongosa National Park, however, this effort have been hampered by increase of poaching. ii) Approved the transformation of the area of the old Mahlazine ammunition storehouses into a biological park which will include the introduction of some small wild animals iii) Mangrove replanting in Nhangau in Sofala province, in the Estuary of Limpopo River in Gaza province, In Angoche in Nampula province and Mecúfi in Cabo Delgado Province. iv) Restoration of Gorongosa Mount	

	iii) Policy on rivers flow discharges in accordance with the natural cycles to maintain ecosystems. iv) Reduction of current levels of poaching and degradation of wildlife habitats		
Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	This target is partially incorporated into the NBSAP 2003- 2010, and include the following national target: i) Existence of a program for the rehabilitation and restoration of degraded ecosystems	Is underway the draft of national REDD + strategy. Other actions include: i) The "carbon livelihoods" project from the British company, Envirotrade, in the Quirimbas National Park, the forest reserves of Nhampakue and Inhamitanga and in the buffer zone of the Gorongosa National Park and at Nhambita community. ii) Plantation in degraded areas of the Lurio, and Sanga of 54, 000 hectares of exotic forest.	
Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits	This target is partially incorporated into the NBSAP 2003- 2010, and includes the	Since 2007, Mozambique has a Regulation on Access and Benefit Sharing Arising from Genetic Resources and	

Arising from their Utilization is in force and operational, consistent with national legislation.	following national goals: i) Improvement of the living standard of the artisanal fishermen. ii) Establishment of mutually beneficial partnerships between fishermen of different categories iii) Definition of policy for people living in and around the protected areas iv) mechanisms for benefit sharing derived from tourism v) Equitable sharing of benefits from forestry activities.	Associated Traditional Knowledge. The Nagoya Protocol was ratified in 2014. Is underway the draft of National REDD + Strategy.	

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building			
Target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.		Mozambique is in the reviewing process of its NBSAP.	
Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	The NBSAP 2003- 2010 did not set any target on this subject	The Government has approved the Strategy of Intellectual Property - 2008 – 2018. Approved the Regulation on Access and Benefit Sharing Arising from Genetic Resources and Associated Traditional Knowledge. approved the Strategy for Science, Technology and Innovation of Mozambique whose research priorities are: i) the creation of baseline information for the ethnobotanical knowledge; ii) creation of a coordinating mechanism for ethnobotanical investigation and its use in applied social and economic development programs; iii) research on the characterization of traditional practices, including social aspects; iv) research to valuate the traditional knowledge; v) research about the use, production and marketing of products based on local knowledge; vi) research on ethnobotanical resources and their use in different contexts, via plants with nutritional value, plants with medicinal value, plants with aromatic properties to produce insecticides, toiletries, cosmetics, aromatherapy and ornamental purposes. Despite the various strategies and regulations regarding this aspect, little has been done in practical terms	

Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	This target is partially incorporated into the NBSAP 2003- 2010, and includes the following national targets: i) Collection, systematization and dissemination of existing information on biodiversity and its relationship within the ecosystem, as well as the processes and activities that may have an adverse impact. ii) Development of a coordinating system for the collection, processing and exchange of information between the state, the private sector and other organizations to assess economic, social and environmental contribution and business development.	Mozambique does not have yet the "clear house mechanism" The Science, Technology and Innovation Strategy of Mozambique aimed at training nearly 7,000 academic scientists by 2025, 15% of which in the area of natural resource management. At present there are less than 500 in this area	
Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	The NBSAP 2003- 2010 did not set any target on this topic.	The budget approved by the Legislature for the environmental sector between 2009 and 2010 experienced an increase in 7:40% and between 2010 and 2011 a decreased by 35.09%. MozBIO program (Government, World Bank, French Agency, GEF) - funding for areas of conservation. Funding from GEF - went from 6 to 9 million Meticais GEF. Existence of BIOFUND program	

3. Contribution of the actions in the implementation of the Convention and into achieving the relevant targets of the Millennium Development Goals in the country.

Mozambique has undertaken several actions in order to achieve the Millennium Development Goals (MDGs), being the most relevant for Biodiversity the Goal 1: Eradication of extreme poverty and hunger and the Goal 7: Ensure environmental sustainability.

Goal 1: Eradication of extreme poverty and hunger

The percentage of the Mozambican population living below 1.25 U.S. dollars per day has decreased by 10% from 1998 to 2008. Hunger and malnutrition reduced by almost 30% from 1990 to 2012.

The actions that lead to ecosystem protection and sustainable use of biological resources have in a long-term, positive impact on poverty reduction. The initiatives described in the above table, such as the approval by the Government of the Action Plan for the Green Economy (PAEV) for the period 2013/2014, the National Strategy for the Promotion of Integrated Natural Resources Management, the initiatives on sustainable production and consumption, the REDD + strategy and the benefit-sharing and traditional knowledge regulations have a positive impact in reducing extreme poverty and hunger.

Goal 7: Ensure environmental sustainability

Moçambique desenvolveu várias actividades e criou várias estratégias e políticas no âmbito da Convenção que impactaram esta meta. Muitas das políticas nacionais e sectoriais enfatizam a produção e desenvolvimento sustentável. É de salientar o já mencionado Plano de Acção para a Economia Verde (PAEV) para o período 2013/2014.
Para a conservação da biodiversidade, foram estabelecidas ao longo do tempo várias áreas de conservação.

Mozambique has developed several activities and created several strategies and policies within the Convention that impacted this goal. Many national and sectoral policies emphasize the sustainable production and development. It is worth noting the aforementioned Action Plan for the Green Economy (PAEV) for the period 2013/2014.

The consumption of substances that deplete the ozone layer increased in Mozambique from 0.5 million tons in 2003 to 0.9 tons in 2009. In response, in 2009 the Government has adopted the Resolution 78/2009 which bans the importation of chlorofluorocarbons (CFCs).

Access to potable water rose from 37.3% in 1997 to 56.0% in 2009. The national target for potable water supply set for 2015 is 70%. The proportion of the population with access to basic sanitation increased from 40% in 2003 to 45% in 2009, the 2015 target is 50%.

Mozambique has shown progresses toward achieving the Millennium Development Goal number 7.

3. Lessons learned from the implementation of the Convention in the country

Over the years, the implementation of the Convention in the country, helped to appreciate the value of biodiversity. Biodiversity is the backbone of the national economy and therefore its protection and conservation is a top priority.

Since the ratification of the CBD Convention, the country has learned many lessons, which include the recognition that there have been major progress in two main domains:

- in the fact that there have been an increase in coverage and representativity of protected areas; this is of interest to the country, but in the situation of rural Mozambique, the effectiveness of conservation requires multiple approaches to human development and protection interests of people that live within these areas. However this should be done in a phased and coordinated manner;

- in the development of policies and legal framework appropriate to the implementation of the convection; this was a good achievement, however to influence the implementation of environmental policy requires flexibility and cannot be taken as a process that delivers immediate results.

Moderate progresses made in the following:

• there has been an increase in the public awareness and in the knowledge about biodiversity and its values; however, the adoption of the conservation principle by the public and even by decision-makers has been slow due to cultural and social beliefs;

• in promoting the sustainable use of biodiversity and ecosystems; however, Mozambique has also learned that the promotion of alternative livelihood activities can significantly improve the protection of biodiversity and ecosystem services, reducing the pressure on biodiversity.

Little progress was made:

- in updating the NBSAP and red lists of the country;
- in the systematization and dissemination of information about biodiversity;
- in the use of scientific and traditional knowledge;
- in the restoration of ecosystems and
- in the implementation of the existing legal framework and policies.

The greatest difficulty was the lack of baseline information on the national targets.

The biggest lesson learned from the little progress referred above is that the collaborative partnership between the various stakeholders is of key importance to achieve the biodiversity targets. Still, requires adequate communication, education and public awareness. Thus, the cooperation between the key parts should be strengthened and enforced and should be recognized the principle that the integration of biodiversity within external sectors to MICOA, requires institutional change.

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ANNEXES AND APPENDICES

APPENDIX I : INFORMATION CONCERNING THE REPORTING PARTY AND PREPARATION OF THE FIFTH NATIONAL REPORT

A1. REPORTING PARTY

Contracting Party	Republic of Mozambique
NATIONAL FOCAL POINT	
Full Name of the Institution	
Name and title of the Contact Officer	*Anselmina L. Liphola,* Head of Dept of Conservation and Natural Resources and CDB Focal Point
Mailing address	*Av. Acordos de Lusaka, 2115, Caixa Postal 2020* Maputo – Moçambique
Telephone	*+ 258 21 466244/465299*
Fax	*+ 258 21 465849*
E-mail	*minaliphola@yahoo.com.br or 'anselmina.liphola@micoa.gov.mz*
CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Name of the reporting Institution	University of Eduardo Mondlane
Full Name of the Reporting Person	Dr.Cornélio Ntumi Head of Department of Biological Sciences, University of Eduardo Mondlane
Mailing address	PO Box 257, Maputo, Mozambique
Telephone	+258 82 40 16 880
Fax	
E-mail	cntumi@uem.mz
SUBMISSION	
Signature of the officer responsible for submitting the national report	*Anselmina L. Liphola,* Direcção Nacional de Gestão Ambiental Ministério para a Coordenação da Acção Ambiental
Date of submission	October 2014

A2. PREPARATION OF THE FIFTH NATIONAL REPORT

This report was produced in compliance with those recommended by the CBD secretariat procedures and obeyed the following main procedures:
1. Initially, was developed a plan to prepare the report, which received approval by GEF for the necessary funding.
2. Then, the focal point of Mozambique prepared the Terms of Reference, assigned roles of responsibilities to a consultant which in turn formed a team of experts for the preparation of the report.
3. The consultant and his team identified stakeholders, established a plan for the preparation of the report and its methodology of work. The consultant, timetabled activities, established mechanisms of coordination among team members and with the focal point.
4. The team reviewed the literature, including archives of previous reports from the government as well as previous CBD reports produced for Mozambique. Main focus was given to the description of the current knowledge on biodiversity, analysis of the value of biodiversity, analysis of the root causes of biodiversity degradation, its impacts and future scenarios for biodiversity management.
5. The review led to relevant authorities for biodiversity, official pages of existing institutions in Mozambique.
6. The focal point organized a workshop, which was facilitated by the team responsible for producing the report to assess the NBSAP 2003-2010 and other relevant aspects of the report. The seminar was attended by members of the unit of biodiversity, representing various partners for the implementation of the biodiversity action plan and its strategy.
7. The team tasked with producing the report compiled the first draft report for circulation to relevant stakeholders for comments.
8. The report was discussed at a national seminar and benefited from additional stakeholder comments. The seminar was attended by participants from Ministries, services and agencies; media; Nongovernmental organizations (NGOs) and development partners.
9.The team prepared a final version and submitted to the focal point.

The main sources of information used during the preparation of this National Report were as follows:
National Biodiversity Strategy and Action Plan (NBSAP) (2003);
Fourth National Report on Biological Diversity (2009);
National Climate Change Strategy (2012);
State Budget (2009/2010 - 2013/2014);
National policies, plans, strategies, legislation and various specialized reports

APPENDIX II :FURTHER SOURCES OF INFORMATION

A. Websites

Government Ministries, Departments and Agencies	
Ministério para a Coordenação da Acção Ambiental	www.micoa.gov.mz
Ministry of Tourism	www.mitur.gov.mz
Ministry of Fisheries	www.mozpesca.gov.mz
Ministério de Obras Públicas e Habitação	www.moph.gov.mz
Ministry of Agriculture	www.minag.gov.mz
Instituto de Investigaçãp Pesqueia	www.inip.gov.mz
Ministério de Ciências e Tecnologia	www.mct.gov.mz
Ministry of Energy	www.me.gov.mz
Ministry of Mineral Resources	www.mirem.gov.mz
Instituto de Investigação Agrária de Moçambique	www.iiam.gov.mz
Fundo do Ambiente	www.funab.gov.mz
Fundo Nacional de Energia	www.funae.co.mz
University of Eduardo Mondlane	www.uem.mz
IIAM	
Tanzania Biodiversity Information Facility (TanBIF)	
Non-Governmental Organizations	
Centro Terra Viva	www.ctv.org.mz
LIVANINGO	
Justiça Ambiental	