



**NATIONAL**  
**BIODIVERSITY STRATEGY**  
**AND ACTION PLAN**  
**2015-2020**  
**(NBSAP II)**

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MINISTRY OF INFRASTRUCTURE, NATURAL RESOURCES AND ENVIRONMENT

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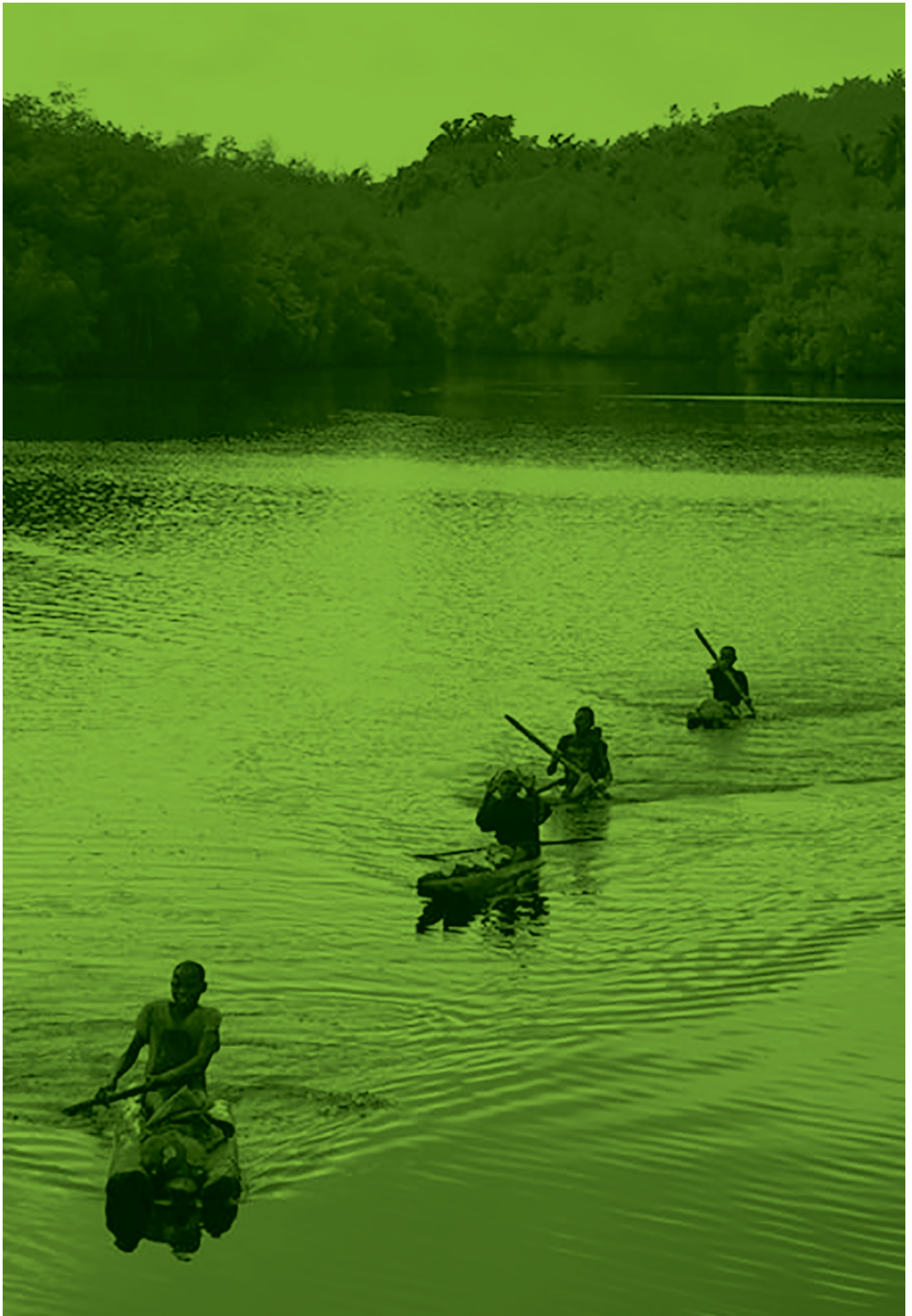
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## ACRONYMS

<b>AAP</b>	Projects on Inland Climate Change Adaptation	<b>MAI</b>	Ministry of Internal Affairs
<b>ABEDA</b>	Arab Bank for Economic Development in Africa	<b>MCIT</b>	Ministry Commerce Industry and Tourism
<b>ADB</b>	African Development Bank	<b>MCS</b>	Monitoring, Control and Surveillance
<b>CBD</b>	Convention on Biological Diversity	<b>MDOI</b>	Ministry of Defence and Internal Order
<b>CECAF</b>	Commission for East and Central Atlantic Fisheries	<b>MECF</b>	Ministry of Education, Science and Technology
<b>CEPIBA</b>	Pepper and Vanilla Export Cooperative	<b>MECI</b>	Ministry of the Economy and International Cooperation
<b>CHM</b>	Interchange centre of Information on Biodiversity	<b>MFAP</b>	Ministry of Finance and Public Administration
<b>CIAT</b>	Agronomic and Technological Research Centre	<b>MIRNA</b>	Ministry of Infrastructure, Natural Resources and Environment
<b>CITES</b>	Convention on International Trade in Endangered Species of Wild Fauna and Flora	<b>MNEC</b>	Ministry of Foreign Affairs and Cooperation
<b>CMAP</b>	CPC-Merged Analysis of Precipitation	<b>MPA</b>	Marine Protected Area
<b>CMS</b>	Convention on Migratory Species (Bonn Convention)	<b>NAPA</b>	Program for Adaptation to Climate Change in São Tomé and Príncipe
<b>COMICAF</b>	Commission of Central African Forests	<b>NBSAP</b>	National Biodiversity Strategy and Action Plan
<b>CONAB</b>	National Commission for Monitory and Evaluation of the Project	<b>NGO</b>	Non Governmental Organization
<b>COP</b>	Conference of the Parties to the CBD	<b>NPFCA</b>	Network of Protected Forests of Central Africa
<b>CPC</b>	Climate Prediction Centre	<b>NSPA</b>	National Strategy for Poverty Alleviation
<b>DA</b>	Department of the Environment (GRP)	<b>OFAC</b>	Observatory of Central Africa Forests
<b>DCSQA</b>	Direction for the Conservation, Sanitation and Environmental Quality	<b>OPRC</b>	International Convention on Oil Pollution Preparedness, Response and Co-operation
<b>DF</b>	Direction of Forests	<b>ORSTOM</b>	Office for Scientific and Technical Research Overseas
<b>DGA</b>	General Direction for the Environment	<b>PIC</b>	Prior Informed Consent
<b>DGRNE</b>	General Direction for Natural Resources and Energy	<b>PMPNOST</b>	Management Plan for the Obô Natural Park of São Tomé
<b>DPNP</b>	Department of the Príncipe's Natural Park	<b>PNADD</b>	National Plan for the Environment and Sustainable Development
<b>DRACN</b>	Regional Direction for the Environment and the Nature Conservation	<b>PNOST</b>	Obô Natural Park of São Tomé
<b>DSRF</b>	Department of Regional Services of Forests	<b>PNP</b>	Príncipe Natural Park
<b>EBA</b>	Endemic Bird Area	<b>POP</b>	Persistent Organic Pollutant
<b>ECOFAC</b>	Program for the Conservation and Use of Forest Ecosystems in Africa	<b>RAMSAR</b>	Convention on Wetlands of International Importance, especially as Waterfowl Habitat
<b>EEZ</b>	Exclusive Economic Zone, as prescribed by UN Convention on the Law of the Sea	<b>RBP</b>	Príncipe Biosphere Reserve
<b>EIA</b>	Environmental Impact Assessment	<b>RDSTP</b>	Democratic Republic of São Tomé and Príncipe
<b>EIE</b>	Environmental Impact Evaluation	<b>REDD+</b>	Reduction of Emissions due to Deforestation and Forest Degradation
<b>EMAE</b>	Municipal Company for Electricity Supply	<b>STP</b>	São Tomé and Príncipe
<b>ENRP</b>	National Strategy for Poverty Alleviation	<b>UNCED</b>	United Nations Conference on Environment and Development
<b>EU</b>	European Union	<b>UNDAP</b>	United Nations Development Action Framework
<b>FAD</b>	Fish Aggregating Devices	<b>UNDAP</b>	United Nations Development Assistance Plan
<b>FAO</b>	Food and Agriculture Organization of the United Nations	<b>UNDP</b>	United Nations Development Programme
<b>GCLME</b>	Guinea Current Large Marine Ecosystem	<b>UNEP</b>	United Nations Environment Programme
<b>GDP</b>	Gross Domestic Product	<b>UNESCO</b>	The United Nations Educational Scientific and Cultural Organization
<b>GEF</b>	Global Environment Facility Fund	<b>USAID</b>	United States Agency for International Development
<b>GHG</b>	Green-House Gas	<b>USD</b>	US Dollar
<b>GNC</b>	National Coordination Office of Biological Diversity Conservation and Promotion	<b>WB</b>	World Bank
<b>GRDSTP</b>	Government of the Democratic Republic of São Tomé and Príncipe	<b>WWF</b>	World Wide Fund For Nature
<b>GRP</b>	Príncipe Regional Government		
<b>GTZ</b>	German Cooperation Agency		
<b>HDI</b>	Human Development Index		
<b>IBA</b>	Important Bird Area		
<b>ICCAT</b>	International Commission for the Conservation of Atlantic Tunas		
<b>IEC</b>	Information, Education e Communication		
<b>IFAD</b>	International Fund for Agricultural Development		
<b>IMAP</b>	Maritime and Port Institute		
<b>IMO</b>	International Maritime Organization		
<b>INE</b>	National Statistics Institute		
<b>INN</b>	Illegal Not declared Not regulated fishing		
<b>INP</b>	Fisheries National Institute		
<b>IUCN</b>	International Union for Conservation of Nature		
<b>MADRP</b>	Ministry of Agriculture, Agrarian Development and Fisheries		



## FOREWORD

The Democratic Republic of São Tomé and Príncipe, aware of its role in the preservation of the Country biodiversity, which is a natural heritage of great importance for its people and for the world, has assumed the share of the responsibility incumbent upon it in this matter, despite the enormous constraints of economic and social order that the country has recently faced, due to the complex adjustment process to a new social and economic order, which was imposed by its independence.

In a society still suffering from significant financial and economic difficulties, it is not always easy to decide on the option for immediate or deferred access to natural resources, all the more when it was not yet possible a full detailed assessment of the respective consequences. Only with the assiduous and careful efforts of the technical staff and people's organizations, with the possible support from the political governance and the share of the international partners, it has been possible a greater restraint in the indiscriminate access to those resources and a better control of potentially detrimental actions for biological diversity.

The progressive official and unofficial engagement is the guarantor of a committed on-going move towards a greater security of the biodiversity, through a sustainable use of the natural resources and the equitable share of the benefits derived therefrom. This engagement is enshrined in the country commitment and participation in the several international Agreements, Conventions and Protocols, related with the protection and valuation of biodiversity, and is strengthened by the general citizens perception of the relevance of its national natural heritage, so as in the global agreed effort, to safeguard biological diversity and environmental quality

It is under this perspective that, once completed the First National Biodiversity Strategy and Action Plan of São Tomé and Príncipe (NBSAP I), with a clear achievement of most of the envisaged goals, now it is presented the NBSAP II, aware of its costs for the country and for international partners, but in the certainty, however, of the urgency in achieving the proposed objectives, to safeguard the valuable universal heritage of which we have de custody.

The Minister of Infrastructures, Natural Resources and Environment  
Carlos Vila Nova





## **1. INTRODUCTION**

**1.1. BACKGROUND: THE CONVENTION ON BIOLOGICAL DIVERSITY**

**1.2. PROCEDURE FOR THE STRATEGY REVIEW AND UPDATING**

**1.3. GROUNDS FOR REVIEW AND UPDATING**

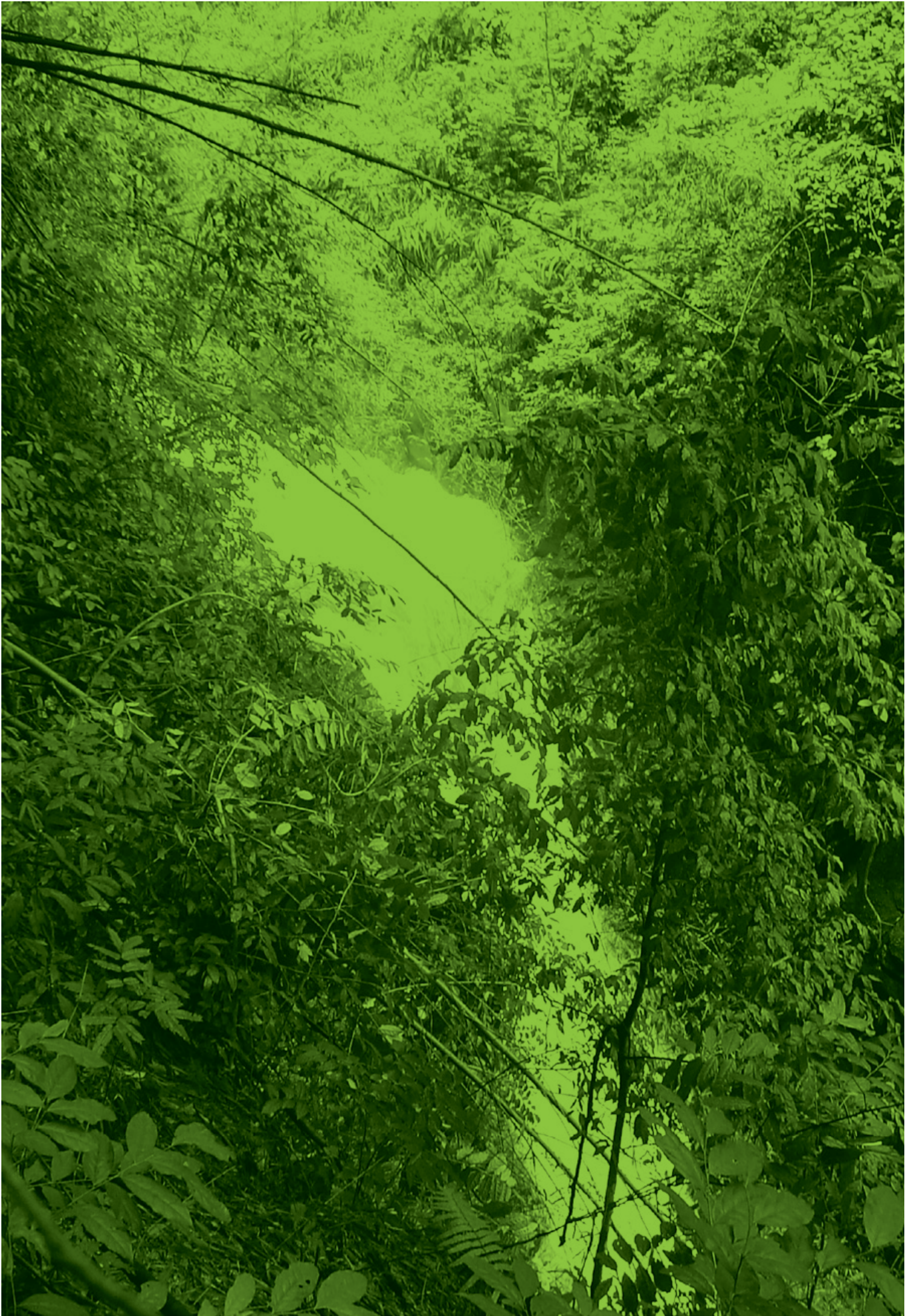
**1.4. OBJECTIVES OF THE STRATEGY AND ACTION PLAN**

**1.5. PHYSICAL AND GEOGRAPHICAL CONTEXT**

**1.6. SOCIOECONOMICAL CONTEXT**

**1.7. LEGAL AND INSTITUTIONAL FRAMEWORK**

BEQUNIACEAE  
BEQONIA  
ACCATA  
A BÔBA  
N DÊMICA



## 1. INTRODUCTION

### 1.1. BACKGROUND: THE CONVENTION ON BIOLOGICAL DIVERSITY

In recent times the problem of biodiversity degradation has assumed, globally, alarming proportions. So, the world's will to the conservation and the utilization of the natural resources in a rational way culminated with the opening for signature of the Convention on Biological Diversity (CBD), on June 5, 1992, during the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil. This Convention is the international legal instrument for the conservation and sustainable use of biological diversity, and entered into force at the 29th December 1993.

The objectives of the CBD are three, consisting of (i) the conservation of biological diversity, (ii) the sustainable use of its components and (iii) the fair and equitable sharing of the benefits arising from the utilization of genetic resources.

To achieve these goals, the States Party to the Convention must meet certain obligations. Some of these obligations include the development and implementation of strategies, plans and programs aimed at the conservation and sustainable use of biological diversity, so as the integration of these objectives in the specific framework of the several sectorial plans and programs of development.

The Democratic Republic of São Tomé and Príncipe (RDSTP), aware that the issue of conservation of biological diversity is a common concern to all humanity, and that it is in trustee of a unique biological variability, worthy of being preserved, signed, in June 1992, the Convention on Biological Diversity, and ratified it through the Presidential Decree No. 5/98 of May 30<sup>1</sup>, thus becoming a full member of the Conference Of the Parties (COP) at the 29 of September 1999.

Since then, São Tomé and Príncipe (STP) have been strengthening their capabilities to participate and fully meet its commitments concerning the CBD. One of these commitments include the formulation, adoption and implementation of the National Biodiversity Strategy and Action Plan and the National Biodiversity State Reports; another one requires the commitment in the COP, as a way to maximize the involvement of the country in implementing the Convention and ensure that the conservation and sustainable use of biodiversity, in STP, are made effectively and in line with other countries.

This strategy has been developed based on the review and updating of the First National Biodiversity Strategy and Action Plan of São Tomé and Príncipe (NBSAP I)

1 Official Gazette (DR) No. 5/98

prepared in 2005, with wide participation of the public and private sectors and civil society organizations, local government, religious authorities, environment activists, academics, communities and media.

### 1.2. PROCEDURE FOR THE STRATEGY REVIEW AND UPDATING

#### STEP 1 – PRELIMINARY ACTIONS

This step involved two essential actions. The first was a three days training for Non Governmental Organizations (NGOs) and community leaders, and the second a survey in the field, which included the participation of national environment activists from different NGOs and communities. During the inquiry, through a participatory diagnosis method, collecting data and an awareness campaign were carried out across the country.

#### STEP 2 – PREPARATION OF NATIONAL MONOGRAPHS

During this step, the gathering and analysis of data, on the situation of different ecosystems, was made, as well as the analysis of socioeconomic aspects of policies and of the legal and institutional framework for biodiversity. Therefor, five papers were produced that formed the basis for the preparation of this document, according to the following themes:

- 1. Study of the forest ecosystems**, based on the analysis of terrestrial biodiversity, including plants and wildlife, and the analysis and classification of the pressures of human origin on this ecosystem;
- 2. Study of the agrarian ecosystems**, which consisted of the analysis of the agricultural and livestock situation of the country, including mixed farming, and the natural and human pressures over this ecosystems;
- 3. Study of the marine and coastal ecosystems**, which consisted in the survey of the status of various components of these ecosystems and the pressures of anthropogenic and natural origin;
- 4. Study of the inland water ecosystems**, which examined the status of the various components of these ecosystems, and identified the different pressures of human and natural origin;
- 5. Study of the socioeconomic aspects of biodiversity**, which consisted of the analysis of the relationship of socioeconomic and demographic patterns with the pressures on biodiversity.

#### STEP 3 – PREPARATION OF THE 'NBSAP II' DRAFT

After accomplishment of thematic studies, we proceeded to the analysis and selection of measures to be undertaken, in order to address possible threats and to

ensure conservation, environmentally sound use, and the equitable and fair sharing of biodiversity resources.

#### STEP 4 – VALIDATION WORKSHOP

A draft was presented at a national workshop, attended by representatives of government institutions, local government, religious authorities, private sector, civil society, environment activists, higher education representatives, local communities, and media. In this validation process more than 50 people were involved. The recommendations from this workshop, and other contributions, were considered in the final version of the Second National Biodiversity Strategy and Action Plan (NBSAP II).

#### STEP 5 – PREPARATION OF THE FINAL VERSION

Besides the Introduction and an annex with some details on STP biodiversity, the final version of the document includes two chapters:

- **One** concerns the current state of biological diversity of São Tomé and Príncipe, and the way for its management and conservation, the causes of degradation and the valuing of biological diversity;
- **The other** defines the measures proposed to solve the identified problems, including the strategic guidelines for intervention, the strategic priorities, the action plan, and the implementation mechanism of the strategy itself, taking into account the imperatives of sustainable management of biological resources and the equitable sharing of benefits taken from this management;

#### 1.3. GROUNDS FOR REVIEW AND UPDATING

After ten years of development of the first Strategy, the review and update of NBSAP I became a national priority, taking into account some changes of different character, as natural, social and economic, in particular the influences of climate change on different ecosystems, continuous irrational exploitation of natural resources, the new national approach in the production of some export products, such as cocoa and organic coffee, and even the adoption of new international rules and regulations, such as the Nagoya Protocol.

Moreover, the considerable increase in studies and projects in STP, together with the constant evolution and development of the country, make it vital that management documents and action plans are reviewed and updated, so that all country strategies be in accordance with the on-going reality of the country, and are in line with other State Parties to the Convention.

The updating of a national strategy is also an opportunity to analyse the changes – or lack thereof – in a certain period of time, thereby allowing to understand

if the previously elaborated strategy is still objective, taking into account a new reality of the country or whether, otherwise, it needs to be reconsidered and redesigned so as to have a higher effectiveness.

With the revision and updating of the national strategy for the conservation of STP biodiversity, it is possible a realistic evaluation of the last 10 years of the country, and see what actions were not implemented and the causes and difficulties encountered, and thus understand what developments and improvements were achieved during this period of time, detecting strengths and weaknesses, and so identifying where it is urgent to act.

#### 1.4. OBJECTIVES OF THE STRATEGY AND ACTION PLAN

Article 6 of the CBD commits all parties to develop strategies, plans and programs for the conservation and sustainable use of biodiversity.

The aim of this Strategy is to make the diagnosis of the status of biological diversity in STP, and identify appropriate measures for their conservation and sustainable use. It also aims to incorporate, in the policies and development programs, measures for the conservation and sustainable use of biological diversity and the fair and equitable sharing of biological resources for the benefit of all STP people and the CBD Parties.

#### 1.5. PHYSICAL AND GEOGRAPHICAL CONTEXT

##### 1.5.1 Geographic Situation

Located at the Gulf of Guinea, the archipelago of São Tomé and Príncipe has a volcanic origin and consists of two islands and several islets, around 0° 25' N latitude and 6° 20' E longitude. From the African mainland coast, São Tomé Island and Príncipe Island are at a distance of, respectively, 360 km and 269 km, being the island of Príncipe, approximately, at 160 km north from São Tomé.

The two main islands cover an overall area of 1,001 km<sup>2</sup> (São Tomé with 859 km<sup>2</sup> and Príncipe with 142 km<sup>2</sup>). On the whole, the country is mountainous and the higher proportion of the area is below 800 m. The highest point is the Pico of São Tomé, which reaches 2,024 m above sea level.

Despite having a relatively small area, STP distance from the mainland, its particular orography and geographic situation led to the speciation of a unique biological diversity, with various types of ecosystems and endemic species, particularly birds, amphibians and plants.



Fig. 1 Location of the Archipelago of São Tomé and Príncipe

### 1.5.2. Climate

The climate is tropical humid, characterized by two main seasons, with a rainier hot season with heavy rainfall for most of the year (about nine months), and the 'gravana', which is the relatively drier shortest season (lasting about three-months – mid-June to mid-September). The average annual rainfall is 2,000–3,000 mm/year, reaching 7,000 mm/year in the cloud forests.

The air relative humidity is very high, reaching more than 90% at higher altitudes. The average annual temperature is 26°C.

Rainfall varies along a northeast-southwest oriented gradient, following the distribution of the mountains (so in São Tomé as in Príncipe).

### Case of the Príncipe Island

The main determinants of climate are: seasonal displacement of equatorial low pressures, mongolian winds from the south and relief. The mountainous massif of Pico Papagaio intercepts the southern winds, which in a humid adiabatic ascendant process results in abundant rains. To the north, rainfall decreases as the mass of air descend under a dry adiabatic process, thus accentuating the influence of dry and hot winds that blow from the north and northeast. So, the types of microclimate, from south to north, are: super-humid, humid, sub-humid and semi-arid. The average annual rainfall is respectively 3,000, 2,000, 1,500 and 1,000 mm.

The relative humidity is very high, reaching more than 80%. At higher elevations relative humidity reaches, frequently, the 100%.

### 1.5.3. Geo-Morphological Aspects

São Tomé Island is very mountainous, and São Tomé peak is the highest point of the island, standing in the centre-west, and ascending to 2,024 m. A dozen

peaks exceed 1,000 m altitude. The North Island is less mountainous, and it is for this reason that the first farmers settled there. In the Príncipe Island, the highest peak, with the same name of the island (Príncipe peak), reaches 948 m, and the relief is hillier, with the north less mountainous, so as in São Tomé.

In both islands, the water lines are numerous and they have river systems with a radial configuration, which departs from the centre of the highest area towards the coastline.

Of volcanic origin, the islands that make up the country are part of an eruptive chain that extends across the Gulf of Guinea, from Cameroon Mountains to the Annobón Island, and continues to the St. Helena Island. As already referred in NBSAP I, São Tomé is an atlantic volcanic stratum 5,000 meters high, which is mainly composed of basaltic lavas that rest on cretaceous rocks, rich in silica, the oldest of which date back to more than 15.7 Myr. The Príncipe Island rests on an oceanic platform, at a depth of 3,000 m. The northern rocks of Príncipe are mostly basalts, phonolites and nephritis. According to K-Ar dating, the age of these rocks varies between 30.4 and 4.9 Myr (Munhá *et al.* 2007).

## 1.6. SOCIOECONOMICAL CONTEXT

In 2001, the STP resident population was 137,599 inhabitants, of which, 51% were women and 49% men, with an urbanization rate of 54.5%. In the last Census of Population and Housing, conducted in 2012 by the National Statistics Institute (INE), the resident population of the country was 178,739 people, of which 50.03% were women (89,872) and 49.97% men (88,867), and the population grew, in the last decade, an annual average of 2.45%. The female population is slightly majority in relation to the male population.

It should be noted that most of the STP population occupies the coastal areas, where most of the infrastructures and the main socioeconomic activities of the country are gathered, making them very vulnerable to any changes in climatic conditions and natural disasters.

São Tomé and Príncipe is an essentially agricultural country, especially geared for cocoa cultivation – its main export. The exploitation of fishing resources, and the demand for forest resources for use in construction and firewood production is increasing.

Over the past 10 years the country had a sustainable growth rate, with an average of around 5.2% of the real GDP, slightly higher than the average growth rate of African countries south of the Sahara (4.8%) (NPRS II, from 2012 to 2016). However, good macroeconomic performance does not imply, necessarily, a significant

improvement in people's lives. Although the lack of reliable statistics on the poverty profile does not allow to define poverty in São Tomé and Príncipe, some empirical observations indicate that the poverty situation has worsened since the last survey in 2001 (UNDAF, 2012-2016).

According to the last UNDP report on Human Development, in 2013, São Tomé and Príncipe occupies the 144th place among 187 countries with a Human Development Index (HDI) of 0.525. The average income level in 2012 was 1,508.64 USD *per capita*, which places it in the group of middle-income countries, with a gross domestic product (GDP) estimated in 264 million USD.

The performance of the economic activity has been heavily dominated by the tertiary sector. From 2002 to 2011 this sector grew annually, on average, by 6%, and represents 66.4% of GDP. It was mainly driven by the sectors of trade, transport, storage, communications and public administration. The secondary sector represents, on average, 16.4% of GDP, having grown annually, on average, 2.6% over the same period. Also in the secondary sector, the highest growth was recorded in the processing industries. Finally, the primary sector grew annually an average of 2.3%, and contributed 17.2% to GDP<sup>2</sup>.

## 1.7. LEGAL AND INSTITUTIONAL FRAMEWORK

### 1.7.1. Legal Framework

The implementation of an effective legal and institutional framework, in the Democratic Republic of São Tomé and Príncipe, was one of the favourable conditions for the strengthening of environmental management capabilities and, consequently, of the biodiversity conservation. The Government's political will, the effective participation of the population, the private sector awareness and the engagement of the international community are important factors, essential for a proper implementation of a legal and institutional framework.

Ratified in May 1998, the Convention on Biological Diversity boosted, among others, the development of national strategies, plans and programs for the conservation – with particular emphasis on *in situ* conservation and sustainable use of biodiversity. This ratification allowed for the exchange of information, education, public awareness, technical capacitation and mobilization of funding, and the integration of biodiversity concerns into sectorial and inter-sectorial policies.

São Tomé and Príncipe, as a Party to the Convention on Biological Diversity, has already drawn up, and

submitted to the Secretariat of the CBD, a set of mandatory documents used to assess the degree of implementation thereof, including the first National Biodiversity Strategy and Action Plan (2005) so as the National Reports on the State of Biodiversity, 2005, 2009 and 2014.

The interest and efforts for national implementation of policies aimed at preserving biodiversity brought, in accordance with Article 8 of the Convention on *in situ* Conservation, the creation (through Law No. 6 and 7/2006) of the Obô National Park of São Tomé and the National Park of Príncipe, together representing approximately 30 % of the country territory. The Obô Natural Park of São Tomé covers an area of 25,151.53ha (77.9%) and Príncipe Natural Park covers an area of 7,128.29 ha (22.1%).

### In the national context

The Constitution of the Democratic Republic of São Tomé and Príncipe foresees that everyone has the right to housing and to a human living environment and the duty to defend it (art. 48 p. 1<sup>st</sup>), and the State has the responsibility to defend the environment and biological resources through the adoption of strategies, policies and environmental legislation, and abide to international conventions relevant to the conservation and sustainable use of natural resources.

The Law of Environmental Bases (Law 10/99), as a framework-law, defines the guiding principles for the protection and valuation of flora and fauna, and determines that the State, through appropriate bodies and by appealing to popular and communitarian initiatives, should establish environmental quality standards, promoting a better individual and collective welfare of citizens.

After the publication of the Law of Environmental Bases, the production of environmental legislation in the country increased considerably. From this produced legislation is worth to highlight:

- Decree Law No. 6/2014, on the capture and commercialization of sea turtles and their products – published in the Official Gazette (DR) No. 25 of 04.11.2014;
- Regional Decree No. 3, on the Protection and Conservation of Sea Turtles – published on the 18th Supplement, of the Official Gazette No. 90 of 07.08.2009;
- Law of the Obô Natural Park of São Tomé and the Natural Park of Príncipe, Law No. 6/06 – published in the Official Gazette (DR) No. 29 of 02/08/2006;
- Law of the Natural Park of Príncipe, Law No. 7/06 – published in DR No. 29 of 02.08.2006;
- Law of the Forests, Law No. 5/2001 – published in DR No. 8 of 31/12/2001;

2 ENRP/II, 2012-2016

- Law of Fisheries and Fishery Resources, Law No. 9/2001 – published in the Official Gazette (DR) No. 8 of 31/12/2001;
- Law of the Conservation of Flora, Fauna and Protected Areas, Law No. 11/99 – published in the Official Gazette (DR) No. 15, 5th Supplement of December 31, 1999;
- Decree on the Extraction of Inert in the Coastal Areas and Rivers, Decree No. 35/99 – published in the Official Gazette (DR) No. 12, of 30/11/99;
- Decree on the Management of Municipal Solid Wastes, Decree No. 36/99 – published in the Official Gazette (DR) No. 12, of 30/11/99;
- Regulation on the Evaluation Process of Environmental Impact, Decree No. 37/99 – published in the Official Gazette (DR) No. 12 of 30/11/99.

#### **International Conventions and Protocols Already Ratified, Adhered Published**

With regard to environmental conventions the country has ratified the following:

- Convention on Biological Diversity, ratified in 1998;
- Framework Convention on Climate Change, ratified in 1998, and the Kyoto Protocol, ratified in 2008;
- Convention on Fight Desertification, ratified in 1998;
- Convention on the International Trade of Endangered Species of the Wild Fauna and Flora (CITES), joined in 2001;
- Bonn Convention on the Conservation of Migratory Species of Wild Animals (CMS), joined in 2001;
- Vienna Convention for the Protection of the Ozone Layer, the Montreal Protocol on Substances that Deplete the Ozone Layer, as well as all its amendments: London, Montreal, Copenhagen and Beijing, all joined in 2001;
- Convention establishing the International Union for Conservation of Nature and Natural Resources (IUCN), joined in 2004;
- Stockholm Convention on Persistent Organic Pollutants (POPs), ratified in 2006;
- Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (RAMSAR), joined in 2008;
- Basel Convention on the Trans-Boundary Movement of Hazardous Wastes and Their Disposal, joined in 2012;
- Rotterdam Convention on the Prior Informed Consent (PIC) Procedure Knowingly, joined in 2012.

#### **International Conventions Whose Membership and/or Ratification Is Recommended**

- Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Derived from their Use, Nagoya, 2010.
- Cartagena Protocol on Biosafety, 2000.
- Africa-Europe-Asia Agreement on Migratory Waterfowl, 1996.
- Memorandum of Abidjan Agreement on the Conservation Measures for the Marine Turtles of the Atlantic Coast of Africa, Paris, 1994.

- Convention on the Preparation, Fight and Cooperation in what Concern Hydrocarbons Pollution – OPRC, London, 1991.
- Protocol to the RAMSAR Convention, Paris, 1982.
- International Convention on the Establishment of the International Fund for Compensation for Damage Caused by Hydrocarbons Contamination, Brussels, 1971.
- International Convention on Liability for Damage Caused by Pollution of the Sea Water by Hydrocarbons, Brussels, 1969.
- African Convention for the Conservation of Nature and Natural Resources, Algiers 1968.
- International Convention for the Conservation of Atlantic Tunas, Rio de Janeiro 1966.
- Convention on Fishing and Conservation of Biological Resources of the High Seas, Geneva, 1958.
- International Convention for the Prevention of Pollution of the Sea Water by Hydrocarbons, London, 1954, and its amendments of 1962, 1969 and 1971.
- International Convention for the Protection of Vegetation, Paris, 1951.
- International Convention for the Protection of Birds, Paris, 1950.

#### **Legal Framework Issues**

Despite the considerable effort to creating a legal framework, this is still very lacking, in particular in the domain of biodiversity conservation. Most laws need to be regulated and, consequently, applied. On the other hand, the application of existing laws is still in deficit, due to the fragility of the different implementation structures (political, legal and regulatory) and to the mainstreaming of its application.

Apart from these factors, there are other problems that plague the current legal framework of DRSTP on environmental issues and, particularly, on the protection and conservation of biodiversity, from which the following can be pointed out:

- Poor implementation of international conventions adhered to and ratified by the country;
- Absence of a specific law for the protection of the identified ecosystems;
- Absence of regulatory standards of maritime authority of invasive marine species (regulation on the water ballast);
- Lack of a specific legislative provision regulating sea-farming practice;
- Lack of regulations intended to govern the marine protected areas, and means of supervision of their use;
- Ignorance of the law by the STP citizens;
- High level of non-compliance with existing laws, due to the weak mechanisms of its enforcement;
- Quantitatively, and especially qualitatively, insufficient human resources involved in the implementation and correct application of existing rules;
- Lack of regulation of the produced diplomas;

- Insufficient knowledge of natural resources to be protected by legal rules.

### 1.7.2. Institutional Framework

The Ministry of Infrastructures, Natural Resources and Environment (MIRNA) is the body, of public administration, responsible for the preparation, coordination, execution and monitoring of environment policy instruments. For the fulfilment of their responsibilities on the environment, the MIRNA has two Steering Bodies, namely, the General Direction of Environment (DGA) – responsible for implementing the national environmental management program – and the General Direction of Natural Resources and Energy (DGRNE) – which is responsible for the design and implementation of policies and strategies for the conservation and rational use of natural resources and energy.

Another important Ministry is the Ministry of Agriculture, Agrarian Development and Fisheries (MADRP), which oversees the policy in the sectors of forestry, agriculture, fisheries and livestock, politically coordinating national parks. Also within this ministry mandate is the coordination with structures of regional domain, as NPFFCA, COMIFAC, OFAC, REDD+, among others.

To ensure the implementation of the nature conservation policy and management of the national network of protected areas, it was established, within the DGA, the Department of Conservation, Sanitation and Environmental Quality – DCSQA, whose function is to manage all the issues related to nature conservation, environmental sanitation and the control and monitoring of the environment quality. The DCSQA works in partnership with the Direction of Forests (DF).

Under the decentralization policy, pursued by the Central Government, the District Councils have an official responsibility for environmental issues.

The Príncipe Regional Government (GRP) created a new agency, called the Regional Direction of the Environment and Nature Conservation (DRACN), which includes the Natural Park of Príncipe (PNP), the Department of Regional Services of Forests (DSRF), the Environment Department (DA) and the Biosphere Reserve of Príncipe (RBP). This new direction (DRACN) is under the guidance of the GRP Presidency, and its aim is to give a new dynamic, more responsibility and more relevance to the nature conservation and the environment sector, and is made up of three departments: Department of RBP and Environment, DSRF and Department of the PNP.

### Other organizations involved

In addition to the above mentioned bodies, with a directive function in what concerns the environment and the biodiversity, there are others which also, more or less directly, exert some action in such areas, as is the case

of the Regional Directions of Agriculture, the Direction of Fisheries, Department of Agricultural Planning, Direction of Agriculture and Agrarian Development, the Direction of Livestock, the Department of Tourism and the Coast Guard.

With regard to NGOs and community associations, they play now a very important role in the implementation of projects on the environment, agriculture, fisheries, socio-educational areas, sports and health, among others, greatly contributing both to the building of a bigger and better awareness on environmental protection, in general, and on biodiversity, in particular, and to improve the living conditions of the different communities in which they operate.

### Institutional Issues

Still, some problems of institutional character remain. Above all, the inadequate harmonization and coordination between the various institutions and steering bodies responsible for managing the biodiversity, the lack of qualified human resources trained in the different priority areas for sustainable management of biodiversity, the lack of material and financial resources, and the lack of inspection capacity (adequate means and skills).

### 1.7.3. Policies, Plans, Programs and Projects Aimed at Conservation and Sustainable Use of Biological Diversity

The formulation of policies, plans, programs and projects, whose objectives primarily aimed at the resolution and compliance with the main issues of environment and development as cross-cutting issue, has shown, in recent years, to be an imperative need for the country, where human and financial resources are limited and institutional capacity is still very weak.

It should be noted that since 1992, the country was the target of interest from its traditional partners, in the framework of bilateral and multilateral cooperation, leading, in 1998, to the preparation of the National Environmental Plan for Sustainable Development (PNADD), with a time horizon of 10 years. The PNADD is a reference to the sustainable development of STP, in that it brought environmental concerns to the forefront of national politics, and sought to be a first step in the integration of environmental concerns in all areas of governance, particularly the conservation of nature and biodiversity.

Still in the framework of international cooperation, the country benefited from backing leading to the protection and conservation of the environment. Among the supports the following may be referred: the joint project related with the Institutions and Environmental Legislation in Africa, funded by UNEP; the ECOFAC project on Forest Ecosystems in Central Africa, funded

by the EU; GTZ project of the German cooperation, in which various instruments of environmental policy were produced. It can be also mentioned: the Adaptation to Climate Change Project (AAP) in inside land, funded by the Japanese Government and UNDP and; Adaptation to Climate Change in Coastal Zones of São Tomé (GEF/WB); the project of Integrated Approach to the Ecosystem for the Integration and Biodiversity Conservation in the Buffer Zone (GEF/IFAD) and; the projects, of the GEF/UNDP, related with the Promotion of Sustainable Environment and Resilience to Climate, and with the Strengthening of Information on Climate and the Early Warning Systems in Central and Western Africa.

Aware of the fragility of ecosystems and the vulnerability that characterize the country, and in the context of its policy on deforestation reduction and on conservation of forest resources, the GRDSTP, as a country member of COMIFAC, joined the REDD+ initiatives, which is a mechanism under the Convention on Climate Change, dealing with the reduction of emissions of greenhouse gases by reducing deforestation and forest degradation.

Still in relation to biodiversity conservation matters, it is important to emphasize the actions taken under the ECOFAC program. This program – implementing conservation actions and management of forests in six countries of the Central African sub-region – became operational in STP since 1993. In partnership with other

projects and national institutions, this program conducted some activities that marked a certain revolution in the knowledge sector, within which the following must be emphasized:

- Studies and perspectives in the wood rank in STP;
- Study of the growth and regeneration of wood resources of São Tomé dense forests;
- Forestry inventory;
- Installation of experimental forestry fields;
- Carbonization Mission;
- Study of endemic plants of STP;
- Guide for STP Birds;
- Study on the biology of the population of monkeys (*Cercopithecus mona*) of São Tomé and Príncipe;
- Creation of natural parks;
- Accomplishment of Administration and Management Plans for the STP Natural Parks;

In the context of enhancing the contribution of Non Timber Forest Products (NTFP) for Food Security in Central Africa, it is anticipated the integration of COMIFAC directives concerning NTFP of plant origin, and how these products, as components of biodiversity, will be included in the legal framework of the country. Within this context, and with the scope of the valuation and the creation of NTFP ranks, two basic studies were performed in pilot sites, including 'New Destination' and 'Plancas I' (production zones of NTFP).





## **2. SÃO TOMÉ AND PRÍNCIPE BIODIVERSITY**

**2.1. SPECIES DIVERSITY**

**2.2. ECOSYSTEMS DIVERSITY**

**2.3. WAYS OF BIODIVERSITY MANAGEMENT**

**2.4. MAIN THREATS ON BIODIVERSITY**

**2.5. TRENDS, DRAMATIC SITUATIONS AND IMPLICATIONS  
ON HUMAN BEINGS WELFARE**

**2.6. PROGRESS ACHIEVED ON PERSUING THE TARGETS  
OF 2010-AICHI AND ON THE ACTION PLAN  
IMPLEMENTATION**

## 2. SÃO TOMÉ AND PRÍNCIPE BIODIVERSITY

### 2.1. SPECIES DIVERSITY

As it can be shown in the relevant literature, STP biodiversity (all life forms) is remarkable. The archipelago shows a significant wealth of flora and fauna species, especially considering its relatively small size (Melo, 2006). This is due, regardless of limited size of the islands, to their isolation and its diversity of microclimates. The inland flora and fauna of the islands show a significant proportion of species that are found nowhere else in the world – *i.e.* endemic of the islands.

#### 2.1.1. FLORA

The first surveys of the flora of São Tomé and Príncipe date back to the colonial period, in which should be mainly highlighted the studies performed by Welwitshi, Barter and Mann, who visited the island of São Tomé, respectively, in 1853, 1858 and 1861. These studies led to the discovery of numerous previously unknown species. The first fairly complete and homogeneous investigations on the vegetation of São Tomé and Príncipe were carried out in the years 1932 and 1933, by the researcher Exell (1944; 1956; 1973). Other studies and analysis on the vegetation of forest ecosystems were performed by the researcher Monod, who visited the island in 1956 (Monod, 1960), by Joaquim Espírito Santo, in the 60s and 70s, including the description of new species, by Lains-e-Silva (1958a,b) and finally by White (1984). Increasingly STP is a destination of choice for researchers and universities that, given the here existing species richness, discover new species every new scientific mission, thus contributing to an increase in projects and studies in the country, and for the production of bibliography that made STP internationally renowned. However, much remains to be explored.

In more recent years, especially under the ECOFAC program, a series of studies have been accomplished, that enriched, consistently, the knowledge of the STP flora and vegetation, and resulted in the Management Plan of the Obô Natural Park of São Tomé (PMPNOST 2009).

Under the PMPNOST 2009, it was showed that, in the current state of knowledge of the flora and the floristic associations of the country, the estimated number of species in the archipelago is about 1,200, of which, around 900 are indigenous plants (including 148 endemic species) and circa 300 are introduced (cultivated or sub spontaneous species). Total plant biodiversity of spermatophytes in São Tomé is estimated as approximately 700 species.

The most representative families belonging to the group of terrestrial angiosperms are: *Rubiaceae* (27 species, of which 23 are endemic – 85%), *Orchidaceae* (22 endemic species), *Euphorbiaceae* (11 species, seven of which are endemic – 64%), *Melastomataceae* (8 endemic species, in a total of 17 species – *i.e.* 47% of endemism) and *Begoniaceae* (6 endemic species within a total of 11, or 55% of endemism) (5th CBD Report, 2014). Certain of these groups are particularly rich, such as orchids, which include circa 135 species.

The national flora includes more than 100 pteridophytes (ferns and similar) and circa 800 species of seed plants (spermatophytes). The ferns are distributed in 28 different families and include 9 endemic species (PMPNOST, 2009).

According to data from the Report on the State of Biodiversity of São Tomé and Príncipe (2014), a total of 148 plant species (14% of the national flora) are endemic in the country, of which, 50 are present in the Príncipe Island and 123 in São Tomé Island (within which, 25 are endemic in both Islands). It is estimated that, according to the status IUCN code, 1994, 14.9% of STP endemic species have the statute of vulnerable (VU), 12.2% are near threatened (NT) and 7.4% have a wide area of distribution, having a status of Least Concern (LC).

**TABLE 1 – WEALTH IN SPECIES AND ENDEMISM IN SÃO TOMÉ AND PRÍNCIPE**

PHYLOGENY GROUPS	ISLANDS	NO. OF SPECIES	ENDEMISM %
<b>Mammalia (Except Bats)</b>	São Tomé	10	30
	Príncipe	5	20
<b>Mammalia (Only Bats)</b>	São Tomé	9	55
	Príncipe	4	50
<b>Birds</b>	São Tomé	49	57
	Príncipe	35	54
<b>Reptiles</b>	Whole country	16	44
<b>Amphibians</b>	São Tomé	6	100
	Príncipe	3	100
<b>Insects (Only Butterflies)</b>	São Tomé	47	38
	Príncipe	42	21
<b>Molluscs</b>	São Tomé	39	77
	Príncipe	32	78
<b>Higher plants</b>	Whole country	895	15

Source: 5th CBD Report, 2014

### 2.1.2. FAUNA

Generally, the STP heritage of national vertebrates is well known and is characterized by inland, marine and of transition environment species. However there is a notorious need of very detailed biological studies on terrestrial and aquatic invertebrates and microorganisms (Hydrozoans, Spongiary, polychaete worms, nematodes, etc.).

Despite to be well known the biological heritage of the country, there are few studies, with continuity, to assess the preservation of the different populations, the threats they suffer, their ecological requirements and their interactions within the ecosystems.

The inland faunal biodiversity (*vide* Table 1) is particularly rich in birds, reptiles, amphibians and invertebrates. Overall, depending on the taxonomic classification, are recognised, so far, circa 10 species of small mammals, 49 species of birds, 16 reptiles, 8 amphibians, as well as other *taxa* with considerable representation in STP.



“Pomba do mato”, *Columba thomensis*.  
FOTO: ANASTASIOS PAUL LEVENTIS



“Tordo-do-Príncipe”, *Turdus xanthorhynchus*.  
FOTO: ANASTASIOS PAUL LEVENTIS



“Galinhola”, *Bostrychia bocagei*. FOTO: ANASTASIOS PAUL LEVENTIS

### Avifauna

With 1,001 km<sup>2</sup>, STP supports an avifauna represented by 28 species of endemic birds (São Tomé with 21 endemic species, and Príncipe with seven endemic species).

Since 1990 it is recognised that the avifauna of São Tomé and Príncipe amounts to 25% of the endemisms of 218 Endemic Birds Areas (EBA) worldwide. Very recently, the two islands were included in the “Important Bird Areas” (IBA) in Africa.

The rich biodiversity of the archipelago is recognized by the scientific world, which considers the rainforest of STP as the second one in terms of bird conservation priority, among the 75 African forests (World Bank, 1993) housing a remarkable natural heritage.

According to Jones *et al.* (1991), in “Conservation of Forest Ecosystems in the Democratic Republic of São Tomé and Príncipe”, before an ornithological research, done in 1990 by researchers of the University of East Anglia, in São Tomé and Príncipe, three species were known to science through half a dozen existing specimens, in the museum, which were collected 50 or 100 years ago, namely: a woodcock (*Bostrychia bocagei*), the shrike of São Tomé (*Lanius newtoni*) and the *Amaurociclia concolor* (renamed, after phylogenetic analysis, as *Criithagra concolor*).

In coastal areas the avifauna is mostly composed of birds that populate mainly the uninhabited small islets and

coastal areas. The main species that nests in the colonies are the *Phaeton lepturus* (‘coonzucu’), *Sula leucogaster*, *Sula dactylatra*, *Anous stolidus*, *Anous minutus*, *Sterna fuscata*, *Sterna anaethetus* and *Oceanodroma castro* (sea ducks). In the savannah regions of the north of São Tomé, there is a group of typical birds, made especially of the quail (*Coturnix delegorguei*) and the African corncrake (*Crecopsis egregia*). Nowadays, these bird species have the status of threatened species, including Critically Endangered (CR), according to IUCN.

Studies by renowned institutions, such as ‘Birdlife International’, claim that Tinhosas Islets are the main cradle of marine birds in the Gulf of Guinea. Tinhosa Grande (20.5 ha) and Tinhosa Pequena (3.3 ha) are home to some of the major breeding colonies of seabirds on the coast of West Africa, with tens of thousands of breeding couples. The importance of this led to the recognition of these Islets as sites of international significance, under the RAMSAR Convention.

As it is shown in Table 1, the Príncipe Island houses a total of 35 species of birds, but more recent studies by Melo (2006) point to 33 species of land birds, plus at least 6 species of seabirds that nest on the main island and on the near-by islets. According to Martim Melo (*op. cit.*), São Tomé holds a minimum of 51 species of freshwater land birds and about five species of nesting seabirds. Dozens of species have been recorded as migrants, casual or wandering visitors (Jones & Tye, 2006).



Caeciliidae "Cobra Bobo" de São Tomé, *Schistometopum thomense*. FOTO: JOSEF UYEDA

### Reptiles

According to data obtained from the publication "Conservation of Forest Ecosystems in the Democratic Republic of São Tomé and Príncipe" (Jones *et al.*, 1991), there are 14 species of reptiles in STP, four of which are common to both islands.

In the island of São Tomé there are, for example, the gecko (*Hemidactylus greeffii*), the 'lagarto' (*Panaspis africana*), the 'cobra-escavadoura' (*Rynotyphlops newtoni*), the 'cobra-preta' (*Naja melanoleuca*) and the 'jita' (*Boaedon lineatus*).

In the Príncipe Island there are, for example, the 'lagarto-sem-patas' (*Feyinia polylepis*), the 'Cobra-bobo-do-Príncipe' (*Typlops elegans*), the 'cobra-verde-do-Príncipe' (*Hapsidophrys principis*), the 'osga-dourada' (*Hemidactylus Principensis*) and the 'Jita' (*Boaedon lineatus*).

Also designated by 'gecko', the *Lygodactylus thomensis* is endemic to both STP main islands.

The order of *Testudines* is also represented by the 'bencú' of the swamps (*Pelusio castaneus*) and the 'bencú' of the forest (*Pelusio gabonensis*). The 'bencú' are increasingly rare species in our ecosystems, and it is noticeable the trend to reduce its number. Generally, the perception is that the 'bencú' or African-turtle is decreasing, however there is a lack of information about the number of populations, the status and the distribution of both species, and it is therefore necessary to accomplish studies for the taxonomy, reproductive biology and ecology of both species (Cruz, 2013).

### Frogs and caecilians

In STP, the Class *Amphibia* is represented by four families of the *Anura* Order and one family of the *Gymnophiona* Order, with a total of seven species, of which six species are identified in São Tomé, two in Príncipe and two in Rolas Islet. One species is common to the three islands (*Phrynobatrachus dispar*), one can be found in São Tomé and Rolas Islet (*Schistometopum thomense*), two species are endemic of São Tomé (*Nesionixalus mollerii* and *Nesionixalus thomensis*) and one species is endemic to the Príncipe Island (*Leptopelis palmatus*).

All six species of frogs of the islands (including a tree frog) so as the cecilian 'Cobra-bobo-de-São-Tomé' (*Schistometopum thomense*) are endemic. The Príncipe has two exclusive species and São Tomé has four, including the recently described tree frog *Phrynobatrachus leveleve*. The species *Schistometopum thomense* (belonging to the *Gymnophiona* order), although it is not specific to aquatic environments, attends humid environments, building galleries such as earthworms (cormichas).

In São Tomé the following endemic species can also be found: the tree frogs *Nesionixalus mollerii* and *Nesionixalus thomensis* and the frog of the species *Ptychadena newtoni*. On the Príncipe Island the tree frog belonging to the species *Leptopelis palmatus* and the frog, *Rhrynobatrachus dispar* can also be found.

### Arthropods of the *Insecta* and *Diplopoda* classes

Regarding the insect fauna, there are about 89 species of butterflies in the archipelago; São Tomé with 47

species and the Príncipe with 42 species with an endemism rate of 38% and 21% respectively.

Data from the latest report on biodiversity make no mention of the *Lepidoptera* and *Coleoptera*, but some species of *Lepidoptera* class are known (as *Graphium leonidas thomasius* and *Oelides bocagii*), which are endemic, and are threatened (Carvalho, 2013). Other species of *Lepidoptera* are *Dixeia piscicollis* and *Neptis eltringhami*. Populations of these species are permanently at risk due to fires, caused by both the practice of burning for preparing land for cultivation and to spontaneous fires in the dry season.

The bees within the genus *Apis* are honeybees and have a very important role in pollination (fertilization of flowering plants) thus contributing to the conservation of forest areas. The insect-plant co-evolutionary relationship can be harnessed in beekeeping. However, beekeeping practice in the country is not made with due process: beekeepers kill the bees to remove honey instead of just smoking. It is therefore essential training these professionals, thus contributing to the conservation of honeybee species, fundamental to the ecosystem, and at the same time improve the subsistence of several families.

Interventions in this field pass through the conservation of insect fauna. This requires in-depth studies of existing species and populations, and implementation of administration and management plans to achieve a sustainable use of these natural resources.

In addition to these species of insects, the centipedes (class *Diplopoda*) are represented by *Globanus integer* and *Globanus marginescaber* (Milipeias of SãoTomé) who have status of protected (Oliveira, 2002).

### Terrestrial Mammals

São Tomé and Príncipe islands are very rich in endemic or indigenes species of mammals, mainly due to their distance from the mainland. We can find the shrew of São Tomé (*Crociodura thomensis*), which is endemic to this island, while the one of Príncipe Island (*Crociodura poensis*) is an endemic subspecies of this island. Among the bats of São Tomé there are two species and three endemic subspecies, while at the Príncipe Island there are one endemic species and one subspecies. In addition, we also find other six species of bats – *Myonycteris brachycephala*, *Hipposideros thomensis*, *Miniopterus minor* and *Rousettus aegyptiacus*, and the continental forms, *Eidolon helvum* and *Hipposideros ruber*.

Regarding introduced wild terrestrial mammals; we can find, among many others, monkeys (*Cercopithecus mona*), wild pigs (*Sus domesticus*), “lagaia” (*Civettictis civetta*), “aledunha” (*Mustela nivalis*) and rats (*Rattus rattus*, *Mus musculus* and *Rattus norvegicus*).

### Freshwater fish and crustaceans

In the fresh and slightly brackish water live different species of fish. Among others we can find the ‘charoco’ (*Eleotris vittata*), the ‘rocandor’ or ‘besugo’ (*Pomadasys jubelinii*) and the ‘tilápia do Nilo’ or ‘papê’ (*Oreochromis niloticus*).

In what concern crustaceans we can find, in the rivers and streams of the country, the ‘Izé fundo’, the ‘má bobô’, the ‘má plamina’ and the ‘izê blanco’. Another shrimp that is also seen in the rivers and streams in São Tomé and Príncipe is the ‘manglolô’, whose scientific name is *Sicydium bustamantei*. Besides this species of crustaceans, a crab (*Cardisoma armatum*), characteristic of rivers, riverbanks and earth, can be observed.

Currently these species are threatened due to rinsing containers and mosquito nets (impregnated with insecticide against the malaria vector) in the rivers, creeks and streams, causing the progressive destruction of the fauna in their waters. No less important is the uncontrolled use of chemicals in agriculture, such as fertilizers, herbicides and insecticides, whose impact on biodiversity is notorious.

## 2.2. ECOSYSTEMS DIVERSITY

Although some socioeconomic activities are influencing negatively the balance of national biodiversity, the country still has a large and quite unique biological wealth, as a result of its geographical location and geophysical conditions (climate, orography, soil).

Within the context of the implementation of the Convention on Biological Diversity, forest and agrarian ecosystems, and inland, coastal and marine water ecosystems were identified as the main ecosystems harbouring the STP biodiversity and biological resources.

### 2.2.1. FOREST ECOSYSTEMS

There are several forest ecosystems in São Tomé and Príncipe:

The **Low Altitude Rainforest Zone** (ranging from sea level up to 800 m) has a significant number of endemic trees. Within this area, four types of plant formations can be recognized: “Secondary Forest”, mainly characterized by the predominance of exotic and cultivated species and pioneer species with rapid growth that become naturalized; “Shadow Forest”, consisting of wild survivor species from the original forest and species introduced for a shadow effect on cocoa (*Theobroma cacao*) and coffee (*Coffea* spp.) crops; the “Savannah” is the edaphic and climatic formation that is located on part of the coastline; and the “Mangroves”, which are distributed by the mouth of watercourses.



Shadow forest. FOTO: L. MONTEIRO



Savana, North S. Tomé. FOTO: ARLINDO DE CARVALHO

The **Mountain Forest Zone** occupies the entire area within an altitude from 800 m to 1,400 m. It is characterized by a change in the species composition, in relation to the less high altitudes, due to the decrease in temperature with the increasing altitude, higher rainfall and humidity, constant fogs and considerable mists, reducing light levels.

The **Fog Forest Zone** goes from an altitude of 1,400 m up to 2,024 m. In this zone predominate

typical endemic species, such as the country endemic, and unique, gymnosperm, 'pinheiro de São Tomé' (*Afrocarpus manii*) and the 'giant lobelia' (*Lobelia barnsii*). Orchids, ferns (within which the 'samambaias'), mosses and lichens are also frequent, as well as an abundance of epiphytes.

A summary of ecosystems and types of plant formations is set forth below in Table No. 2.

**TABLE 2 – DIVERSITY OF PLANT FORMATIONS IN SÃO TOMÉ AND PRÍNCIPE**

FOREST ECOSYSTEMS	PLANT FORMATIONS	DESCRIPTION
<b>Cloud Forest Zone</b>	<b>Cloud Forest</b> (1,400-2,024m)	<p>It is characterized by presenting:</p> <ul style="list-style-type: none"> <li>• High rain and humidity;</li> <li>• Fog almost constant and always low temperature</li> <li>• With low trees and epiphytes, particularly orchids, mosses, lichens and ferns of the genus <i>Asplenium</i>;</li> <li>• Presence of <i>Schefflera manii</i>, 'pinheiro de São Tomé' (<i>Afrocarpus manii</i>), <i>Ilex mitis</i>, 'pau-impé' (<i>Olea capensis</i>), 'macambará' (<i>Craterispermum montanum</i>), 'cola de macaco' (<i>Trichilia grandifolia</i>), 'cata d'Obô' (<i>Tabernaemontana stenosphon</i>), 'cacau d'Obô' (<i>Pseudogrostistachys Africana</i>), 'quebra machado' (<i>Homalium henriquensii</i>), 'teia teia' (<i>Rothmannia urcelliformis</i>), 'tchapo-tchapo-d'Obô' (<i>Peddiea thomensis</i>), 'pau-formiga' (<i>Pauridiantha floribunda</i>) and 'pau-três' (<i>Allophylus africanus</i>).</li> </ul>
<b>Mountain Forest</b>	<b>Mountain Forest</b> (800-1,400 m)	<p>The trees are tall (30-40 m) with dense canopies and the existing high moisture favours the development of epiphytes, lianas and ferns that cover the trunks of large trees. Tree ferns abound in quantity and variety. The <i>Rubiaceae</i> and <i>Euphorbiaceae</i> families are the most represented. The tree species characteristics of these formations are: <i>Trichilia grandifolia</i>, <i>Pauridiantha insularis</i>, <i>Pavetta monticola</i>, <i>Erythrocoeca mollerii</i> and <i>Tabernaemontana stenosphon</i>. At this higher altitude, these formations were, in a general way, not much modified by man.</p>
<b>Low Altitude Rainforest Zone</b>	<b>Secondary Forest</b>	<p>Occupies areas from primary plant formations, but that, in the 19<sup>th</sup> century, were cleared for cocoa plantations. Later, these areas were abandoned and the ecological succession originated secondary forests. The floristic composition is mainly characterized by exotic and cultivated species and pioneer species with rapid growth as, for example, bamboos, and 'figo Porco' (<i>Ficus mucuso</i>), tree species, such as 'pão caixão', fruit trees, such as jackfruit, 'izaquenteiro', etc.</p>
	<b>Shadow Forest for cocoa and coffee</b>	<p>This plant association follows the actions of modernization of cocoa plantations (<i>Theobroma cacao</i>) and coffee tree (<i>Coffea</i> spp.). It is composed of both introduced and spontaneous trees species for the shadow effect. It can be mention the 'amoreira' (<i>Milicia excelsa</i>), the 'cedrela' (<i>Cedrela odorata</i>), the 'marapião' (<i>Xanthoxylum gilletii</i>), the 'gogô' (<i>Carapa procera</i>) and the coral trees (<i>Erythrina</i> spp.), for nitrogen fixation.</p>
	<b>Savannah</b>	<p>It is an edaphic and climatic formation occupying a strip of the sea coastline, extending sometimes to the interior, in areas under semi-arid to arid climate, with rainfall lower than 700 mm per year (sometimes 500 mm/y). The predominant vegetation is herbaceous within which can also be found tree and shrub species, such as 'micondós', tamarind, 'úlua', 'zimbrão', etc.</p>
	<b>Mangrove (and Dunes)</b>	<p>It develops in the low costal zone or in lagoons separated from the mainland at the mouth of rivers. In intertidal areas, a pool of various species of algae covers the roots of the mangroves, and these host several species of bivalves (such as oysters), crustaceans (such as mangrove crabs), birds (such as 'galinha d'água' – water chicken -, the heron 'garça de cabeça negra' – black headed heron -, among others).</p> <p>In the mangrove area may lay essentially the 'mangue da praia' (beach mangrove) or the 'mangue-vermelho' (red mangrove) – <i>Rhizophora mangle</i> – and the 'mangue branco' (white mangrove) – <i>Laguncularia racemosa</i>.</p> <p>The floral species found in abundance in the dune areas are the 'frá tataluga' (<i>Ipomoea pes-caprae</i>) and the 'frá açançá' (<i>Canavalia rosea</i>).</p>

The Príncipe Island was the first of the archipelago to be intervened with the sugar cane plantation, in the 16<sup>th</sup> century. According to Jones *et al.* (1991), on the Príncipe Island, savannah formations had not developed in the far north, as expected, by analogy with the São Tomé, perhaps because the combination of weather conditions and orography is not favourable to the emergence of this ecosystem. All the primary forest of the northern part and centre of the island was replaced with cacao, coffee, coconut and banana plantations, and in the south, due to the difficulties of access, little was intervened upon.

These authors (*op. cit.*) also report that almost all-primary rainforest that existed in the island was destroyed during a campaign to eradicate sleeping sickness (african trypanosomiasis) in 1906. But recent research has shown that efforts needed to reach that order of destruction exceeded the capacity of the control teams at that time, and most of the southern part of the island remained intact until today.

The dense rainforest (primary) on the Príncipe is similar to the lowland rainforest of São Tomé, although being relatively less dense. In the Príncipe forests the following endemic species of flora can be find: *Rinorea insularis*, *Ouratea nutans*, *Casearia mannii*, *Croton stellulifer* ('cubango') and *Erythrococca columnaris*. This forest is particularly rich in *Euphorbiaceae*, among which stand out five endemic species of the island. Near the Príncipe's Peak summit (948 m), the forest has a physiography slightly similar to that in São Tomé, but the altitude is not so high as to develop cloud forests, such as in São Tomé.

## 2.2.2. AGRARIAN ECOSYSTEMS

Agrarian ecosystems are a very diverse mosaic of the natural environments, restricted mainly to agriculture and livestock, where an important part of the human population gets its income, which thus becomes the fundamental basis for the fight against poverty.

STP is essentially an agricultural country, with more than a third of the population engaged in agriculture, livestock and fisheries. But the primary sector (agriculture, livestock, forest and fisheries) contributes only with 17.2% of GDP and only 26.2% of the working population is directly dependent on this sector (NPRS II, 2012-2016). The performance of economic activity has been heavily dominated by the tertiary sector, particularly trade sectors, transport, storage and communications, and public administration, which represented 66.4% of GDP in 2011.

### 2.2.2.1. Farming

An ecosystem refers to a dynamic complex of plant, animal and microorganism and their environment, which, on interacting among them, form a functional unit. The farming ecosystems (or agro-systems) are particular cases where human intervention is decisive for its characterization and sustainability. In these ecosystems, many plant species are used in the

production of food and fuel, in industry, medicine, ornamentation and other purposes.

Taken as a base criteria the purpose of the commercial product, the different plant species in São Tomé and Príncipe, whether spontaneous or cultivated species, can be grouped as follows: i) Industrial species, ii) food species, iii) aromatic species, iv) medicinal species and v) ornamental species.

#### i) Industrial species

Industrial species concern to plant species whose final product is a raw material for industry. Given the low level of industrial development of the country, these products are geared almost entirely abroad, becoming this way an immediate source of currency to cover domestic demands relating to convertible currency. This group is made up of the cocoa tree (*Theobroma cacao*), coconut (*Cocos nucifera*), the palm-of-oil (*Elaeis guineensis*), the coffee plant (mainly *Coffea arabica*), the pepper (*Piper nigrum*) and the vanilla (*Vanilla spp.*).

##### Cocoa tree

The cocoa was introduced in the Príncipe Island in 1822 and in São Tomé in 1855, and is distributed throughout the area between the 100 m and 600 m of altitude; there are plantations located almost at sea level, but then under irrigation. The cocoa therefore occupies almost the whole area designated as Agro-ecologic Shadow Wood. Until the late 80s, the cocoa plantations covered an estimated area of 24,000 hectares. With the land distribution process, part of this area came to be used for the development of other activities, as food crops (fruit-growing, vegetable and other), other export crops (pepper and vanilla), and also to urbanization. Thus, the area currently occupied by the cocoa plantations is considerably reduced, but official figures are not known, becoming urgent to carry out an agricultural census (Ministério da Economia, 2006).

##### Coconut tree

Coconut plantations are distributed from the sea level to an altitude of about 150 m, and occupy almost the entire coastline of the Islands. The lack of research on the culture, the absence of market research as well as the existence of old plantations are the main constraints to the development of this culture in the country.

##### African oil palm

Palm trees are a bit scattered all along the agro-ecological zone, due to its great adaptability and easy propagation, which greatly contributes to feeding birds and other animals, and the larger palm groves are located in the SE São Tomé Island. In STP the palm oil tree is almost always used with the dual function of giving shade to cocoa or coffee trees and, at the same time, as producing edible oil.

Development of this culture is faced with various constraints, notably the advanced age of the existing plantations, the lack of research and funding for the production of local seeds for the renovation of the palmar. Recent investments in the development of this culture have generated some controversy, since the option for intensive farming has become a significant

threat to the green mantle that covered part of the southern zone of São Tomé – sanctuary of endemic trees and some bird species with threatened status, in particular species Critically Endangered (CR) as a woodcock (*Bostrychia bocagei*), a shrike (*Lanius newtoni*) and the ‘anjolô’ (*Crithagra concolor*).

In addition to the intensive production, investments are intended to build a palm oil production plant to produce about 10 thousand tons/year, starting in 2016. Given its small size, São Tomé and Príncipe do not have enough space for such target, or to ensure major palm oil production, compared with other countries in the sub-region. Taking into account the potentially negative impact of this project, an urgent constant monitoring of the ecosystems and the species present there is necessary, in order to implement conservation, so as compensatory measures for the eventual negative impacts.

#### Coffee plant

On the island of São Tomé coffee plantations occupy part of the Shading Forest, whose altitude is above 600 m, especially in the case of ‘arabica coffee’ variant (*Coffea arabica*), as is the case on the existing plantations in ‘Monte Café’ and small plantations spread over various parts of the country. In Low and Medium Altitude Areas, also corresponding to the Shading Forest Zone, develop, in small plantations regime, the ‘robusta coffee’ variant (*Coffea robusta*). In Príncipe Island, both in the shading zone as in the Zone of Secondary Forest, there are several coffee plantations of ‘libérica’ variant (*Coffea liberica*), many of which are abandoned, registering the traces of plantations that once constituted one of the island agriculture supporters. The major constraints to the development of the coffee culture include: lack of farming cares, attack of pests and diseases; lack of inputs; marketing difficulties; lack of investment in renewal of plantations and lack of crop research.

#### Pepper

Located in Shadow Forest Zones in plantations, many of which led within the required technical precision (Santa Clara, Benfica, Potó, Rio Lima, etc.). In Secondary Forest areas, numerous different varieties of this species (developing spontaneously but without commercial interest) can also be identified. The major constraints to its development reside in the attack from viruses and the gall disease, the lack of virology laboratory equipment to identify the virus in plants, marketing difficulties and deficient operation of the Export Pepper and Vanilla Cooperative (CEPIBA).

#### Sugar cane

In the two islands, there are small plantations within the shadow areas, which are used for direct consumption. In São Tomé, this culture is mainly in the districts of Lembá (Santa Catarina and vicinity) and Lobata

(Agostinho Neto, Caldeiras, Fernão Dias, Morro Peixe, Canavial and Diego Nunes). In the Autonomous Region of Príncipe, the sugarcane crop is concentrated in the northern areas of the island. In these areas, this crop is used primarily for rum production.

At present, sugarcane is produced without essential care for its maintenance, if it is to have a good income and to help maintain the stability of the ecosystem. Therefore, no action is taken to preserve the culture and the habitat in which it grows. If this situation prevails, in the near future it will be a threat to destabilize the ecosystem. Thus, it is suggested to introduce, in the production areas, good agricultural practices for maintaining and renewing this culture, in order to avoid environmental deterioration, and maintain the ecological balance.

#### ii) Food species

Food species are considered as those that produce food or goods entering directly in the composition of food, such as fruits, seeds, leaves, roots, tubers or stems. Food species can be divided into annual and perennial (depending on the plant life cycle), and into vegetables, fruit-growing, root tubers and cereals, depending on the characteristics of the agricultural product or the plant part that is consumed as food. Thus, it can be distinguished:

- **Vegetables:** tomato, lettuce, green beans, cucumber, cabbage, onion, garlic, turnip, radish, cabbage, peppers, etc.;
- **Fruits:** papaya (*Carica papaya*), pineapple (*Ananas comosus*), hose (*Mangifera indica*), avocado (*Persea americana*), guava (*Psidium guajava*), jackfruit (*Artocarpus heterophyllus*), ‘safuzeiro’ (*Dacryode edulis*), ‘cajamanga’ (*Spondias cytherea*), etc.;
- **Tubers:** arrowleaf elephant ear ‘matabala’ (*Xanthosoma sagittifolium*), sweet potato (*Ipomoea batatas*), potato (*Solanum tuberosum*);
- **Roots:** cassava (*Manihot esculenta*);
- **Cereals:** corn (*Zea mays*) and rice (*Oryza sativa*).

Although several projects in applied research have demonstrated the capability of the country to produce food crops – vegetables, fruits, cereals (such as maize), legumes (such as beans) –, their production is insufficient to supply the domestic market, leaving the deficit covered by imports (Ministério da Economia, 2006).

#### iii) Aromatic species

They comprise plant species producing pleasing aromas and tastes and, therefore, very exploited by man. Included in this group are plants, such as vanilla (*Vanilla planifolia*), cinnamon (*Cinnamomum zeylanicum*), ‘micocó’ (*Ocimum viridis*), ylang-ylang (*Cananga odorata*), Mexican coriander (*Eryngium foetidum*) and lemon grass (*Cymbopogon citratus*).

#### Vanilla

The culture of vanilla was established as a substitute for pepper crop, first due to the emergence of the virus that affected pepper crop, and second for being a culture with similar management demand. Although the involved area is not yet large, favourable soil and climate conditions for the development of this culture, together with the farmer's awareness for its commercial importance, may offer opportunities for its promotion and increased production. However, some constraints to the increment of this culture remain, such as: lack of irrigation infrastructures; shortage of qualified technical capacitation for fertilization and harvest; lack of infrastructures for processing and industrialization of vanilla; difficulties in the product commercialization; and lack of financial resources for investment in new plantations and for farmer's capacitation building.

#### Cinnamon

Cinnamon is a spontaneous plant at the secondary and the primary forest zone, in various areas of the interior. Currently there are no threats in relation to this culture; however, to safeguard a way to the species perseverance, without future changes in the ecosystem, it is essential to develop and carry out a program for renovation and replanting. Therefore, it becomes

necessary to better focus the production and ensures that it lasts in harmony with the ecosystem.

#### iv) Medicinal Species

These are plants with healing effect, and therefore used in the treatment of diseases of different natures, such as asthma, malaria, wounds, cough, diabetes, etc. As prime examples it may be mentioned 'quina' (*Cinchona*), 'iobo' (*Onodora myristica*), 'cata de Obô' (*Voacanga africana*), etc. Other relevant medicinal herbs exist in the archipelago, such as: 'folha de ponto' (*Achyranthes aspera*), which is used against bleeding; 'folha salaconta' (*Canna indica*), used against scabies; "pau quina" (*Cinchona* spp.) against malaria and bruising; 'cata grande' (*Rauvolfia dichotoma*) against malaria and diabetes; 'coedano' (*Cestrum laevigatum*), against scabies; 'macambrará' (*Craterispermum montanum*) and 'matchanzoche' (*Syzygium guineense*), aphrodisiac plants; 'pau três' (*Allophylus africanus*, *Allophylus grandifolius*), against malaria and aphrodisiac; 'matruço' (*Chenopodium ambrosioides*) against worms and diarrhoea, and in massaging bruises; 'folha da mina' (*Bryophyllum pinnatum*), for bruises. These develop mainly in Secondary and Primary Forest areas, although disseminated, a bit, by all other agro-ecological zones.



Medicinal plants. FOTO: L.MONTEIRO

To guaranty the continuity of these plants in the ecosystem, it is essential to ensure a controlled sustainable production. In order to achieve this, it is necessary to perform multiplication and expansion programs for these species, so the biological diversity remains.

#### v) **Ornamental species**

Ornamental species distinguished by the beauty of its flowers or leaves which justify its use as ornamental. Examples are the anthuriums (*Anthurium andreanum*), the orchids (*Cyrtorchis henriquensiana*, *Calanthe sylvatica*), the false birds of paradise ('bico de papagaio' - *Heliconia rostrata*), the ginger flower ('rosa de porcelana' - *Nicolaia elatior*), all of them common in zones of shadow and Secondary Forests. Experiments carried out in several of its regions showed that the country has ideal conditions for producing high quality flowers and foliage. The constraints to this culture are: lack of investment in the culture; poor quality of the end products; low number of flower production companies; and lack of adequate storage conditions for flowers and foliage.

#### 2.2.2.2. **Livestock**

Livestock activity in São Tomé and Príncipe plays a modest role, compared to other agronomic activities. In STP, animal production focuses on cattle, pigs, chickens and goats, although there is a lower production of other animals (PMPNOST, 2009-2014). Livestock is a source for supplying animal protein to the population, thus helping to improve the quality of life in less favoured communities and, at the same time, it is also a source of income for breeders and others who are part of the chain of marketing and processing.

Raising goats, pigs and poultry (eggs and chickens) is well represented in the national livestock sector and is evolving from a subsistence production in agrarian areas, for a more market-oriented controlled production.

Most of the breeding system is the traditional extensive type (animals on the loose) in contrast to a rather small number of suburban poultry farmers, who practice intensive systems with improved breeds. The production of other species of economic interest (pigs, goats and sheep) is also undertaken in medium-sized enterprises.

The breeding of these animals contributed to the introduction of many forage species to ensure continuous pasture. Thus, in pasture areas, the following species are common: *Aeschynomene indica*, *Desmodium uncinatum*, *Desmodium intortum*, *Centrosema pubescens*, *Pueraria phaseoloides*, *Leucaena leucocephala* and *Mimosa farnesiana*. These are spontaneous leguminous plants, with increased palatability ratios in association with other species. In regions with higher rainfall, abound the 'bodó-bodó' (*Commelina* spp.) and the 'uagá-uagá' (*Setaria*

*megaphylla*) as forage species. Smallholders use, in animal feed, the so-called secondary forages, as the leaves from banana (*Musa* spp.), 'fruteira' (*Artocarpus altilis*), jackfruit (*Artocarpus heterophylla*) and coral tree (*Erythrina* spp.).

The lack of animal products in the domestic market is bridged by imports, mainly frozen chicken, milk and dairy products (butter, cheese, yogurts), so as processed products of animal origin (ham, sausage, etc.).

Livestock activity is developed by the private sector, with greater expression among the family farming sector in the villages and city's suburbs. The livestock breeding structures that existed before the privatization of the mixed farming enterprises (now state companies) are currently in an advanced stage of degradation.

According to the Letter of Agricultural Policy (Ministério da Economia, 2006), the main constraints to the development of livestock are: inefficiency in the administration and management of livestock; fragility of the health control and risk of introducing exotic diseases and epidemics; absence of local production of balanced feed; reduction of the areas of available and potential pastures; low performance of local reproducers; inadequate veterinary support; lack of infrastructures; and difficulties on implementing livestock research programs. Added to these constraints the fragility of the animal health control system, caused by the lack of transport means, for the technical teams of inspection, to far-reaching posts, breeders and slaughterhouses; and the lack of equipment and reagents in the only one laboratory of Veterinary Medicine existing in the country.

#### 2.2.3. **INLAND WATERS ECOSYSTEMS**

Inland water ecosystems in STP are classified into lotic, lentic and brackish waters. The lotic waters are the current water bodies such as rivers and streams, while the lentic waters are the masses of standing or stagnant water, such as swamps, marshes and mud. The brackish waters are formed at the mouths of rivers - *i.e.* the intersection between the freshwater and the seawater.

##### Lotic waters

In the two main islands there are 116 river basins and 223 watercourses, ranging in length between 5 to 27 km, with waterfalls that vary between 100 and 800 m high. In the island of São Tomé the river system has a radial configuration from the highest part in the centre. The largest hydrological basin is that of the 'lô Grande', with 111.4 km<sup>2</sup>, followed by that of 'Rio Abade', with 49.5 km<sup>2</sup>, and of 'Rio do Ouro', with 46.4 km<sup>2</sup> (Lima, 2012).

The main rivers of São Tomé and Príncipe are, 'lô grande', 'Xufe-xufe', 'Quija', 'Contador', 'Água grande', 'Abade', 'Manuel Jorge', 'Rio do Ouro', 'Mussacavú', 'Lembá', 'Caué', 'Papagaio' and 'S. Tomé', these last two belonging to the Autonomous Region of Príncipe. The 'Malanza' (South of São Tomé) is a large water reservoir that generates controversy regarding its characterization. It is considered by some as the Malanza River, but others consider it as the Malanza Lagoon.

The river network, in the country, consists of more than 50 rivers. However, their distribution is uneven. More than 60% of the river's flow is located in the southwest and south of the islands. This relates to higher rainfall that takes place in these areas. Indeed, the rainfall is very high in this part of the São Tomé Island (5,000 mm/yr, in the southwest, compared to 1,000 mm/yr, in the city of São Tomé).

On the Príncipe Island, the location of the rivers also conforms to the terrain characteristics, with a northern region characterized by a platform with an altitude from 120 to 180 m and a somehow regular relief, with small elevations and slopes that overlook the sea – the largest is the 'Precipício' (precipice), with 108 m high – while the southern region is mountainous, with a highly rugged orography, with numerous valleys with rivers and temporary streams. There are many scarps,

ridges and needles, of which the most prominent are the 'Pico Papagaio', 'João Dias Pai' and 'João Dias Filho'.

To the present purpose, the rivers were considered into three *strata*, according to the characteristics of the ecosystem present, namely: upper *stratum*, middle *stratum* and lower course.

### Upper Stratum

It encompasses all the initial part of the rivers including its source. The predominant vegetation is the primary forest. In these ecosystems several plant formations can be distinguished.

In the upper *stratum* of the rivers located south and southwest of São Tomé Island, namely, 'Cantador', 'Lembá', 'Xufe-xufe', 'Quija', 'Mussucavú' and 'Yo grande', you can find the *Staudtia pterocarpa* vegetation community, formed by the species, *Staudtia pterocarpa*, *Santiria trimera*, *Phyllanthus discoideus* and *Pycnanthus angolensis* associated, among others, with *Voacanga africana*, *Croton draconopsis* and *Grumilea venosa*. In rivers located in the north and east, such as 'Manuel Jorge', 'Abade' and 'Ouro', the upper *stratum* is dominated by the vegetation community *Craterispermum montanum*, with predominance of the species *Craterispermum montanum*, *Anysophyllea cabole*, *Olea capensis* and *Canthium glabriflorum*,



Rio do Ouro (gold river). FOTO: ARLINDO DE CARVALHO

associated with *Croton stellulifer*, *Trema guineensis*, *Sabicea ingrata* and *Uapaca guineensis*.

On the Príncipe Island, the upper *stratum* of the river Papagaio is formed by the primary forest type, where you can find species such as *Rinorea insularis*, *Ouratea nutans*, *Casearia mannii* and *Erythrococca columnaris*.

In this *stratum* of all rivers in the country occur the cryptogams (algae, liverworts and mosses) as well as some herbs, such as *Tristemma mauritianum* and *Rhynchospora corymbosa*. Concerning animals, it is characterized by the absence of ichthyological species, with only a few flatworms, such as *Turbellaria* – aquatic *Plathelminthes* (small beings, 1 to 2 cm, moving by cilia).

### Middle Stratum

Covers the entire middle reaches of the rivers, that is, the medium length from the spring to the mouth. The predominant vegetation is that of the river valleys, namely the Guinean *Syzygium*, formed by the *Syzygium guineense*, *Croton stellulifer*, *Homalium africanum* and *Voacanga africana*, associated with the species *Carapa procera*, *Drypetes glabra*, *Funtumia africana* and *Leea tinctoria*. This vegetation is also associated with an herbaceous *stratum* where you can find the following species: *Eclipta prostrata*, *Begonia ampla*, *Costus giganteus*, *Adenostemma perrottetii*, *Panicum* spp., *Calvoa hirsuta*, *Elatostema thomense*, among others.

The fauna consists of small size fishes, such as 'charoco' (*Eleotris vittata*) as well as by some crustaceans, *Atya* spp., *Macrobrachium* spp. and *Sicydium bustamantei* (freshwater shrimps).

### Lower course

Corresponds to the lower reaches of the rivers, in the area of secondary forest, and is associated with areas of productive forest, where you can find the species *Syzygium guineense*, *Malnikara multinervis* and *Staudtia pterocarpa*. The predominant vegetation community is the *Musanga cecropioides*, where are present the species *Musanga cecropioides*, *Cedrella odorata*, *Cecropia peltata*, *Carapa procera*, *Ficus sidiifolia*, *Dracaena arborea*, associated with *Artocarpus heterophyllus*, *Artocarpus altilis* and *Elaeis guineensis*. The *Bambusa vulgaris* community is also characteristic of this *stratum*, as well as of the middle layer, forming, in some cases, an almost impenetrable vegetation curtain, as exists, for example, in the region of River lô Grande.

The fauna consists mainly of fish and crustaceans. The planarians can be observed in São Tomé at the river lô Grande, and in the Príncipe Island at the River Papagaio, and may also easily be found in small streams. Among the birds we find the *Corythornis thomensis* (Conóbia or Pica-peixe), which feeds on



Rio Papagaio (Papagaio river). FOTO: ARLINDO DE CARVALHO

fish in the rivers. On the banks of the rivers can be found the *Phalacrocorax africanus* (Pata-d'água), the *Butorides striatus* (Chuchu or Garça-de-cabeça-negra – Black-headed Heron) or yet the *Gallinula chloropus* (Galinha d'água – Hen-of-water).

### Lentic waters

The lentic waters are formed inland, as standing waters, and can be swamps, marshes and muds. According to the Master Plan for the Marshes (MIRNA, 2005) São Tomé Island has, officially, 36 wetlands, the main ones being the 'Morro Peixe', 'Micoló', 'Praia melão', 'Água-Izé', 'Ribeira Afonso', 'Angratoldo', 'Lê Grande' and 'Malanza'. In the autonomous region of Príncipe Island, there are six major wetlands, namely: 'Água Senhor Padre', 'Mé Fidel', 'Lentá Piá', 'Budo-Budo', 'Porto Real' and 'Praia das Burras'.

The flora of lentic water is formed by green algae, with specimens of the genus *Pandorina*, *Scenedesmus*, *Closterium*, *Cosmarium*, and blues algae, including *Navicula*, *Oscillatoria* and other diatoms. Part of the flora of standing water areas are submerged plants, including the genus *Patamogenton*, and floating plants formed by *Sagitaria*, *Nuphar* and *Nymphaea*.

In the swamps, various species of higher animals can be found, such as the 'Papê' (*Oreochromis niloticus*), the 'Cucumba d'água' (*Periophthalmus barbarus*), the tortoise 'bencú' (*Pelusios castaneus*) or the waterfowl (*Gallinula chloropus*). The swamps are also inhabited by inferior beings, which are major pathogens, especially for human beings.

In general, it is not taken into account the ecological importance of wetlands, featuring them as a mere breeding of malaria-causing mosquito, not recognizing much importance as part of inland waters ecosystems. However, studies in the country, regarding the control



Rio Iô Grande (Iô grand river). FOTO: ARLINDO DE CARVALHO

of malaria, have proven that the *Anopheles gambiae* (mosquitoes transmitting malaria) main breeding sites are not swamps. According to the Performance Evaluation of the National Programme of Fight Against Malaria (OMS, 2012), the cradle of *Anopheles gambiae* in São Tomé and Príncipe are generally small accumulations of water exposed to the sun, either or not provided of vegetation.

Within the lentic waters we also have the lakes and lagoons, of which the best example in São Tomé and Príncipe is the 'Lagoa Amélia', in the center of São Tomé Island (Mê-Zochi district), located in the crater of an ancient volcano.

The vegetation consists of a very dense herbaceous cloak, predominantly grasses such as *Panicum hochstetteri* and *Panicum brevifolium*, which are invasive plants of wetlands of Equatorial Africa, some sedges (*Cyperaceae*), such as *Cyperus articulatus* and *Polygonum salicifolium*. There is also a population of ferns (*Pteridophyta*) within the Families of *Polypodiaceae* and *Hymenophyllaceae*, which are giant ferns, very abundant and characteristic of the region. Finally, some *Orchidaceae* can also be found, such as *Bulbophyllum cocleatum*.

The vertebrate fauna is essentially composed of birds (*Phalacrocorax africanus*, *Butorides striata* and *Gallinula chloropus*), which have for food as much algae as some insects prevalent in these habitats. In recent years, lianas have invaded the lagoon space, changing the physiognomy and floristic composition of the botanical association of *Begonia baccata* and tree ferns of the genus *Cyathea*. Moreover, most of the old volcanic crater is invaded with bushes (*Anthocleista scandens* – *Gentianaceae*). The biggest danger is the disappearance of the original ecosystem, with negative

consequences for the conservation of endemic species that depend on this habitat.

#### **Brackish water**

These ecosystems consist of a mixture of fresh and salt water, which provides a unique environment where characteristic animals and plants can be found. For plants, the focus is on the existence of mangroves. According to Oliveira and Vaz (2007), the vegetation of brackish water is very special, but poor in plant species. It is dominated by *Rhizophora mangle* and *Rhizophora racemosa* (both trees with aerial roots) and *Avicennia germinans* also provided with pneumatophores. According to these authors, in these ecosystems may appear ferns of the genus *Microsorium*, which are common in all mangroves in the world.

According to Christy and Clarke (1987) some mangroves are situated close to the slow-flowing rivers. The country's largest mangroves are located near the areas of Praia das Conchas, Praia dos Tamarindos, Pantufo, Água-Izé and Malanza. Mangroves also represent prominence as bird nesting areas for water ducks (*Phalacrocorax africanus*), water chicken (*Gallinula chloropus*) and white heron (*Egretta intermedia*), which have an extensive colony in 'Água-Izé' area and in Praia das Conchas, the latter with a lower density compared to Água-Izé.

Regardless of seawater fish that live temporarily in this ecosystem, there are species that are characteristic of this ecosystem, such as 'Cucumba' (*Periophthalmus Barbus*). The brackish water ecosystem is quite important for the preservation of many species, especially for saltwater fish that use these habitats to reproduce.



Lagoa Malanza (Malanza lagoon). FOTO: L. MONTEIRO

#### 2.2.4. COASTAL AND MARINE ECOSYSTEMS

The country has a coastline of about 260 km long and a wide exclusive economic zone in the Atlantic Ocean. The coastal area and the marine environment are an integrated resource and an essential component of the environment, offering valuable possibilities for achieving sustainable development in São Tomé and Príncipe.

These ecosystems are populated by a large variety of species, from inferior to superior living beings.

#### FLORA

##### Lower plants

Lower plants usually are phytoplankton, mainly composed of macro and microscopic algae, without flowers, with a rudimentary organization, the body shredded into cells and always with pigments. As an example, we can note the presence of *Dunaliella salina*, specie of *Chlorophyceae* (green algae), *Cyanophyceae* (blue algae) and *Pheophyceae*, as *Fucus platycarpus*, which appears sometimes during low tide, and also *Rhodophyceae* (brown seaweed).

##### Higher plants

Within the coastal higher plants predominate coconut (*Cocos nucifera*), 'folha tartaruga' (*Ipomoea pes-caprae*), 'libo d'água' (*Strachium sparganphora*), 'tamarindo' (*Tamarindus indica*), banana (*Musa spp.*) 'caroceiro doce' (*Terminalia catappa*), 'zimbrão' (*Ziziphus abyssinica*), 'micondó' (*Adansonia digitata*), 'limão' (*Ximenia americana*), 'bamboo' (*Bambusa vulgaris*), 'fruteira' (*Artocarpus altilis*), 'folha boldrega' (*Portulaca oleracea*).

In the coastal ecosystem we can also find the above-referred mangroves, which have as dominant species *Rhizophora mangle* (*Rhizophoraceae*) and *Avicennia germians* (*Avicenniaceae*). These species occur along the lower reaches and the mouth of some rivers (Malanza, São João de Angolares and Praia Grande) and on the edge of small coastal lagoons of the north, near the Morro Peixe and Praia das Conchas.

Note that currently, in the Príncipe Island, the few mangrove areas are concentrated in the southeast edge of the island and in the PNP, between Praia Grande, Praia Seca, and Praia Lapa, in the Baía das Agulhas, and they are all not much developed. The remaining areas of this vegetation are mainly in the PNP territory,

in the south of the island, and the buffer zone adjoining PNP areas. Coconut trees, on the coast, and cocoa, inside, have already replaced a great area of this forest region.<sup>1</sup>

## FAUNA

In STP, the coastal ecosystems are made up mainly by beaches, rocky shores, estuaries and coastal wetlands, dominated by various forms of life that make up the richness of this biodiversity. For these ecosystems, there are no studies with particular emphasis on fauna. So the data available for certain species are much insufficient.

The coastal fauna is mainly composed by seabirds, which mainly inhabit the desert islets and coastal areas. In addition to this, it is also relevant the presence of some endangered species, such as the endemic bat (*Hipposideros thomensis*), that inhabits the savannah zones in the Praia das Conchas and the Lagoa Azul, at the north Coast of São Tomé Island.

With regard to insects, there are endemic species, such as *Graphium leonidas thomasius* and *Oelides bocagii*, species of endemic and endangered butterflies. Given the lack of field information about this group, it is suggested a survey and a review of the species and populations, for subsequent conservation strategies.

Apart from these, five of the seven species of worldwide sea turtles live in the territorial waters of São Tomé and Príncipe, namely 'Tatô' (*Lepidochelys olivacea*), 'Ambô' or 'Mão branca' (*Chelonia mydas*), 'Sada' (*Eretmochelys imbricata*), 'Ambulância' (*Dermochelys coriacea*) and the 'Tartaruga cabeçuda' (*Caretta caretta*). Although they are protected species, at the international level, and notwithstanding the recent implementation of national legislation, the sea turtle is still sought and captured at large scale, for purposes of consumption, marketing and processing. They are common species inhabiting the territorial waters of the archipelago, sometimes using the beaches for breeding, spawning and nesting. Data from fishermen targeted for a study confirm that the reduction of its number persists every year that goes. In Príncipe Island, legislation came earlier through a regional decree and, thanks to the conservation policy being carried out by the Regional Government of the Príncipe Island, now a days we can watch the nesting turtles, at the main beaches of the Island, such as Praia Grande, although the beach erosion is still a threat to the nesting of this species.

The fauna of the marine ecosystems consists mainly of fish, crustaceans, molluscs, reptiles, cetaceans and corals. There are also echinoderms, coelenterates, annelids and sponges.



"Bonito", *Caranx crysos*. FOTO: L. MONTEIRO

Large pelagic (sea waters, neither close to the bottom nor near the shore) vertebrates and small pelagic and demersal (sea waters that are near to, and significantly affected by, the seabed) vertebrates integrate the fish fauna of STP. The best-represented families are the *Carangidae* (14 species), *Serranidae* (11 species) and *Gobiidae* and *Scombridae* (8 species each).

The large pelagic vertebrates are represented, among others, by the *Istiophoridae* 'Peixe Andala' (*Istiophorus albicans*) and the *Scombridae* 'Peixe Fumo' (*Acanthocybium solandri*), 'Atum oledê' (*Thunnus albacares*), 'Atum judeu' (*Katsuwonus pelamis*), as well as the large tuna, which are migratory species.

As for the small pelagic vertebrates, stand out, among others: the *Clupeidae* – sardines; the *Scombridae* – small tuna, 'fulufulu', mackerel and sawfish; the *Carangidae* – 'bonito', 'corcovado' ou 'olho grosso', 'selelê', 'carapau', 'osso molê'; the *Mugilidae* – 'tainha'; the *Exocoetidae* – 'voador' or 'concom'; and the *Hemiramphidae* 'Maxipombo'.

Demersal or bottom fish are represented by 'cherne', 'badejo', 'bacalhau' and 'peixe sabão' (*Serranidae*), 'caqui' (*Holocentridae*), 'judeu' (*Scianidae*), 'vermelho fundo', 'vermelho terra' and 'pargo' (*Litjanidae*), 'vermelho sangue', 'vermelho sol' and 'malagueta' (*Sparidae*) and 'moreia' (*Muraenidae*).

Among the animal species prevalent in brackish waters, the following small fish can be referred: 'charoco' (*Eleotris vittata* – family *Eleotridae*); 'roncador de pintas', 'roncador' and 'bujigo' (respectively, *Pomadasys jubelini*, *Pomadasys rogeri* and *Pomadasys peroteti* – family *Haemulidae*); 'corcovados' (*Caranx hippos* – family *Carangidae*); 'tainha' (*Mugil curema* – family *Mugilidae*); 'papê' (*Oreochromis niloticus* – family *Cichlidae*); and 'peixinho'.

<sup>1</sup> Management Plan for the Príncipe Natural Parque, 2009

The name 'peixinho' refers to fish of small size (1-2 cm), which is very appreciated by the population. Generally caught at the river's mouth, it is presumed to be the result of the reproduction process of marine species that come spawn in rivers. This catching activity may therefore have serious consequences in the reproduction of these species, however we have no information on the real impact of these catches on their effective population.

According to the Fifth Report of the State of Biodiversity of São Tomé and Príncipe, 2014, crustaceans predominate in both marine and coastal ecosystems of São Tomé and Príncipe. They are distinguished as shrimps, lobsters, crayfish, crabs and slipper lobster.

Regarding shrimps (decapod swimmers), the following genus can be found: *Penaeus*, *Metapenaeus* and *Parapenaeus*. The lobsters (decapod walkers) are represented by several genera as, for example, *Panulirus*, *Callinectes*, *Calappa*, etc.

The 'paramola' (*Cuvieri aranea*) and the spider crab (*Geryon maritae*) are the most common crabs. Langoustines and slipper lobster are rare, represented by the species *Nephrops* spp. and *Scyllarides herklotsii*, respectively.

In inland water ecosystems, freshwater shrimp is explored, in particular the STP indigenous species, as the white shrimp (*Macrobrachium zariqueryi*), which has experienced a considerable decrease, mainly due to the contamination of rivers.

Molluscs also play an important role in the economic and food sector, as, for example, the marine gastropod 'búzio do mar' (*Buccinum undatum*). There are also terrestrial gastropods, or African giant snails, including 'búzio do mato' (*Archachatina marginata*) and 'búzio d'Obô' (*Archachatina bicarinata*). The *Archachatina marginata* – introduced some 30 years ago in the national biological heritage, with unknown origin – naturalized in such a way that tends to take on a zoo-social character of invader. In certain formations of secondary forests, its population has grown rapidly, to the detriment of the endemic species 'búzio d'Obô' (*Achachatina bicarinata*). Its value in terms of consumption as a source of wild protein, has stepped up his catching, prompting collectors to go more deep into the forest to pick up shells, and taking this specie to retreat more and more into the habitat of the local species, concealing them food and space.

Cetaceans can quite frequently be seen from the southern tip of the island; among others stand out *Mystecetes* sub-order and the species *Balaenoptera musculus*, *Megaptera novaeangliae*, etc. One of the most common examples of observed *Odontocetes* is the dolphin *Delphinus delphis*. This group of species make



"Búzio do mato" - *Archachatina marginata* FOTO: ARLINDO DE CARVALHO

up also an exceptional point of interest for tourism in São Tomé and Príncipe, since being a proverbial species, attract groups of visitors interested in wale watching. Improving the safety and habitat conditions for these species will allow for the permanence of more animals and, hence, more tourists.

Living marine corals are more abundant in the northern part of the island of São Tomé, particularly in 'Praia das Conchas' and 'Blue Lagoon'. The species *Siderastrea siderea*, *Montastrea cavernosa* and *Porites* spp. are those that can more easily be found. The coral reefs are the foundation of an entire ecosystem, since they provide habitat, food and shelter to a wide variety of fish, crustaceans, echinoderms and many other invertebrates. They are called "rainforests of the sea" and maintain an even wider variety of species and, as with tropical forests, they also are at high risk. The main threats pass through the lack of control of their predators (sea urchins, starfish), pollution, dynamite fishing and mining, and removal, of coral for sale, etc. It is therefore fundamental to carry out surveys and assessments of coral conservation status in São Tomé and Príncipe, to implement conservation and protection measures for these important ecosystems.

#### Seabirds

Islets deserve special mention as nesting sites for seabirds since, by its location and the absence of human occupation, they comprise some of the most important colonies in the Atlantic Ocean. Notable are the 'Tinhosas' islets, the 'Boné de Joquei' and 'Bonezinho', around Príncipe Island, and the 'Sete Pedras' islets, around São Tomé Island, all recognized as exceptionally important sites for seabirds.



Sete Pedras (seven stones) (AUTOR: ARLINDO DE CARVALHO)

According to Martim Melo (2006), the islets around São Tomé and Príncipe islands, with particular relevance to 'Tinhosas', constitute one of the main breeding grounds of the Atlantic Ocean for at least five species of tropical seabirds, including the 'alcatraz pardo' (*Sula leucogaster*), the 'garajau preto' (*Sterna fuscata*), the 'tinhasa' (*Anous stolidus*), and the 'tinhasa de barrete' (*Anous minutus*). In the islets of 'Sete Pedras', south of São Tomé, live populations of the species 'coconzuco' (*Phaethon lepturus*), 'pato marinho' (*Sula leucogaster*) and 'caniboto' (*Oceanodroma castro*).

Given the paucity of islands with adequate conditions for breeding seabirds – that is, not inhabited by man and without introduced predators, as well as other factors, such as topography and vegetation, and given the still smaller number of islands in the tropical region that have these characteristics, it is considered that the 'Tinhosas' Islets are an exceptionally important habitat for the conservation of those species, which is recognised in its classification as international IBA (Important Bird Area).

## 2.3. WAYS OF BIODIVERSITY MANAGEMENT

### 2.3.1. CONVENTIONAL CONSERVATION METHODS

There are two conventional ways of conservation of biological diversity: The *in situ* conservation, which consists in the conservation of plants and animals in their natural communities, is a fundamental part of a country's conservation system of its genetic resources, since it ensures that natural evolutionary processes

and changes, resulting from the interaction with the physical and cultural environment, are maintained, and allowing the generation of genetic variation, resulting from the adaptation to the environmental and social changes; but when this is not possible, there is the *ex situ* conservation, which literally means, conservation outside the place of origin – this is the protection process for endangered species, by removing part of the population from the threatened habitat and carrying it to a new location, which can be a wild area (sanctuary) or a captive area (zoo, botanical garden or other similar site).

#### 2.3.1.1. In Situ Conservation

Implementing efforts to enhance the *in situ* conservation, the government of São Tomé and Príncipe, after ratification, created four protected areas, corresponding to 30% of the country territory. This is the case of Obô Natural Park of São Tomé and the Príncipe Natural Park, which have as scope to protect the great mountain and lowland ecosystems, as well as the respectively associated species, featuring STP archipelago. Protected areas comprehend the remaining dense forests that the rugged relief centre still maintained uninhabited and relatively pristine. Later on were created the Integral Reserve of Tinhosas Islets, with a surface of 15 ha, and the Reserve of Rolas Islet, with an area of six ha.

These protected areas, under the biological and naturalistic point of view, aimed, among other objectives, the preservation and conservation of coastal forest and marine ecosystems, and to promote the orderly use of the territory and its natural resources, in order to ensure continuity of the evolutionary processes that have occurred during several million years (3<sup>rd</sup> CBD Report, 2007).

It is, however, evident the absence of marine protected areas that may enable the conservation of their highly important ecosystems, not only to safeguard the resources of the biodiversity they contain, but also by the possibility of the country's safe economic development through the sustainable use of the whole of marine resources.

#### 2.3.1.2. Ex Situ Conservation

There have been also some efforts to conserve *ex situ* some species, trying to ensure the genetic preservation (and potential) of endangered species in their natural habitat. The country already has a botanical garden with more than 400 specimens of the endemic flora and a herbarium with more than 1,000 plant samples, collected during several botanical expeditions inside the Parks.

The Botanical Garden (gateway of the Obô Natural Park of São Tomé) is located in 'Bom Sucesso', an old agricultural dependence of 'Roça

Monte Café'. The objectives of the creation of this Botanical Garden (associated with the Herbarium) was connected with tourism and recreation, gathering phenologic data, environment education, teaching of systematic botany, awareness of conservation and, finally, the *ex situ* conservation of endangered species, through a set of live samples for scientific research.

The Herbarium serves as an effective instrument of scientific research in the diagnosis of pasture resources, characterization and classification of natural pastures, mapping and study of the dynamics of vegetation, training and actions to improve the territory management.

In addition, the community nurseries may have a key role in *ex-situ* conservation, in that they help to know the potentialities of the plants under the new conditions beyond the site of origin, and allow testing in agrarian areas.

In Príncipe Island there are not yet implemented actions aimed at *ex situ* conservation, however, the competent authorities demonstrate this concern and already planned the creation, shortly, of a botanical garden on the island.

## 2.3.2. VALUATION/UTILIZATION OF BIODIVERSITY

### 2.3.2.1. Ecological Value of Biodiversity

The highly rugged centre-southwest of São Tomé prevent human intervention in this region, thus promoting the conservation of the pristine dense and damp forest massif, of vital importance to the agricultural system of the country, for its key role on the elements of climate (rainfall pattern, wind direction and speed, air humidity and insolation) and, so, as a conditioning factor of the productive capacity of the cultures that modelled the agricultural history of the country. Moreover, as other tropical forests in the world, it works as a carbon



Botanical garden – *ex situ* conservation. FOTO: L. MONTEIRO

dioxide consumer, thus contributing to addressing the problem of climate change worldwide.

The forest cover also plays other important roles for society, since it protects the soil from the impacts of torrential rains, thus preventing erosion. Organic debris from the decomposition of leaves, branches, bark and fallen fruits produce humus, which contributes to the natural fertility of the soil by improving its physical and chemical characteristics.

The dense and humid forest massif, covering the centre-southwest mountains, protects the hydrographic basins of the most important rivers in the country, contributing significantly for supplying densely populated areas, located in the lower belts of the two islands, with water that is used for domestic consumption, irrigation and energy production.

São Tomé and Príncipe have an agricultural area of about 40,000 ha (40.6% of the national area) that is irrigated by several rivers and streams.

The secondary forest, covering land of accessible slope (not frequently over 25%), ensures excellent soil and environmental conditions for the development of forest formations and forestry, indirectly determinants of land suitability for cocoa and coffee plantations and horticulture at lower and flatter regions.

The cocoa and coffee plantations (shade forest), who settled and naturalized, for more than two centuries, in the lower and flatter region with best agricultural potential in São Tomé and Príncipe, are agroforestry systems (farming under trees shadow) of international prestige, being suitable for conservation of tropical soils in insular conditions and allowing the conservation of flora and fauna species, since they are excellent habitats.

### 2.3.2.2. Economical Value of the Biological Diversity

#### NOT WOOD FOREST PRODUCTS

In the newly abandoned plantations (new secondary forest) it is grown 'banana prata' (fruit from *Musa paradisiaca* var. *sapientum*), 'matabala' (tuber from *Xanthosoma sagittifolium*) and 'fruta-pão' (fruit of *Artocarpus altilis*), which practically constitute the traditional staple food of São Tomé. To this group, it may be added the 'izaquente' (fruit of *Treulia africana*), with which the dish of the same name is prepared, mainly served in the local festivities.

The main fruits harvested in these ecosystems are: The 'jaca' (*Artocarpus heterophylla*), 'cajamarca' (*Spondias cytherea*), 'safu' (*Dracryodes edulis*) and 'manga' (*Mangifera indica*). Fruits like 'sapo-sapo' (*Annona squamosa*), 'anona' (*Annona reticulata*),

'pêssego de São Tomé' (*Chytranthus manni*), 'pitanga' (*Eugenia uniflora*), 'alfarroba' (*Ceratonía siliqua*), 'grumichama' (*Eugenia brasiliensis*) are not so popular, perhaps because they are less abundant. In some sites, under the shade forest, there are cassava, yam, corn and vegetable crops.

Plantations abandoned for over 20 years (secondary forest) are favourite habitats of the apes (*Cercopithecus mona*) and the 'porco do mato' (*Sus domesticus*), which are the main mammals supplier of the wild meat that is consumed in São Tomé and Príncipe, along with the 'guembú', a bat (*Myonycteris brachycephala*) also hunted for their meat, rather consumed by certain strata of the population. There is, however, a lack of the health control of diseases of these animal species, which are vectors of many humans' diseases. Some bird species, such as the 'rola' (*Columba malherbii*), the 'pombo de mato' (*Columba thomensis*), the 'cessa' (*Treron australis virescens*), the 'curucuco' (*Streptopelia senegalensis*), the 'muncanha' (*Aplopelia larvata simplex* or *principalis*) are much hunted and consumed as delicacies; although some are endemic the current status of their populations is not known.

The 'búzio d'Obô' (*Achachatina bicarinata*) and 'búzio do mato' (*Achachatina marginata*) are two terrestrial molluscs present in the diet of São Tomé, especially the most needy section of the population. The 'búzio do pico' (the name given in Príncipe Island to 'búzio d'Obô'), was, about 40 years ago, the only specie consumed in STP, till the 80's of the last century, when the 'búzio do mato' was introduced at random (uncertain origin till today). This last one, due to its high reproductive capacity, spreads rapidly throughout the shade of the forest and the farming areas, having been discovered by the people as a new source of animal protein, and today their catch supersedes that of the other. However, while being a menace to the endemic species, in competing for habitat and food, eventually remove the hunting pressure over the other.

#### WOODY FOREST PRODUCTS

The total volume of commercial timber in São Tomé and Príncipe is estimated at  $11.5 \pm 0.8$  million m<sup>3</sup> (including primary forest). This capital in woods, spread throughout the forest area of the country, gives an annual average of 125 m<sup>3</sup>.ha<sup>-1</sup>.

Being the total volume (whole volume of wood of a tree with diameter equal or greater than 10 feet), generally, 35 to 40% greater than its commercial volume, it is estimated for the whole country from 15.5 to 16.1 milhões de metros cúbicos of commercial timber. There are wood resources available annually for sustained exploitation, which were valued at 70,000 to 103,000 m<sup>3</sup> of timber in shell for sawmills, and 43,000 to 65,000 m<sup>3</sup> of wood with bark for firewood (Interforest AB, 1990).

It is important to note that, nowadays, with an increase of informal exploitations, the wood products are exploited without a management plan and without the support of an annual harvesting plan.

#### WOOD AND BIOMASS AS ENERGY SOURCE

The energy sector, in STP, is essentially characterized by the consumption based in energy resources from oil (gasoline, diesel, jet A1, butane gas and lubricants) and biomass (wood); electric power is mainly produced from thermal power plants, with about 70% of the total.

Considering that the use of wood for energy is a major cause of forest degradation, especially in the northern savannah of São Tomé, it is essential to interfere in this sector by creating alternatives to coal production and the use of wood, in order to significantly reduce the emission of Green House effect Gas (GHG). In this context, measures should be targeted for energy efficiency in the medium term, in three different sectors:

- Sector 1: Planting fast growing species of high calorific value;
- Sector 2: Installing furnaces with carbonization-improved techniques for high-energy coal production;
- Sector 3: Popularizing the use of improved stoves in agrarian areas.

These measures will contribute enormously to the reduction GHG emissions.

Regarding the production of clean energy, the following actions may be undertaken in the medium and long term:

- Production of renewable energy and alternative energy sources for all agrarian areas where energy is mainly based on coal and firewood burning;
- Promotion of hydropower production to reduce the pressure over EMAE energy production;
- Promotion of energy production from forestry unused remains;
- Implementation of plantations with fast growing species for energy purposes, particularly in the dry areas north of São Tomé, and elsewhere where it is felt the problem of excessive burning of coal.

The main obstacles to the implementation of these initiatives are of a financial nature, taking into account the cost/benefit ratio of each investment that the country needs. Within this context, the private sector is very important, especially in the implementation of new technologies and their management, for the advent of a true era of green economy.

It should be noted, however, that the energy issue could be related to other strategic options, such as forestry. Indeed, the valuation of forestry by-products,

as well as those from agriculture and livestock, for energy purposes, is essential. Hence, it is justified the need for a more sustainable management of resources, reducing, at the same time, the long-term GHG emissions.

#### MEDICINAL PLANTS AND NATURAL MEDICINAL PRODUCTS

In STP, the main medicinal products from biological diversity are of plant origin, being known about 300 species of medicinal plants. The higher targeted diseases are: malaria, diarrhoea/dysentery, skin diseases, wounds, jaundice/hepatitis, asthma, influenza, diabetes, etc. According to Madureira (2008), in the "Ethno-pharmacological Study of Medicinal Plants of São Tomé and Príncipe", the flora of São Tomé and Príncipe is rich in medicinal plants, whose use in industrial and natural medicine is, in various situations, a valid alternative to the chemical formulations of multinational laboratories around the world.

Roots, barks, leaves and flowers are used, since ancient times, for the preservation of health and in curing diseases. This practice is universally recognized as essential to the life of people (particularly by the relevance of the prospection of new empirical medications), and so became closely followed, worldwide, by scholars and herbalists who, thus, have rendered high and relevant services to experimental pharmacopoeia – and, so, to humanity.

Under the medicinal point of view, the following species must be emphasized: 'cata grande' (*Voacanga africana*), 'macambará' (*Craterispermum montanum*), 'libô muncambú' (*Vernonia amygdalina*), 'pau três' (*Allophylus africanus*), 'canafístula' (*Cassia fistula*), 'pau-quina' (*Cinchona* spp.), 'folha da mina' (*Bryophyllum pinnatum*), 'milondó homem' (*Acridocarpus longifolius*), 'iobó' (*Monodora myristica*), 'maioba' (*Senna occidentalis*), 'micocó' (*Ocimum viridis*), 'stlofi' (*Momordica charantia*) and many others.

At the human community level there was, over the years, a relative abandonment of traditional practices and alternative medicine, turning to western medicine, through pharmaceutical industry (despising the potentialities of traditional knowledge). It will therefore be essential to improve the development and accessibility of communities to alternative medicine, exploring the production and processing of these plants and species, and encouraging the return to the consumption of such products (once recognized their experimental validation and the authority of who prescribes them), under the fair and equitable share of the economic and social benefits derived from the traditional knowledge and the use of the genetic resources.

The fauna species of São Tomé and Príncipe have not yet been studied in their potential medicinal properties. This could, eventually, be an important branch for the development of traditional medicine in the country.

#### ORNAMENTAL PLANTS AND WILD ANIMALS USED AS PETS

São Tomé and Príncipe have the richest flora of orchids in Africa (Carsten Brühl, 1993), which may be one of the main attractions, considering the valuation of STP ornamental flora. Besides orchids, it must be also emphasized the ornamental value of the following endemic species:

- *Begoniaceae*: *Begonia baccata*, *Begonia subalpestris* and *Begonia thomeana*;
- *Balsaminaceae*: *Impatiens buccinalis*, *Impatiens thomensis* and *Impatiens manteroana*;
- *Pandanaceae*: *Pandanus thomensis* (pau-esteira);
- *Cyatheaceae* (giant foetuses): *Cyathea manniana* and *Cyathea welwitschii*.

São Tomé and Príncipe have soil and climate conditions suitable for the development of several ornamental species of commercial importance, such as orchids, gingers, anthuriums, heliconias and strelitzias.

There are some wild animals used as pets, such as parrots (*Psittacus erythacus*) and parakeets (*Agapornis pullarius*). However, the parrots have conservation and protection status and are covered by CITES. Therefore, efforts should be made to raise awareness and revert this situation, by creating national legislation to control the use of protected species, as pets, as provided for in the protocols and international partnerships.

#### USE OF BIODIVERSITY PRODUCTS IN CRAFTS

Currently an increasingly growing number of men and women are engaged in this activity in São Tomé and Príncipe. The bamboo (*Bambusa vulgaris*) is a species widely used for making craft objects, furniture, roofing, fences, etc. Apart from this, there is a range of plants of great artisanal value, such as coconut palm (*Cocos nucifera*), cedrela (*Cedrela odorata*), 'gogô' (*Carapa procera*) and 'amoreira' (*Milicia excelsa*), among others.

From the biological diversity of forest ecosystems the following raw materials for crafts are extracted:

- Wooden, mainly from cedrela (*Cedrela odorata*) and from 'ocá' (*Ceiba pentandra* var. *guineensis*), for kitchen cutlery, sculptures and canoes;
- Bamboo (*Bambusa vulgaris*) for manufacture of furniture and various other utensils;
- Palm leaves (*Elaeis guineensis* and *Cocos nucifera*), from which 'unha' is obtained for making baskets and bags (*mussuá*, *klissaki*, *kissanda*), brooms, etc.;



"Papagaio" *Psittacus erythacus*. FOTO: FÁBIO OLMO

- Coconut (fruit of *Cocos nucifera*), providing fibers and hard shell for the production of various objects (bracelets, rings, glasses, earrings, ashtrays, mats, etc.);
- Úlua Sheet (*Borassus aethiopum*) provides raw material for the manufacture of bags of various shapes;
- 'Corda de bananeira' (*Musa* spp.) is used for making tables;
- 'Pau-esteira' dry leaves (*Pandanus thomensis*) used to weave mats – one of the most important sources of income of the inhabitants of the southern zone of São Tomé Island, as on the Príncipe Island.

#### ECOTOURISTIC EXPLOITATION OF BIODIVERSITY

Over the past five years, ecotourism has experienced an upward trend in STP. Next are mentioned, as an example, only a few unquestionable references of touristic interest:

- The 'Pico de São Tomé', with 2,024 m altitude;
- Several waterfalls, the most important being the fall of 'São Nicolau', 'Bombaim' and 'Blú-blú';
- Other high peaks, as 'Pico Maria Fernandes', 'Cão Grande' and 'Cão Pequeno';
- Lush and dense vegetation of the altitude primary forest and secondary forest, as well as its flora and endemic birds;
- Slopes covered of green vegetation, exposed in various areas;
- Cocoa and coffee plantations, ordered in instalments bounded by agricultural paths, having inside giant trees, authentic monuments witnessing the lowland rainforests (0-800 m) that had given way to crops;
- Cultural, and even ethnic, diversity of the population, consisting of descendants of former slaves and forced workers, brought during colonial times from the coasts of Central Africa, Guinea, Mozambique, Angola and Cape Verde;

- 'Roça Sundy', the only one with the big house preserved;
- Landscapes, as in 'Praia das Bananas', and viewpoints, as from 'Pico Papagaio', 'Pico Mesa', 'Boné de jóquei';
- Whale watching, at sea, marine turtles, in Príncipe, and birds in internationally important sites, highlighting the 'Tinhosas' Islets.

This economic activity is currently under-utilized and does not have a hierarchically organized (and let alone integrated) management of the offer. Greater potential sites for the development of ecotourism have the following limitations:

- Agricultural paths (deliberately or spontaneously open) are in poor condition, impassable or, merely, disappeared;
- Proper signalling is almost non-existent along the paths, sites and other;
- Most potential natural sites lack environmental information infrastructures (signs, panels, etc.);
- There is no inventory, ranking and publishing of resources;
- Low level of training of human resources for the provision of ecotourism services;
- There are no public facilities (bathrooms, etc.) for visitors;
- There is a lack of development of a sustainable and responsible tourism, and of dissemination, by stakeholders (including tourists), of the policy and strategy information.

Maintenance work of the circuits in Obô Natural Park of São Tomé is extremely important. These well marked circuits provide access to varied landscapes and biotopes. The small groups of bird watching may move without the risk of disturbing them. It is necessary to capacitate the ecological guides, in the fields of ornithology and botany, and the knowledge of the environment should be as high as possible.

The permanent exhibition of photographs, reproductions of birds and endemic plant species, through short films, videos, brochures, etc., should be present in the house-museum of the park. The beekeeping, floriculture, snail farming, butterfly and other insect's collections are activities that should be attractions for the visitors.

In short, it is necessary to appreciate the current elements of interest for all curious, in general, and especially for the tourists more focused on nature and local biodiversity, organizing and managing this row, ensuring quality and safety services to tourists.

### 2.3.2.3. Cultural Value of Biodiversity

From the cultural point of view, many plant species are used for manufacturing musical instruments (which are used by cultural groups, folk orchestras, musical groups, etc. *Tilia platityrsa* ('tabaque'), for example, is widely used for making drums.

In STP forest ecosystems there are some sites that are used to fulfil the superstitious and religious needs of the population, among which are the waterfalls of 'San Nicolau', 'Bombaim', 'Budo Bachana' (giant basalt outcrop), 'Budo Mucego' (basalt outcrop) and the hills 'Muquiqui', 'Saccli', etc.

Composers, singers and painters, use many plant and animal species of these ecosystems as an inspiration, as it is the case of:

- 'Lagaia' – to make mention of a very discreet man;
- 'Flóli canido', 'Losa bilanza' and 'Safu' – to refer to beautiful women.

As the country's symbols are the black kite, known as falcon (*Milvus migrans*), which represents the São Tomé Island, and the parrot (*Psittacus erithacus*), which represents the Príncipe Island.

There is also the owl ('kitoli' – *Otus hartlaubi*), the bat ('fanaliche' – *hipposideros ruber*), the snakes, cats and other animals, used by sorcerers and healers in their 'djambis' and other animist acts.

### ACCESS TO BIOLOGICAL RESOURCES AND EQUITABLE SHARING OF RESSOURCES FROM BIODIVERSITY – NAGOYA PROTOCOL

There has been, over the past decade, a gradual appraisal of biodiversity resources in STP. But its multiplier effect on other branches of the national economy and job creation, at national level, it is not yet satisfactory, due to the predominance of the informal sector and the absence of investment and financing.

Natural forests of the islands have a rich biodiversity of endemic flora and fauna, with exceptional scientific and conservation value; that is why the problem of access to biological resources and equitable sharing of their benefits are of fundamental importance to STP.

The Nagoya Protocol creates greater legal certainty and transparency in the exploitation process of the biological resources, from the countries, by the many multinationals that have come over the years to explore these resources, especially in developing countries.

The engagement of STP in the Protocol will provide financial, technical and scientific means, necessary to help protect our biodiversity, promoting research and guidance to a better survey, management and fair and equitable sharing of dividends from their holdings, with the implicit contribute to poverty eradication and environmental sustainability. Thus, it is urgent its ratification or membership.

## 2.4. MAIN THREATS ON BIODIVERSITY

The country still has a primary forest reserve and a secondary forest, of high quality, under development. However, it has been observed over the course of the country socioeconomic development, certain practices that, associated with hasty policies, have been threatening national ecosystems and exerting strong pressure on biodiversity.

Research by national technical teams, during the NBSAP update process, as well as by several international experts who have investigated the various components of national biodiversity, have shown that the STP ecosystems have been subjected to degradation by humans, with extremely worrying trends for the future biodiversity. The main causes of this deterioration are as follows:

### 2.4.1. LOSS AND DEGRADATION OF HABITATS

#### 2.4.1.1. Large Scale Agricultural Development

In the survey work on the state of biodiversity, held during the year 2013, in order to update the National Biodiversity Strategy and Action Plan, respondents were unanimous in declaring that one of the main factors of the habitat loss, that occurs in STP, is the loss of lowland forests and secondary forests, caused by the opening of previously abandoned agricultural plantation areas, being rehabilitated for new crops.

A prime example is the intensive planting of palm trees, by Agripalma Company, in south São Tomé, that aims to cover a total of about five hectares, spread over seven different areas. By the end of 2013 they had already cut 1.2 thousand hectares, including areas around the buffer zone of the São Tomé Obô Natural Park, where may be find the main habitats of bird species, many of which are endemic and endangered. This project is a major threat to biodiversity, since it promotes intensive agriculture, with serious consequences for the loss of some endangered species habitats.

The opening of areas for introducing palm for the development of palm oil industry will increase the level of disturbance of local wildlife species in three ways:

- The opening of roads inside and around the plantation areas will increase the accessibility to users of forests, including illegal extraction of wood and the increase in hunting activities in sensitive locations that were not visited before.
- The areas of wild species distribution will become more subject to human activities.
- Increased access for uncontrolled logging will lead to significant loss of habitats in the buffer zone around the Obô National Park. Which implies the degradation of ecotone zones.

Still in the context of opening areas for economic activities, it may be noted the provision of around 3,500 ha for the development of cocoa culture. It is not yet made the evaluation of threats posed to native wild species by this new activity, however, the opening of old abandoned areas, in the form of forests that these species adopted as preferred habitat, will influence adversely its subsistence and reproduction, once damaging significantly their habitats.

#### 2.4.1.2. Infrastructures Implementation

Other potentially harmful economic activity for the biodiversity of São Tomé is the future construction of the hydro-electric dam on the river 'lô Grande', in the south of São Tomé. The basin of 'lô Grande' has a significant amount of lowland forest, well preserved, where are the habitats of various animal species, including three species with the status of critically endangered: the woodcock (*Bostrychia Bocagei*), the 'picanço de São Tomé' (São Tomé fiscal – *Lanius newtoni*) and 'anjolô' (São Tomé grosbeak – *Crithagra concolor*). Construction activities will negatively affect the stability of these populations – sensitive as they are – and will enhance the destruction of their habitats.

#### 2.4.1.3. Subsistence Farming, Wooden and Palm Wine Exploitation

The land privatization process for small and medium farmers has led to increased small number of properties, which, in turn, also increased the uncontrolled logging (Melo, 2006). The advance of farming in the more accessible areas of Obô Natural Park, where various crops can be grown in different seasons (Olmos & Turshak, 2007), has led to logging inside the park, which, even in small scale, had a critical impact on areas adjoining to the Park, where the forest is still very well preserved and where even minimal disruptions have ominous effects.



New palm tree (*Elaeis guineensis*) plantations at south S.Tomé. FOTO: L. MONTEIRO

#### **2.4.1.4. Disturbance by Hunt, Catch of Conch and Logging**

According to studies carried out by Olmos & Turshak (2007 and 2010) and Gascoigne *in litt.* (2000), there is a considerable intrusive human presence inside the forests, including in protected areas, namely by hunters, loggers, palm wine producers, snail catchers, healers using traditional medicines, etc., thereby increasing the pressure on populations of the fauna and flora species, endangering the balance of populations, in particular, and of ecosystems, in general.

#### **2.4.1.5. Impact of Invasive Exotic Species on Habitats**

Invasive exotic species are strongly linked to loss and degradation of habitats, by competition for food and space and by predation. Concerning the exotic flora, present in the park, it can be observed an increasingly dense vegetation of weeds in the sub-forest

grove, which will reduce the quality of forest habitat for various species. Also the fauna of introduced species, for consumption, such as pigs, have caused considerable negative impacts on the soil of forests, by revolving the undergrowth and influencing the regeneration of the trees. The apes, in turn, have also changed the vegetation of forests by dispersion of exotic plant seeds.

#### **2.4.1.6. Predation by Exotic Species**

According to studies carried out by Bird Life International, focused on a few species of critically endangered status, predation of adults, juveniles, and nests by exotic mammal species, introduced in São Tomé and Príncipe, such as rats (*Rattus rattus*), monkeys (*Cercopithecus mona*), the African civet (*Civettictis civetta*) and the weasel (*Mustela nivallis*) have had serious impacts on the population and balance of those species. According to Dutton (1994), rats and civets

have colonized the areas of primary forests, including the edges of rivers, and are very likely to have a significant negative effect on nesting birds, devouring eggs and preying juveniles.

#### **2.4.1.7. Incorrect Use of Chemicals**

The wash in the rivers, creeks and streams, of mosquito nets containing chemical products, is the basis for the destruction of the fauna of inland water ecosystems. No less important is the inadequate use of chemicals in agriculture, such as fertilizers, herbicides, fungicides, pesticides and other phytochemicals, and the lack of policies and control measures, which has contributed to large-scale biodiversity loss. There has been a decrease in the number of species of *Eleotris vittata* ('charoco'), as well as *Sicydium bustamantei* (freshwater shrimp), which play an important role in the food requirements of the population, especially of those living in agrarian areas.

#### **2.4.1.8. Degradation of coastal and marine ecosystems**

A number of factors have contributed to degrade the status of coastal and marine ecosystems, among which it should be highlighted the coastal erosion caused by rising sea level, which, associated with the disorganized exploitation of coastal inert, is an important cause of destruction of the breeding grounds of sea turtles. However, also the use, in the territorial waters, of fishing nets with inadequate size, or the use of explosives to catch fish, so as the oil-tankers washing on the high sea territorial waters, with driving waste to coastal areas, have contributed greatly to the destruction of these habitats.

Moreover, capture methods used (too fine mesh nets, explosives, etc.) are progressively contributing to the decrease of fish diversity in our territorial sea waters, as they are undifferentiated fisheries, which catch or kill any kind at any time of their reproductive life.

### **2.5. TRENDS, DRAMATIC SITUATIONS AND IMPLICATIONS ON HUMAN BEINGS WELFARE**

In the analysis of the trends of biodiversity in São Tomé and Príncipe, it was found that the socioeconomic development and the climate change are what most directly influence the welfare of communities.

After the country's independence, in 1975, agricultural enterprises were nationalized and went on to be centrally managed. Given the lack of experience in the management domain, and financial difficulties because of the price variation of the main export product – which is cocoa – on the international market, many agricultural areas have been

abandoned, thus becoming in areas of quite dense forests, and important habitats for several species of fauna and flora.

This abandonment of agricultural land and its transformation into dense forest areas had positive effects in the evolution of STP biodiversity, by increasing the geographic area of available habitat, refuge and food for several species.

However, the repercussions of this abandonment on the welfare of the human population were negative. The financial difficulties have increased the level of poverty in the country, putting about 53% of the population in extreme poverty.

In view of this situation, from the decade of the 90s, the national authorities decided to divide large agricultural companies in instalments, and distribute them to farmers.

According to the data obtained in the 2008 statistics of the Land Reform Office of the Ministry of Agriculture, a gross area of 45,589.34 ha of land was distributed, with 69.7% for small farmers and 30.3% for medium entrepreneurs.

With this important land reform, the problem of lack of available arable land for farmers no longer could be posed. The main problem became the lack of financial resources for their operation.

With this distribution, forest ecosystems began to suffer direct negative impacts, since beneficiaries, who did not have the financial means to develop agriculture, started using the scarce natural resources that they had, which were the trees, with no management or supervision. Since then, there has been an increase in the indiscriminate felling of trees, leaving some species, that predominated in STP forests, in a status of threatened, as in the case of *Milicia excelsa* ('amoreira'ou 'molela'), *Ficus mucuso* ('figo porco'), *Falcataria moluccana* ('acácia mimosa'), *Carapa procera* ('gogô'), *Scytopetalum kamerunianum* ('viro branco') and *Zanthoxylum gillettii* ('marapião').

Other economic activity that has a major influence on biodiversity, and that determine its future trend, is opening up new areas for the introduction of new crops, namely palm and cocoa trees. These areas, abandoned for a long time, had been used as habitats for many species of fauna and flora, many of which are endemic and endangered, and others in situation of critically endangered, as in the case of *Bostrychia bocagei* ('íbis'), *Crithagra concolor* ('enjoló') and *Lanius newtoni* ('picanço'); this is why those initiatives

have called into question the balance and stability of these species.

The trend of biodiversity in these areas is worrisome because, in addition to the agricultural activities, there are also planned future construction of hydroelectric dams in some rivers, running through extremely sensitive areas, and that, in one way or another, will have negative influence on the stability and the balance of the species that live there; but then, these investments will bring social and economic benefits for the population, thereby improving their welfare and, for this, it is essential to find a suitable balance.

It is essential to make studies of environmental impact before any intervention, in order to know and understand the real consequences of a particular action and, since these investments are fundamental to the development of the communities, to find ways and means to minimize these impacts and to compensate those which can not be avoided.

Given the close relationship between climate and biodiversity, the future trend of biodiversity in São Tomé and Príncipe is also determined by how climate change has influenced the various ecosystems and their components.

According to studies, conducted by the University of Cape Town, on the Program on Adaptation of São Tomé and Príncipe to Climate Change (NAPA), in the last two decades the dry season ('gravana') became driest and the season of the rains more humid, which is in line with the changes recorded in the CMAP data (CPC-Merged Analysis of Precipitation) in the country.

The rising temperatures registered in the meteorological data, the rising of the sea level observed by the people who live in coastal areas, the rain decrease, visible in the pluviometric data available, coastal erosion and the advance of the savannah zone in the north of the island of São Tomé, determine serious habitat and ecosystem changes, which influence the evolution of biodiversity. But these events also have direct and fundamental influences on the quality of life of the communities in the country, since they increase floods, with damage or even loss of homes and space for construction, and destruction of plantations and other crops not adapted to the climatic changes taking place.

Therefore, taking into account biodiversity, but also the improvement of the quality of citizens life, it is fundamental to undertake analyses and studies, to assist in understanding the trends and make forecasts

of changes and their impact on ecosystems, to allow for adaptation, trying to minimize their effects where and when that is possible.

### 2.5.1. AGRARIAN ECOSYSTEMS

Climate changes, particularly in the rainfall pattern (with aggravated situations either of excess or lack) and increasing temperature, influence the current situation of the various components of the agrarian ecosystems, with negative impacts in various sectors of agriculture and livestock.

Having in account the specificities of the different sectors of farming activity, it was analysed the extent to which climate elements, under consideration, would contribute to the degradation of the conditions of the various components of these ecosystems, in the context of medium and long term evolution.

Increased precipitation and indiscriminate cutting down of trees, that have occurred in recent times, has led, in some areas of the country – most particularly the south of São Tomé – to an increase of soil erosion, including increased landslides, that lead to loss of soil fertility and consequently the impoverishment of the land used for mixed farming.

In the study of the vulnerability of livestock sector (Baia Dê and Barreto, 2010) – within the scope of the procedure for the preparation of the Second National Communication on Climate Change – the consultants concluded that the temperature rise has caused the proliferation of parasites harmful to animal metabolism efficiency, especially in the pastures productive cycles; on the other hand, in studies, carried out by experts from the University of Cape Town, in 2010, on climate evolution in São Tomé and Príncipe, it was anticipated a very hot period, which foresees that these negative impacts on livestock activities tend to be increasing.

In the agriculture domain, and within the horizon 2040-2060, it was found that the areas currently cultivated with cocoa, and located in zones whose current annual precipitation exceeds 1,800 mm/yr, could become unviable for culture, considering that the trend is for the precipitation values to be less than 1,500 mm/yr, with the aggravating circumstance of the drought periods to be very long. This trend will lead to reduced productivity of existing plantations and pastures, thereby lowering production and, consequently, revenues for farmers and animal breeders. The farming plots eventually located outside the thresholds of acceptable rainfall for crops, (1,500 mm/yr for cocoa) may become unviable for exploitation.

The confirmation of the forward-looking statements, in terms of the impact of the above mentioned climate change, would pose serious consequences to the socioeconomic development of the country, being reflected in the economic performance of the largest agricultural export product, given that their contribution to the country's GDP is around 18% (INE, 1999) and amount to 95% of the exports.

The chart below shows the cocoa export scenarios with (green) and without (red) the influence of climate change.

The study also estimated that, apart from cocoa culture, as one of the important components of the agrarian ecosystem, adverse effects on crops, such as maize, due to decreased precipitation, have been quite fast and remarkable, because corn, as regards water needs, is considered one of the most demanding crops, particularly in the so-called critical period, corresponding to the time of flowering and immediately after this. Maize water needs are estimated to be approximately 5.2 to 5.5 mm/day. Therefore it can be expected that the trend for this agrarian ecosystem component can also reveal some disruption, as a result of the climate change in progress.

Given the close relationship between corn crop and livestock farming, with emphasis on poultry – which

constitute one of the fundamental bases of economic livelihood and food security of the STP population – it can be concluded that this eventual deterioration of maize production, will negatively influence the standard of living and welfare of the STP population, especially in agrarian areas.

Land reform also allowed for a significant increase in the number of small private breeders, as a result of the disappearance of large agricultural companies in the country. About 3,000 ha of land are natural rangeland, essential for animal feeding. However, the business of raising animals is concentrated in a limited number of animals, particularly cattle, pigs, sheep, poultry and goats. Currently, the livestock sector has about 11,783 breeders, 50% of which are women. Taking into account the importance of the Agrarian Ecosystems, and its various components for the STP population welfare, the anticipated negative impact of climate change may also influence, very significantly, the future and well being of this population.

### 2.5.2. INLAND WATERS ECOSYSTEMS

São Tomé and Príncipe have a high water potential, made up of more than 50 streams, fed by relatively high rainfall rates, ranging from 1,000 to 5,000 mm/yr. These streams have a total volume of water estimated at 410.55 millions m<sup>3</sup>, according to recent

### COCOA EXPORT SCENARIO (2004-2065)



Source: Direcção do Comércio, 2009

studies conducted by “CECI Consultants, Inc.” (a company of the Republic of China-Taiwan), in June 2009.

Of the available hydric potential, about 4.93% is used in agriculture, 2.98% in hydroelectric production, 0.45% to supply the population, and the remaining 91.64% have not defined use. These resources are distributed unevenly, exposing certain regions to water shortages and other to excess and waste.

Another negative consequence on biodiversity, of the expected decrease in water flows, lies in increased mortality and migration of animal species. The construction of artificial lakes, dams and reservoirs, in order to store water from rivers, to increase the capacity of water reserves, are effective preventive measures that must be implemented fairly quickly and, above all, under adequate measures of sustainable management of natural resources.

Taking into account the direct link that exists between the various ecosystems, its components and the species of flora and fauna in particular, the trend in the future of water resources in the country also reflects the future of the national biodiversity trend. The decrease in rainfall, that brings a reduction of hydrographical flows, will also bring, in the future, a sharp deterioration of STP biodiversity and, with it, the degradation of the standard of living and welfare of the population, which makes imperative to implement measures to offset and minimise these predictable impacts.

### 2.5.3. MARINE ECOSYSTEMS

According to studies conducted by ORSTOM/SGTE (April to October 1982), and campaigns by oceanographic ships of the Soviet Navy (March 1983 and February to March 1986), the fishery potential of the area for artisanal fishing is about 8,500 t/yr for coastal pelagic species (being 1,500 t in São Tomé and 7,000 t in Príncipe) and 3,500 t/yr for demersal species (being 1,500 t in São Tomé and 2,000 t in Príncipe). However, given the time elapsed since then and the most probable decrease of fish population, it is essential that these data be reviewed and updated.

This halieutic potential, which stresses the marine biodiversity in STP, has suffered a certain degradation, mainly due to lack of official control of fishing activities by foreign companies and local fishermen, who often use very fine mesh nets, explosives, and

other non legal methods of capture, which are direct factors for contamination and destruction of marine habitats.

Despite the impact of local traditional fishing to be low, there is however an ever growing need to increase the number of fishermen, which leads many of them to use less legal methods, but which allow an increased amount of catching in less time (explosives, fine mesh nets, ‘brisa’ nets, etc.), promoting an increase in income but also contributing to the destruction of habitats and the decline of marine population. It is, so, essential to control local fishermen, taking into account the fishing methods used and the species caught.

In addition to the degradation of national fishery resources, by fishing activities undertaken by foreign companies, the phenomenon of climate change also influence the future of marine biodiversity trends. As part of the study on the future climate in São Tomé and Príncipe, carried out by the Cape Town University, we reached the conclusion that the temperature increase, estimated in 2,25 °C, would influence the reduction of surface marine resources on the time horizon of 2040-2060.

The results of a fisheries campaign, carried out in the Gulf of Guinea (FAO, 1999), and studies of the FAO/UNDP/Project GLO 92/013 (1999), have put in evidence a close link between biomass migration in depth with an increase in surface temperature of the ocean waters. This scenario of increased surface temperature of ocean waters is reflected, according to the experts, in a decrease of fish production in the coastal waters of STP, and stresses the need for fishermen to find new technologies that allows them to carry out fishing at a depth of more than 60 meters.

### 2.5.4. COASTAL ECOSYSTEMS

In the ecosystems of the coastal areas of STP, three different zones can be distinguished, each one with its own characteristics and organisms. The most peculiar is the transition zone, which contains brackish water and mangroves. In one side lies the mainland, the terrestrial ecosystem, and in the opposite side the sea, home of the marine ecosystem.

In the transition zone, there are small reserves (near the beaches or even in rocky holes), which are microsystems that are real nurseries for different marine or costal organisms, such as gastropods (in Rolas Islet – south of São Tomé), fishes (*Holocentrus*

*adscensionis* – ‘khaki’), and octopuses. In fact, mangroves are home to *sui generis* ecosystems, and form a buffer zone between land and sea and, with its flora and fauna, play a role of balance and purification of the coastal environment.

There are five endemic species of endangered sea turtles that use the STP coastal zone for their spawn, as well as several seabirds whose preferred habitat is the mangrove. There are also endemic birds of the coastal fauna, such as the *Passeriformes*, *Lamprotornis ornatus* (‘choucador do Príncipe’) and *Dicrurus modestus* ssp. *modestus* (‘rabo de peixe’ ou ‘drongo do Príncipe’).

As regards the phenomena related to climate change, the rising sea water level is, undoubtedly, the cause of one of the biggest impact in the coastal zone, with direct bearing on biodiversity. This same cause will contribute to the loss of potential spawning areas of sea turtles, as well as the loss of the main areas of the country mangroves, thus reducing the breeding grounds for many species, some of which are considered endangered.



Flood in the mouth of the Contador River. FOTO: ARLINDO CARVALHO

## **2.6. PROGRESS ACHIEVED ON PERSUING THE TARGETS OF 2010-AICHI AND ON THE ACTION PLAN IMPLEMENTATION**

Given that over the years there has been an evident loss of biodiversity, the Convention on Biological Diversity, at its 10th Conference of the Parties (COP10), held in Aichi (Japan, 2010), established goals that must be achieved by the Parties, known as the Aichi Biodiversity Targets. There are twenty goals included in five main strategic objectives.

Many were the activities undertaken for the conservation and sustainable use of biodiversity. However, STP has not yet prepared the national indicators to effectively assess the impact, over the past few years, of the activities for conservation and sustainable use of biodiversity. In STP, the progress made in relation to the 2010 objective, which consists

of a significant reduction of the current rate of loss of biodiversity, are quite significant. In this context, one can mention the creation of protected areas, education on environment, adoption of legislation in the field of biodiversity, the integration of biodiversity into sectorial policies and the classification of Príncipe Island as a UNESCO World Reserve.

Although there have been considerable progress in terms of biodiversity conservation, there are still some challenges concerning the degradation of biodiversity. Hence, it is necessary the participation of all actors in the process of conservation.

Table No. 28 presents some undertaken activities, which respond directly or indirectly to global and/or national targets to meet the 2010 objectives.



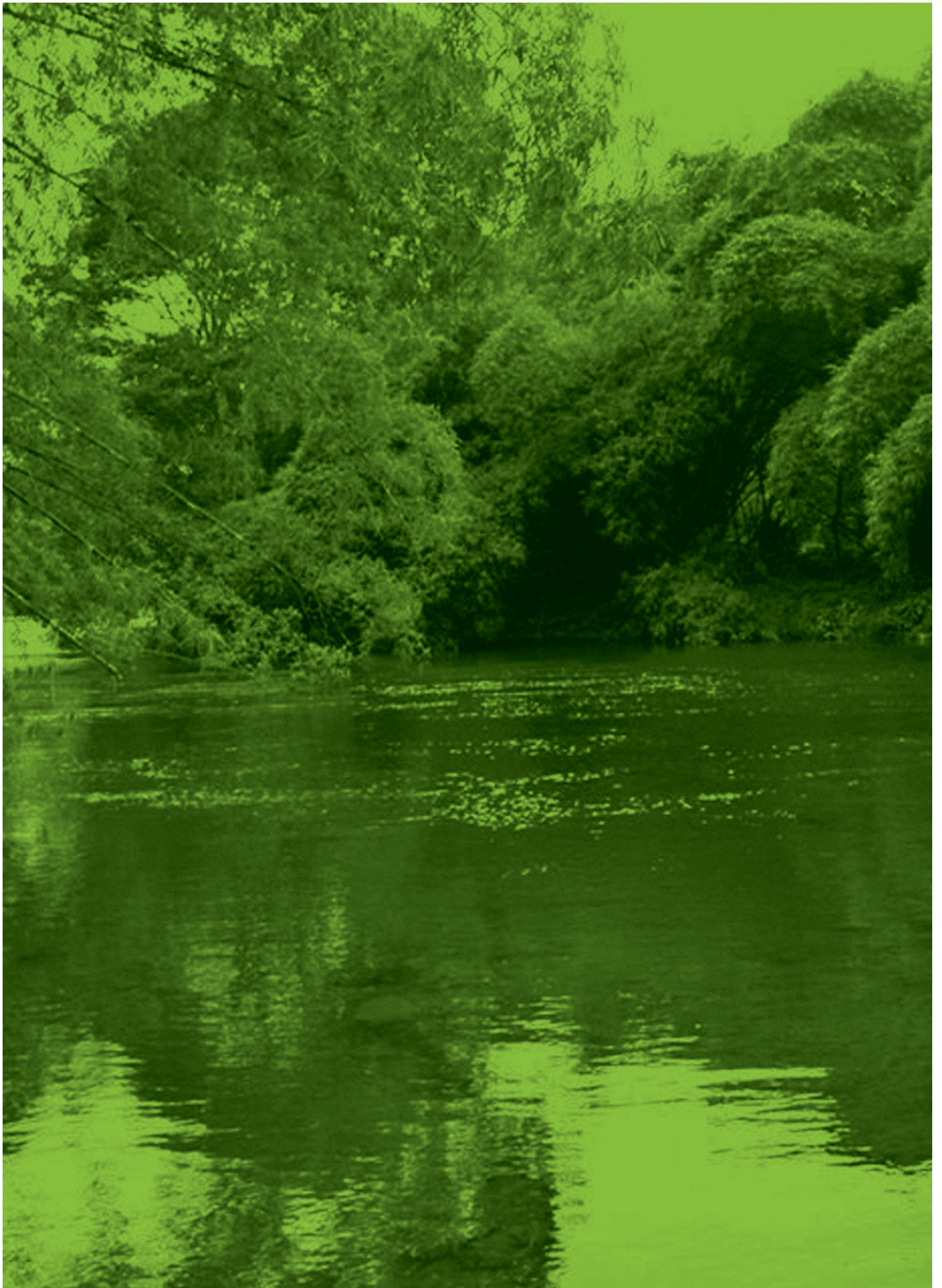
Botanical Garden. FOTO: L. MONTEIRO

**TABLE 3 – PROGRESS ON PURSUING THE AICHI BIODIVERSITY TARGETS 2010**

OBJECTIVES AND GLOBAL TARGETS	PROGRESS MADE AND TO BE CARRIED OUT
<p><b>Strategic objective A: Address the root causes of biodiversity loss, approaching biodiversity together with the government and society (Goals 1 to 4)</b></p>	
<p>Target 1: By 2020, at the latest, people will be aware of the values of biodiversity and the steps that can be taken for its conservation and sustainable use.</p>	<ul style="list-style-type: none"> <li>• Conducting communication and awareness programs, using the mainstream media (newspapers, radio and television, social networks, etc.) to promote awareness of the biodiversity value.</li> <li>• Increased awareness of citizens about the importance of preserving the natural heritage of Obô Natural Park.</li> </ul>
<p>Target 2 In 2020, at the latest, biodiversity values had been integrated into national and local development, poverty reduction strategies and planning processes, and had being incorporated into national accounting, as appropriate, and into information systems.</p>	<ul style="list-style-type: none"> <li>• The Government has recognized the need to strengthen aspects relating to biodiversity in government action, to ratify the CBD and to implement Projects ECOFAC, GEF-5, etc.</li> <li>• Definition of about 30% of the territory of the country as “important area for biodiversity”.</li> <li>• Adoption of Administration and Management Plans of the Obô Parks of São Tomé Island and Príncipe Island.</li> </ul>
<p>Target 3 In 2020, at the latest, biodiversity eventually harmful subsidies, had been eliminated or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity had been developed and applied consistently, in harmony with CBD and other relevant international obligations, taking into account national socioeconomic conditions.</p>	<ul style="list-style-type: none"> <li>• Definition of a plan for identification of incentives</li> </ul>
<p>Target 4 In 2020, at the latest, governments, companies and stakeholders, at all levels, had taken steps to achieve, or have plans in place for, sustainable production and consumption, and had kept the natural resource use impacts well within safe ecological limits.</p>	<ul style="list-style-type: none"> <li>• Implementation of projects on organic farming</li> <li>• Promotion of aquaculture to better management of fishery resources</li> <li>• Adoption of legislation on the conservation of flora and fauna and protected areas.</li> <li>• Training on the best techniques for the production of honey and charcoal firewood and other natural resources</li> </ul>
<p><b>Strategic objective B: Reduce direct pressures on biodiversity and promote its sustainable use (5 to 10)</b></p>	
<p>Target 5 In 2020, at the latest, the rate of loss of all natural habitats, including forests, will be at least half, and possibly brought close to zero, and their degradation and fragmentation had been significantly reduced.</p>	<ul style="list-style-type: none"> <li>• Príncipe Island election, in 2011, as UNESCO Biosphere Reserve;</li> <li>• Enforcement of the Forest Act;</li> <li>• Creation of STP protected areas, covering about 30% of the country territory, including the Obô Natural Parks of São Tomé Island, with 20,000 ha, and of Príncipe Island, with 8,500 ha, the Integral Reserve of Tinhas Islets, with 15 ha and the reserve of Rolas Islet, with 6 ha;</li> <li>• In 2014, the country participates in REDD+ and obtained the certificate of Reduction of the Emissions by Deforestation and Forest Degradation;</li> <li>• <i>In situ</i> and <i>ex situ</i> genetic biodiversity conservation;</li> </ul>
<p>Target 6 By 2020, at the latest, all fish, invertebrates and aquatic plants are managed and harvested sustainably, legally and applying ecosystemic-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 fishing on populations, species and ecosystems will be within safe ecological limits.</p>	<ul style="list-style-type: none"> <li>• Law of Fisheries and Fishery Resources enforcement;</li> <li>• Training and awareness actions on fishery impacts on species and ecosystems;</li> <li>• In 2016, will be reduced the destructive fishing practices through awareness campaigns for fishermen;</li> <li>• Achievement in 2016 of the in-depth study of marine biodiversity;</li> <li>• Control and regular monitoring of fishing activities;</li> <li>• In 2016 will be adopted a Recovery Plan of Degraded Ecosystems.</li> </ul>

OBJECTIVES AND GLOBAL TARGETS	PROGRESS MADE AND TO BE CARRIED OUT
<p>Target 7 By 2020, at the latest, the areas of agriculture, aquaculture and forestry will be managed sustainably, ensuring conservation of biodiversity.</p>	<ul style="list-style-type: none"> <li>• Development of organic farming;</li> <li>• Implementation of various projects of reforestation with tree species of commercial value;</li> <li>• Implementation of projects on resilient agriculture and livestock;</li> <li>• Large projects in the fields of agriculture, aquaculture and forestry will be submitted to EIA;</li> </ul>
<p>Target 8 In 2020, at the latest, pollution, including from excess of fertilizers and pesticides, had been lowered to levels that are not detrimental to the ecosystem's function and to biodiversity.</p>	<ul style="list-style-type: none"> <li>• In 2016 the main sources of pollution that harm ecosystems and species will be evaluated;</li> <li>• Studies on the pollution of Água Grande River and the Bay of Ana Chaves in 2016;</li> <li>• Raising awareness initiatives about marine and land pollution;</li> <li>• Raising awareness on the use of treated mosquito nets;</li> <li>• Concrete actions of cleaning and decontamination.</li> </ul>
<p>Target 9 In 2020, at the latest, invasive alien species, and their paths, are identified and, according with the priority, species will be controlled or eradicated, and measures will be in place to control paths, in order to prevent eventual introductions and settlements.</p>	<ul style="list-style-type: none"> <li>• Entry and exit control, in ports and airports, to species with special relevance to the internal traffic. Training of customs officials and tax police on invasive alien species;</li> <li>• Carry out studies on the control of invasive competitive species.</li> </ul>
<p>Target 10 In 2015, the multiple anthropogenic pressures on coral reefs and other vulnerable ecosystems affected by climate change or ocean acidification should be minimized, so as to maintain their integrity and normal functioning.</p>	<ul style="list-style-type: none"> <li>• Realization of awareness campaigns on the importance of coral reefs and other vulnerable ecosystems;</li> <li>• Realization of beach cleaning campaigns;</li> <li>• Create more marine protected areas;</li> <li>• For the year 2017 the situation of the major reef-building corals in the country will be assessed.</li> </ul>
<p><b>Strategic objective C: Improve the status of biodiversity by protecting ecosystems, species and genetic diversity (11 to 13)</b></p>	
<p>Target 11 In 2020, at least 17% of inland water areas, and 10% of coastal and marine areas – especially areas of particular importance for biodiversity and services of the ecosystem – will be adequately preserved, in a broad perspective of the whole country environment, under an approach of continuity, which takes into account the sustainability of the transition zones.</p>	<ul style="list-style-type: none"> <li>• Creation of STP protected areas covering about 30% of the country territory;</li> <li>• Creation of the Integral Reserve of Tinhosas Islets, with a surface of 15 ha, and Rolas Islet Reserve, with an area of 6 ha;</li> <li>• Principe Island election as a Biosphere Reserve;</li> <li>• Implementation of projects for the protection of coastal areas;</li> <li>• Participation in regional projects for the protection of marine and coastal ecosystems.</li> </ul>
<p>Target 12 By 2020, at the latest, the extinction of known threatened species is prevented, and their conservation status will be improved, especially of those most endangered.</p>	<ul style="list-style-type: none"> <li>• Guide of STP birds (accomplished);</li> <li>• Sea turtle conservation program;</li> <li>• Sharing of information on certain endangered species;</li> <li>• Updating of the National Red List of threatened species.</li> </ul>
<p>Target 13 In 2020, at the latest, the genetic diversity of cultivated plants, farm animals, pets and wild species, including species of socioeconomic and cultural value, is maintained, and strategies have been developed and implemented to minimize genetic erosion and safeguarding their genetic diversity</p>	<ul style="list-style-type: none"> <li>• In 2016, inventory of plant genetic resources</li> <li>• Establishment of protected areas for <i>in-situ</i> conservation of the autochthonous agnetic resources.</li> </ul>
<p><b>Strategic objective D: Increase the benefits of biodiversity and ecosystem services for everyone (14 to 16)</b></p>	
<p>Target 14 By 2020, ecosystems that provide essential services, including water-related services, and contribute to the health, living conditions and welfare, are restored and protected, taking into account the needs of indigenous and local communities, particularly the women and the poor and vulnerable.</p>	<ul style="list-style-type: none"> <li>• For the year 2015, the ecosystem services with particular interest to the poorest and most vulnerable will be identified.</li> <li>• STP will be included as a membership to CITES</li> <li>• STP membership to the Bonn Convention on the Conservation of Migratory Species of Wild Animals (CMS)</li> <li>• STP membership to the Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (RAMSAR).</li> </ul>

OBJECTIVES AND GLOBAL TARGETS	PROGRESS MADE AND TO BE CARRIED OUT
<p>Target 15 By 2020, ecosystem's resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15% of degraded ecosystems, thereby contributing to climate change mitigation and to adaptation and fighting desertification.</p>	<ul style="list-style-type: none"> <li>• For the year 2017, the country will have formulated measures to increase the resilience of natural ecosystems</li> <li>• In 2016, all information on the contribution of the major ecosystems in the fight against desertification will be compiled</li> <li>• Implementation of farming projects in Lobata district</li> <li>• In 2016, implementation of the project on resilient livestock.</li> </ul>
<p>Target 16 In 2015, the Nagoya Protocol on "Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising from their Utilization" is in force and operational, in accordance with national legislation.</p>	<ul style="list-style-type: none"> <li>• Implementation, in 2015, of a campaign of dissemination and awareness of the Nagoya Protocol</li> </ul>
<p><b>Strategic objective E: Enhance implementation through participatory planning, knowledge ,management and training (17 to 20)</b></p>	
<p>Target 17 In 2015, each Party has developed, adopted as a policy instrument, and began to implement, an effective, participatory and updated National Biodiversity Strategy and Action Plan.</p>	<ul style="list-style-type: none"> <li>• Until 2015, the NBSAP was implemented with broad participation of all involved sectors, and has been a policy instrument for the conservation and sustainable use of biodiversity, starting the implementation of a National Strategy in accordance with an effective, participatory and updated Plan of Action</li> <li>• Integration of biodiversity conservation into national development policies</li> </ul>
<p>Target 18 In 2020, traditional knowledge, innovations and practices of indigenous and local communities, relevant to the conservation and sustainable use of biodiversity, and their customary use of biological resources, have been respected – subject to national legislation and relevant international obligations – and fully integrated and reflected in implementing the CBD, with the full and effective participation of indigenous and local communities, at all relevant levels</p>	<ul style="list-style-type: none"> <li>• In 2015 will be carried out an inventory of traditional knowledge and practices, in collaboration with local communities.</li> <li>• Valorisation of traditional medicine</li> </ul>
<p>Target 19 By 2020, knowledge, science and technologies relating to biodiversity, its values, functioning, status and trends, and its preservation will be improved and as widely shared, transferred or applied as convenient.</p>	<ul style="list-style-type: none"> <li>• For the year 2017, the participation of academic entities and other biodiversity research organizations will be increased</li> <li>• Publication of books on medicinal plants of STP</li> <li>• In 2015, establishment of the CHM (information exchange centre on biodiversity): e.g. <a href="http://www.stp.chm-cbd.net">www.stp.chm-cbd.net</a></li> </ul>
<p>Target 20 Until 2020, at the latest, the mobilization, from all sources, of financial resources for the effective implementation of the "Strategic Plan for Biodiversity 2011-2020", in accordance with the agreed and consolidated process for the Resource Mobilization Strategy, should increase substantially from current levels. This will be subject to contingent changes to face the need of resources, as reported by Parties.</p>	<ul style="list-style-type: none"> <li>• In 2016, will be held a support campaign for the implementation of NBSAP II, in order to follow the Strategic Plan for Biodiversity 2011-2020.</li> </ul>





### **3. NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN**

- 3.1. APPRAISAL OF THE ACTION PLAN  
FOR BIODIVERSITY CONSERVATION,  
AS INSERTED IN NBSAP I**
- 3.2. STRATEGIC GUIDELINES FOR THE CONSERVATION  
OF BIOLOGICAL DIVERSITY**
- 3.3. ACTION PLANS**
- 3.4. LOGICAL FRAMEWORK OF INTERVENTION  
(IMPLEMENTATION, MONITORING AND  
EVALUATION)**
- 3.5. FUNDING STRATEGY**

### 3. NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

#### 3.1. APPRAISAL OF THE ACTION PLAN FOR BIODIVERSITY CONSERVATION, AS INSERTED IN NBSAP I

Broadly speaking, during the period of time between the establishment of the first National Biodiversity Strategy and Action Plan and the present time of preparation of the Second Strategy, big changes were not registered, concerning measures and projects to preserve, in an effective way, ecosystems and all elements integrating biodiversity.

Some projects have been implemented and others are in progress, as for example: The project AAP – “Adaptation to Climate Change in Lobata” - finalized in December 2012, the “Adaptation Project to Climate Change in Coastal Zones” and the project “Ecosystem Approach to Maintenance Conservation, and Biodiversity Management, in the Obô Natural Park of São Tomé and the Natural Park of Príncipe Buffer Zones” whose implementation finishes in 2016.

By the continuing worsening of field conditions that lead to the degradation of many ecosystems, threatening its fauna and flora elements, we may conclude that the accomplishment of the implemented projects, combined with other actions taken by the forest authorities (reforestation and plantations, control and supervision of forestry) have not been sufficient to mitigate and reverse the problematic situation of the state of conservation of natural resources.

All this means that the issue of conservation of ecosystems in São Tomé and Príncipe, including their biological resources, keeps almost unchanged, with obvious signs of deterioration.

It was not possible to implement all the measures proposed in the First NBSAP. However, important steps were taken, in particular, with the establishment of 30% of the country territory as protected areas, and the inclusion of Príncipe Island in the UNESCO Biosphere Reserve.

#### 3.2. STRATEGIC GUIDELINES FOR THE CONSERVATION OF BIOLOGICAL DIVERSITY

In order to establish an outlook that transcends the current horizons, and thus set targets at a distance in the future, in order to take into account capacity building and increased efforts, STP enunciated and has committed with a global vision for the conservation of biological diversity:

Until 2020, STP should strengthen the institutional and human capacities in order to promote diversified economic development, which will contribute directly and indirectly to the conservation of biodiversity, thus combining socioeconomic development of communities with the preservation and conservation of biodiversity, in a sustainable way.

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To support this vision, the strategy also specifies actions corresponding to the three fundamental objectives of the Convention on Biological Diversity:

- Conservation of biological diversity, at all levels (genes, species and ecosystems);
- Sustainable use of biological resources;
- Fair and equitable sharing of benefits generated by the use of resources.

A ranking of each of the above objectives gave rise to the following sub-objectives:

- For the conservation of biological diversity:
  - Strengthening *in situ* conservation;
  - Strengthening *ex situ* conservation;
  - Raise awareness, training and organization;
  - Standardization of information on existing projects.
- For the sustainable use of biological resources:
  - The valuation of biodiversity;
  - Awareness, education and communication;
  - Make known to preserve;
  - National legislation and supervision on the use of natural resources.
- To the fair and equitable sharing of benefits arising from the use of biological resources:
  - Strengthening the institutional and legal framework;

- The implementation of mechanisms for access and fair and equitable sharing of biological resources, at national and international level.

Given these objectives, five strategic areas were identified. These are the different approaches and forms of intervention that will be implemented to address the problems identified at the time of diagnosis of the situation, analysed and reconfirmed, in a participatory manner, at the “national validation workshop”. These strategic areas are:

- The conservation of marine and coastal ecosystems;
- The conservation of the inland waters ecosystems;
- The conservation of the forest ecosystems;
- The conservation of the agrarian ecosystems, and;
- Strengthening the institutional, legal and socioeconomic framework, that will intervene as a crosscutting theme in all areas.

While meeting the specified time frame - in strategic terms, by the year 2020 - the duration of the measures and recommended projects, under each of the above referred strategic areas, shall not exceed five years, taking into account the imperatives of a practical action and properly framed in time and subject to constraints - both in terms of funding and safe predictability - when being a problem as complex and dynamic as it is the biodiversity and its conservation.

Thus, the current Plan of Action includes measures of a preliminary nature, which should naturally find continuity for further action, in close dependence of prevalent organizational and financial conditions, and it is essential to make efforts to ensure continuity for long-term plans and strategies, thereby ensuring real consequences in biodiversity conservation and ecosystem preservation, and at the same time not neglecting the sustainable socioeconomic development of STP communities

### 3.2.1. STRATEGIC AXIS “CONSERVATION OF COASTAL AND MARINE ECOSYSTEMS”

#### JUSTIFICATION

- The vulnerability and fragility of coastal areas impose the need for an appropriate use of its spaces, especially when each day became more visible the negative effects of human pressure on both the physical space and the natural resources existing there. The disorderly occupation of coastal areas, and the

non-sustainable way the existing resources are used, accelerates the erosion process in these areas, as well as the degradation of the biological components of its ecosystems. An example of this degradation is given us by the way turtles are hunted, and their eggs collected, in addition to the destruction of their breeding areas, caused by the unregulated exploitation of sand, on the beaches.

- Although previous actions for the protection of these species have already been undertaken, they continue to be hunted indiscriminately. Thus, it was created, in April 2014, the decree on the capture and commercialization of sea turtles, whose aim is to protect this species and strengthen the enforcement of the Fisheries Act and its Regulations.
- The weakness of the inspections and monitoring of fishing activities in STP territorial waters has allowed the uncontrolled capture of several species, jeopardizing the very existence of the same. The lack of control over the fishing units, especially with regard to the type of used artefacts, has facilitated particularly the capture of non-authorized size fish, thus leading to unsustainable use of this resource.
- The unregulated and unsustainable exploitation of fishery resources affects economically, directly on the population, by promoting on the one hand the reduction of their income, and on the other hand the increase in purchase prices.
- Despite the existence of a law on fishing, the lack of means to make the monitoring and inspection of fishing activities in STP EEZ, has resulted in the degradation of halieutic resources and an inadequate exploitation of marine biodiversity. It is therefore urgent to strengthen both regulatory and material means to enforce the law, in order to enabling that marine resources are exploited in a sustainable manner.
- Lack of knowledge about the characteristics of national fishery resources is also preventing the adoption of a policy for sustainable management of these resources, which accelerates their degradation. The conservation of marine biodiversity and its ecosystems require the scientific knowledge of its components, which serve afterward to proper ground for the whole process of prioritization, planning, organization and overall coordination of actions to be undertaken, in this case, with the active and responsible participation of all those involved.

## FUNDAMENTAL OBJECTIVE: THE CONSERVATION OF COASTAL AND MARINE ECOSYSTEMS AND THEIR BIOLOGICAL DIVERSITY

### **SUB-OBJECTIVE 1: Strengthening of *in situ* conservation, comprising the following:**

1. Spatial ordnance of coastal area and sustainable management of its resources;
2. Strengthen the studies and projects in order to understand and learn more about marine ecosystems and their biodiversity;
3. Awareness of people residing in coastal areas;
4. Monitoring measures for the protection and conservation of coastal areas.

### **SUB-OBJECTIVE 2: Strengthening of *in situ* conservation, in which the following actions are inscribed:**

1. Creation of a national and regional marine park;
2. Implementation of protected marine areas, in both islands, where control of catches and fisheries inspection are made, thereby contributing to a sanctuary where fish stocks can reproduce, to be caught later when adults, after reproduction;
3. Studies on halieutic marine resources;
4. Sustainable management of the STP EEZ;
5. Protection of sea turtles;
6. Protection of cetaceans;
7. Implementation of scientific research projects on the population of present cetaceans in STP waters;
8. Census of seabirds in the islets;
9. Implementation of protection measures for seabirds, with control of hunting and disturbance of nesting areas.

### **SUB-OBJECTIVE 3: Strengthening the institutional framework, through:**

1. Strengthening of inter-sectorial actions, of the various institutional frameworks, in the field of conservation and sustainable management of the marine and coastal ecosystems;
2. Implementation of a supervisory action plan, endowed with its own funds and/or external financing, ensuring monitoring and inspection.

*Note: The main actions to put forward these objectives are contained in section 3.3.1*

### **3.2.2. STRATEGIC AXIS "CONSERVATION OF THE INLAND WATERS ECOSYSTEMS"**

#### **JUSTIFICATION**

- STP has a relatively dense hydrographical system, characterized by the irregularity of the regime and the features of the various waterways that comprise it. It is around this water-streams network that arise humid ecosystems, where it can be highlighted a rich biodiversity, with many species of both fauna and flora, some of them endemic and priority for protection, and where it can be seen a unique beauty of landscapes and extremely important areas for the livelihood of human population, given their use of this ecosystem.
- However, despite their importance, no wetland is ranked nationally as a protected area, notwithstanding its wealth of biodiversity. On the contrary, some economic activities tend to endanger aquatic ecosystems,

threatening alarmingly biological resources existing there.

- Lack of knowledge about the characteristics of the biological resources of inland waters prevents from the adoption of a policy of sustainable management of these resources, aimed to its recovery and promotion.
- The inventory and evaluation of the aquatic environments is essential, in order to identify the ecosystems and their components, and will increase the knowledge of the fresh water resources and, consequently, allowing for more appropriate measures for their conservation, recovery and sustainable use.

## FUNDAMENTAL OBJECTIVE: THE CONSERVATION OF INLAND WATERS ECOSYSTEMS AND THEIR BIOLOGICAL DIVERSITY

### **SUB-OBJECTIVE 1: Strengthening of *in situ* conservation, which will feature the following actions:**

1. Conservation of biological resources and its diversity in inland waters;
2. Preparation of studies on the fauna of inland waters;
3. Preparation of the management plan for the marshy areas;
4. Creation of protected areas in humid ecosystems.

### **SUB-OBJECTIVE 2: Strengthening the institutional framework, whose action will comprehend:**

1. Strengthening of inter-sectorial actions, of the various official institutions, in the domain of conservation and sustainable management of inland waters.

*Note: The main actions to put forward these objectives are contained in section 3.3.2*

### **3.2.3. STRATEGIC AXIS “CONSERVATION OF THE FOREST ECOSYSTEMS”**

#### **JUSTIFICATION**

- STP forests are endangered due to uncontrolled exploitation to which they are subject. Fires triggered in an uncontrolled manner, as well as the indiscriminate logging, often affect even the areas of permanent forest vocation.
- With the implementation of the privatization policy of agricultural land, and the delivery of considerable tracts of land to small and medium farmers, farmers use the existing trees, in their plots, as an immediate financial resource to solve their economic problems (as it is the case, for example, in extensive logging) and, so, there is no sustainable managements with long-term goals. This phenomenon, besides leading to a drastic decrease of timber species of high commercial value, accelerated land degradation, destruction of habitats of many species, degradation of watersheds, reduced rainfall and deterioration of the quality of life of the agrarian population, thus compromising the development prospects.
- As a renewable resource, forests can be managed sustainably, consistent with the protection of the environment. For this purpose, it is necessary that urgent action be taken, in order to preserve these resources and give communities a better understanding of the long-term value of forests.
- The population living in agrarian areas, especially in the surroundings of protected areas, do not have economic means able to liberate themselves from the need to put pressure on the natural resources available in the protected areas. Having not other alternatives, its members are dedicated particularly to hunting, farming and logging,

using, for that purpose, inadequate technics, particularly incompatible with the preservation of the concerned areas; so, it is fundamental to implement economic development strategies for the communities involved, in order to find economically viable alternatives to both the livelihoods of communities and the forest resources.

- The sustainable management of protected areas must include the participation of local people, in order to assure the controlled use of available biological resources, as well as a more equitable distribution of the resulting benefits.
- Even the farming, the forestry and the livestock landscape are in a degradation trajectory, under the combined effect of soil erosion, anarchic logging, reduced fallow periods, cultivation on fragile lands (particularly sensitive to erosion), and the consequent fertility reduction.
- In fact, the adequate recovery of the vegetation cover, entails carrying out reforestation actions on a large scale, according to controlled and properly phased programs, which, however, do not neglect the real needs in terms of food security and the development of other crops, including for export. Reforestation programs become always very lengthy and very expensive, so it is essential the commitment of the people to the program's objectives, especially those closest to the damaged areas, in order to obtain satisfactory results and ensure its sustainability.
- The official concerned sectors do not currently have any reliable information on the distribution and number of wild animal species in STP. The strong pressure on them and the lack of species population data limit the effectiveness of all exercises designed to conserve, or to promote the sustainable management of these resources.

- Wild species are hunted in the country throughout the year, not respecting their natural life and reproduction cycles.
- The Botanical Garden and Herbarium, located in the area of Bom Sucesso, should be the main research laboratory, in the area of botany, in STP. The reduced area allocated to them tends to limit the addition of new species, mainly endemic, which deserve special attention. The STP culture, based on traditional knowledge, traditionally played a very protective role, giving particular importance to environment and enhancing ecosystems. The population was aware of the importance of the knowledge related to the practice of conservation of ecosystems, flora and fauna, valuating not only its economic relevance, but also its social and cultural aspects. This is however a value that

is being lost, occurring now a misconception of forest ecosystems, concerning its medicinal and traditional uses.

- Access to traditional knowledge is of great importance for the conservation of biodiversity and the sustainable use of its resources. It is crucial that these traditional knowledge and techniques be updated, so that they can be associated with knowledge and modern techniques, engaging local communities in the protection and sustainable management of biodiversity resources.

## FUNDAMENTAL OBJECTIVE: THE CONSERVATION OF FOREST ECOSYSTEMS AND THEIR BIOLOGICAL DIVERSITY

### **SUB-OBJECTIVE 1: Strengthening of *in situ* conservation, which will feature the following actions:**

1. Awareness of the population residing in the vicinity of protected areas;
2. Monitoring protection and conservation measures of protected areas;
3. Perpetuation of coherent policies and funding for protected areas;
4. Reforestation of degraded areas.

### **SUB-OBJECTIVE 2: Strengthening *ex situ* conservation, which will include the following:**

1. Creating an arboretum;
2. Enlargement and enrichment of the botanical garden and herbarium;
3. Creation of a germplasm bank of endemic and indigenous species;

### **SUB-OBJECTIVE 3: Valuing biodiversity of the forest ecosystem, through the following actions:**

1. Studies relating to the systematic of improperly exploited species;
2. Vulgarization of appropriate techniques for the use of plants for medicinal purposes;
3. Cultivation and sustainable use of medicinal plants;
4. Monitoring activities related to the hunting of endemic animal species;
5. Protection of breeding and nesting grounds of endemic bird species;
6. Adequate management of tree species of commercial value;
7. Structuring and made operational the ecotourism;
8. Study of ornamental species and their valuation;
9. Study of species used in the making of handicrafts and their multiplication;
10. Development of an IEC program on the protection of fauna and flora.

*Note: The main actions to put forward these objectives are contained in section 3.3.3*

### 3.2.4. STRATEGIC AXIS: “CONSERVATION OF THE AGRARIAN ECOSYSTEMS”

#### JUSTIFICATION

- The agrarian ecosystems are a very diverse mosaic of natural habitats, used mainly for agriculture and livestock, from where an important part of the population gets its income, which thus becomes the fundamental basis to fight poverty. The current trend in STP agriculture goes towards a culture of improved varieties to the detriment of indigenous varieties, leading to a certain genetic erosion and disappearance of traditional knowledge linked to agricultural crops.
- The STP agriculture is based on a rich universe of varieties, within both vegetable and fruit species, which have great influence on people’s lives. The not very careful introduction of improved varieties, which have partly replaced traditional and local varieties, tends however to overshadow the research into local varieties, usually more resistant to certain pests, but which are seen today seriously threatened by genetic erosion, although its recognized resilience and high food value.
- Also the spontaneous fruit species are an important source of food for the entire population, particularly those living in agrarian areas; however, the way they are explored has not been the most adequate for its sustainable utilisation, due to lack of knowledge about the value and characteristics of their life cycle and the way they reproduce. Furthermore, the high degree of vulnerability of the areas where they grow, expose them increasingly to the threat of extinction.
- For the sustainable utilization of the local plant heritage, it becomes necessary to set up reference collections of different species exploited in agriculture. The society will only benefit from the inventory and evaluation of the potential of the agrarian ecosystems, in order to identify endangered species and take appropriate measures for their conservation and

sustainable use for the benefit of present and future generations.

- In view of the rapid scientific and technological development, that has been made in the field of agricultural and livestock production worldwide, it is necessary, to the country, to invest heavily in the field of sustainable farming research, especially in its aspects of animal exploitation, in order to pursue increasing proximity to the internationally recommended standards.
- This need becomes even more urgent when the limitation of national territorial space and the small size of the areas suitable for agricultural production make it increasingly difficult to meet the basic needs of a population growing at a very significant pace.
- The creation of a Centre for Research and Development of Livestock would, thus, constitute a particularly important step in research and scientific knowledge on livestock species and races in the country, as it would allow for more detailed and accurate information on their genetic and phenotypic characteristics. Within the Centre duties, it should be investigated, in addition to these features, the systematic biology of taxonomic groups, the appropriate biotechnology, as well as the socioeconomic value of each species, thereby enabling the sustainable management of resources and the promotion of income-generating activities for the population.
- Even in the context of its duties, special attention should obviously be oriented to research, with a view to the protection and enhancement of traditional races, as part of primary interest within the livestock heritage of the country.

## FUNDAMENTAL OBJECTIVE: THE CONSERVATION OF AGRARIAN ECOSYSTEMS AND THEIR BIOLOGICAL DIVERSITY

### **SUB-OBJECTIVE 1: Strengthening of *in situ* conservation of plant species, through the following actions:**

1. Establishment of a national collection of spontaneous fruit species, with a view to germplasm conservation and sustainable use;
2. Preservation, in a controlled manner, of species in their natural habitat, and biometric data computerization;
3. Inventory of endangered varieties;
4. Information, education and communication, aimed at technicians and farmers within the scope of biodiversity conservation and sustainable management of biological resources.

### **SUB-OBJECTIVE 2: Strengthening of *ex situ* conservation of plant species, through the following actions:**

1. Enrichment fields of plant varieties, by the contribution of genes from abroad and from other local varieties.

### **SUB-OBJECTIVE 3: The enhancement of plant biodiversity, which will integrate the actions which follow:**

1. Adoption of a germplasm erosion control program and implementation of food crops in appropriate areas;
2. Promotion of organic production of cocoa and other agricultural products for export;
3. Promotion of fruit and other food crops in order to ensure food security;
4. Development of the potential of ornamental plants, including a market study;
5. Promotion of research centres, intended to undertake further research on biological control methods against pests and diseases;

### **SUB-OBJECTIVE 4: Strengthening of *in situ* conservation of animal diversity within species, through the following action:**

1. *In situ* protection of local races.

### **SUB-OBJECTIVE 5: Strengthening *ex situ* conservation of animal diversity within species, through the following action:**

1. Creation of a livestock research and development centre.

### **SUB-OBJECTIVE 6: The valuation of animal biodiversity, through the following actions:**

1. Strengthening of the most common mixed farming animal species (pigs, cattle, sheep, goats, poultry and rabbits);
2. Increase sheep populations;
3. Increase and better control of animals for slaughter;
4. Implementation of processing facilities (slaughterhouses).

Note: The main actions to put forward these objectives are contained in section 3.3.4

### **3.2.5. STRATEGIC AXIS: "STRENGTHENING INSTITUTIONAL, LEGAL AND SOCIOECONOMIC FRAMEWORK"**

#### **JUSTIFICATION**

• STP needs a legal framework for regulating the way of using biological resources present in each natural ecosystem, in order to provide for their sustainable management. With this scope, this framework should be prepared on close collaboration with local communities and, particularly, with promoters and operators of economic activities, which, in one way or another, must come into contact and maintain relationship with the vast and rich biodiversity world.

- Low institutional capacity of the sectors responsible for the *ex situ* conservation, including the lack of facilities and incentives, low human resources capacitation and the lack of appropriate legislation limits the effectiveness of the measures already launched. Given that the *ex situ* conservation is an essential coadjutant for the preservation *in situ*, it becomes necessary to reinforce the institutional capacity of the sectors responsible for this activity.
- It is not possible to stop the degradation of biological diversity without introducing changes in the behaviour of man and of the communities in which they operate, whose actions tend to jeopardize the integrity of ecosystems and threaten the renewal of

natural resources, thus promoting poverty within the population. These changes are only possible through the establishment of a comprehensive and on-going program of information, education and communication for the general public and, in particular, political, administrative and economic decision-makers.

- Information and awareness of the people are most needed tools that allow for their participation in the protection and conservation of biodiversity, for their own and future generations benefit.

## **FUNDAMENTAL OBJECTIVE: CONSERVATION OF BIODIVERSITY AND USE OF THEIR RESOURCES, BASED ON AN INSTITUTIONAL LEGAL AND SOCIOECONOMIC FRAMEWORK MORE VIGOROUS AND ACTUAL**

### **SUB-OBJECTIVE 1: Strengthening the institutional framework, through the following actions:**

1. Strengthening of intersectoral actions of the various official institutions in the field of conservation and sustainable management of Biodiversity;
2. Strengthening the legal framework for supervision of fishing and hunting;
3. Training more skilled human resources in the field of conservation and sustainable management of biodiversity, including rangers, eco-guardians/eco-guides, botanists, zoologists, ecologists and other;
4. Strengthening management activities of National Parks in São Tomé Island and in Príncipe Island;
5. Preparation of an advanced training program in Agro-forestry, Ethno-botany and Pharmacopoeia;
6. Creation of a public structure for promoting and monitoring the proper use of medicinal plants;
7. Implementation of a national system for collecting and processing technical information on the operating of Botanical Gardens and Herbaria, in accordance with international standards;
8. Approval and implementation of the National Forestry Development Plan;
9. Implementation of a Trust Fund;
10. The promotion of partnerships between the private sector, NGOs and local people, within the scope of Biodiversity;
11. Greater involvement of the official government in the processes and measures to improve the operability and effectiveness of existing support structures (small farmers associations, medium-sized farmers cooperatives, agricultural extension programs and others).

### **SUB-OBJECTIVE 2: Strengthening the legal and regulatory framework, through the actions that follow:**

1. Creation of mechanisms leading to the implementation and enforcement of the already approved and published legislation in the conservation and sustainable management of biodiversity;
2. Strengthen laws and supervision on the use of living things as craftsmanship, such as unchecked turtles capturing;
3. Drafting of legislation on the protection of plant genetic resources;
4. Preparation of the corresponding legal framework to achieve a better functioning and potential for exploitation of the Botanical Garden and the existing Herbarium;
5. Preparation, adoption and application of legislation, in accordance with CITES, on the export, import and trade of species between Islands;
6. Preparation, adoption and application of Livestock Code;
7. Development of laws that incorporate the notion of accessibility and fair and equitable sharing of benefits.

### **SUB-OBJECTIVE 3: The creation of mechanisms for the access and fair and equitable sharing of biological resources, through the following actions:**

#### **At the National level:**

1. Maintaining the integrity of forest ecosystems;
2. Promotion of support for protective structures and community management of the conservation of biological resources.

#### **At the international level:**

3. Strengthening of cooperation mechanisms for the acquisition of genes abroad, depending on the needs and national development programs;
4. Institutionalization of the process of eco-certification of agro-forestry products;
5. Regular guaranteed access to zoo-sanitary information and scientific-technical innovations worldwide.

*Note: The main actions to put forward these objectives are contained in section 3.3.5*

### 3.3. ACTION PLANS

#### 3.3.1. ACTION PLAN FOR THE CONSERVATION OF THE COASTAL AND MARINE ECOSYSTEMS AND SUSTAINABLE USE OF THEIR RESOURCES

**TABLE 4 – STRATEGIC AXIS: “COASTAL AND MARINE ECOSYSTEMS”**

Country: São Tomé and Príncipe Title: Action Plan and Strategy for Biodiversity Conservation	Initial Program Cost: USD 2,160,000 Duration: 6 years (2015-2020)
Strategic axis: Coastal and Marine Ecosystem	Date of Preparation: 2015

LOGIC INTERVENTION	ACTION PLAN	COMPLIANCE INDICATORS	SOURCES OF VERIFICATION
<b>GENERAL PURPOSE</b>			
1. Conservation of marine and coastal biological diversity		The National Strategy for the Conservation of Coastal and Marine Ecosystem	Statistics of the Fisheries Direction
		Number of protected species in relation to the total of threatened species	Environment statistics
<b>SPECIFIC OBJECTIVE</b>			
1.1 The increase of <i>in situ</i> conservation	Coastal Zone Ordinance and Sustainable Management of its Resources	The Plan for the Spatial Ordinance of the Coastal Zone	MIRNA Reports
1.2. Strengthening <i>ex situ</i> conservation	Creation of a Marine National Park	The up and running national network of protected areas for marine species,	MADRP Reports
	Studies on Marine Fishery Resources	The National Plan for the Sustainable Use of Fisheries Resources	MADRP Reports
	Sustainable Management of STP EEZ	The EEZ surveillance equipment installed nationwide	MDOI Reports
	Marine Turtles Protection	Turtles Breeding grounds protected at national level  Stabilization of its population	MIRNA Reports

PROJECT NO. 1: COASTAL ZONE  
ORDNANCE AND SUSTAINABLE  
MANAGEMENT OF ITS RESOURCES

**Priority:** Ensure the preservation of coastal ecosystems and their natural resources.

**Title:** Coastal Zone Ordinance and Sustainable Management of its Resources

**Responsible Bodies:** MIRNA.

**National Partners:** MDOI, MAI, MADRP, MECI, local communities and NGOs.

**International Partners:** FAO, UNEP, IUCN, WWF, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU.

### Objectives

- Promote proper management of the coastal zone and their resources;
- Identify the essential components of the coastal biological diversity;
- Ensure proper management of human pressure on the coastal biological diversity;
- To promote the strengthening of *ex situ* and *in situ* conservation of biological diversity;
- Ensure the conservation of endangered species and the recovery of their populations;
- Study the feasibility of adopting alternatives and sustainable forms of sand and other coastal inert exploitation;
- Encourage the participation of communities, living in coastal areas, in the conservation process of these areas and their inherent resources, with particular attention to sea turtles.

### Activities

1. Strengthening of human, material and technical sectors involved in the spatial ordnance process of coastal areas and in the sustainable management of their resources;
2. Gathering and analysis of available social, economic and cultural information, on these areas and respective

resources, with special emphasis in the case of sea turtles;

3. Topographic survey and cartographic treatment of coastal areas;
4. Development and implementation of the corresponding spatial ordnance plan, with clear definition of the areas for different activities (social, economic and conservation);
5. Development of a coherent research program on sea turtles, for the short, medium and long term;
6. Designing and implementing legislative or administrative measures of either deterrence or stimulus, as appropriate.
7. Promoting programs of information, education and communication with local communities, local authorities and the population in general, in terms of occupation of the coastal space and rational use of its resources;
8. Monitoring and evaluation of the planned activities.

**Estimated costs: 435,000 USD**

**External financing:**

**National counterpart:** 10 % of the project value

**Duration:** 3 years

**Start date:** 2015

**TABLE 5 – ESTIMATED COSTS: PROJECT “SPATIAL ORDNANCE OF THE COASTAL ZONE AND SUSTAINABLE MANAGEMENT OF ITS RESOURCES”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, material and technical sectors involved in the spatial ordnance process of coastal areas and in the sustainable management of their resources	120	80	20	20
2	Gathering and analysis of available social, economic and cultural information, on these areas, with special emphasis in the case of sea turtles	40	25	15	–
3	Topographic survey and cartographic treatment of coastal areas	150	50	70	30
4	Development and implementation of the corresponding spatial ordnance plan, with clear definition of the areas for different activities (social, economic and conservation)	20	–	10	10
5	Development of a coherent research program on sea turtles, for the short, medium and long term.	50	10	20	20
6	Designing and implementing legislative or administrative measures of either deterrence or stimulus, as appropriate	15	–	10	5
7	Promoting programs of information, education and communication (IEC) with local communities, local authorities and the general population, in terms of occupation of the coastal space and rational use of its resources	25	5	10	10
8	Monitoring and evaluation of the planned activities	15	–	5	10
<b>Total</b>		<b>435</b>	<b>170</b>	<b>160</b>	<b>105</b>

PROJECT NO. 2: SUSTAINABLE MANAGEMENT  
OF THE EXCLUSIVE ECONOMIC ZONE

**Priority:** To ensure the conservation of marine ecosystems and their biological resources.

**Title:** Sustainable Management of the EEZ.

**Responsible Bodies:** MIRNA, MECI.

**National Partners:** MDOI, MAI, MADRP, MFAP, NGOs and local communities.

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation and EU.

**Objectives**

- Identify the essential components of marine biodiversity, with particular focus on fishery resources, within the framework of a policy of compatibility and balance between the conservation of biological diversity and the sustainable use of its resources;
- Promote research on the conservation of biological diversity and the sustainable use of its resources;
- Develop a national network of protected areas of marine ecosystems;
- Ensure compliance with more appropriate practices, from an economic and ecological point of view, of fishing in the EEZ;
- Adopt a coherent and sustainable policy of surveillance of the EEZ and to ensure its proper implementation, through greater involvement and accountability of all stakeholders in the national fishery resources conservation process.
- Promote sub-regional, regional and international cooperation to the conservation of fisheries biological diversity and to the sustainable access to their resources and the fair and equitable sharing of benefits from their exploitation.

**Activities**

1. Strengthening of human, material and technical sectors and institutions dealing with the issue of the generality of fishery and biological resources in the EEZ;
2. Collect and analyse information on the biological resources and fishing activities in the EEZ;
3. Identification and assessment of impacts that threaten marine biological resources of the EEZ, and design and implementation of legal or administrative measures to control hazards;
4. Definition and implementation of a research program for the conservation and sustainable use of biological resources of the EEZ, including the inventory of marine ecosystems and the mapping of biotopes;
5. Creation of the National Marine Park;
6. Preparation and adoption of a Conservation Plan for fishery resources;
7. Promoting programs of information, education and communication for the conservation of biological diversity and sustainable use of its components, for public and private agents in the fisheries sector;
8. Development of an agreement mechanism, at the regional and sub regional level, for the supervision of activities in the EEZ;
9. Monitoring and evaluation of activities, and subsequent dissemination of results.

**Estimated costs: 705,000 USD**

**External financing:**

**National counterpart:** 10% of the project value

**Duration:** 3 years

**Start date:** 2015

**TABLE 6 – ESTIMATED COSTS: PROJECT “SUSTAINABLE MANAGEMENT OF THE EEZ”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, material and technical sectors and institutions dealing with the issue of fishery and biological resources in the EEZ	250	120	80	50
2	Collect and analyse information on the biological resources and fishing activities in the EEZ	35	15	10	10
3	Identification and assessment of impacts that threaten marine biological resources of the EEZ, and design and implementation of legal or administrative measures to control hazards	70	15	25	30
4	Definition and implementation of a research program for the conservation and sustainable use of biological resources of the EEZ, including the inventory of marine ecosystems and the mapping of biotopes	80	20	30	30
5	Creation of the National Marine Park	150	50	70	30
6	Preparation and adoption of a Conservation Plan for fishery resources	20	–	–	20
7	Promoting programs of information, education and communication (IEC) for the conservation of biological diversity and sustainable use of its components, for public and private agents in the fisheries sector	15	5	5	5
8	Development of an agreement mechanism, at the regional and sub regional level, for the supervision of activities in the EEZ	60	–	20	40
9	Monitoring and evaluation of activities, and subsequent dissemination of results	25	5	10	10
<b>Total</b>		<b>705</b>	<b>230</b>	<b>250</b>	<b>225</b>

PROJECT NO. 3: DEVELOPMENT OF ARTISANAL FISHERIES

**Priority:** Ensure the conservation of marine ecosystems and their biological resources.

**Title:** Development of Artisanal Fisheries.

**Responsible Bodies:** MECI, MDOI.

**National Partners:** MIRNA, MAI, MADRP, MFAP, NGOs and Local Communities.

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs.

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU and MADRP.

**Objectives:**

- Increase the fish production, stabilized incomes of fishermen and their families and improving safety conditions at sea;
- Introduction of new technologies and methods, appropriate for artisanal fisheries, to increase production;
- Improved safety conditions at sea;
- Improvement of infrastructures to support artisanal fishing;

- Creation of organizational structures to support the development of the sector, and to provide financial resources for investments.

**Activities**

1. Conducting a viability study on the introduction of new types of vessels (e.g. Semi-industrial), new fishing techniques (e.g. longline fishing), use of alternative materials (plywood, wooden board, fiberglass), and safer designs used by fishermen in the Gulf region.
2. Introduction and maintenance of Fish Aggregating Devices (FADs);
3. Train fishermen in shipping materials, safety, fishing methods, mechanic/maintenance, handling of fishery products and accounting;
4. Provide safety materials to the artisanal fishermen;
5. Construction of support facilities (e.g. artisanal fishing ports, auction and sanitation facilities, access to water)
6. Creation and/or strengthening of organizational structures in the fisheries sector (e.g. community associations, cooperatives, partnerships), involving

fishermen, traders, industry, civil society, etc., and support/strengthening their capacities to act.

7. Conducting a viability study on the introduction of micro-financing systems to support and facilitate business activities (fishermen, vessel owners, traders, etc.), provide credit for the supply of inputs, such as fishing gear, navigation and security equipment.

**Estimated costs: 600,000 USD**  
**External financing:**  
**National contribution:** 10% of the project value  
**Duration:** 3 years  
**Start date:** 2015

**TABLE 7 – ESTIMATED COSTS: PROJECT “ARTISANAL FISHERIES DEVELOPMENT”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Conducting a viability study on the introduction of new types of vessels (e.g. Semi-industrial) and new construction techniques	30	20	10	0
2	Introduction and maintenance of fish aggregating devices (FADs)	200	100	50	50
3	Train fishermen in shipping materials, safety, fishing methods, mechanic/maintenance, handling of fishery products and accounting	60	30	20	10
4	Provide safety materials to the artisanal fishermen	50	40	10	0
5	Construction of support infrastructures	200	50	100	50
6	Creation and/or strengthening of organizational structures in the fisheries sector	30	10	10	10
7	Conducting a viability study on the introduction of micro-financing systems to support and facilitate business activities	30	20	10	0
<b>Total</b>		<b>600</b>	<b>270</b>	<b>210</b>	<b>120</b>

PROJECT NO. 4: THE MARINE AND COASTAL ENVIRONMENTS PROTECTION

**Priority:** Ensure the conservation of marine ecosystems and biological resources.

**Title:** Protection of the Marine and Coastal Environments

**Responsible Bodies:** MECI, MDOI

**National Partners:** MIRNA, MAI, MADRP, MFAP, NGOs and local communities

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation and EU

**Objectives**

- To ensure the sustainable use and conservation of fishery resources and protection of the marine and coastal environment.
- Measures for fisheries resources conservation and environmental protection, such as the establishment of Marine Protected Areas (MPAs) and specific measures for areas of vulnerable species.

- Reduction of impacts of fishing and related activities in the fisheries resources and the environment, through the awareness of fishermen, traders, authorities and other stakeholders in the sector, to responsible fishing and the implementation of co-management processes.
- Good management of MPAs and the creation of alternative income-generating activities to reduce pressure on coastal areas.

**Activities**

1. Identification of marine protected areas (MPAs) and areas of vulnerable species.
2. Preparation of a map of ecological areas and a map of environmental risks, and define specific plans for sustainability of vulnerable areas.
3. Realization of an updated study on the potential for sustainable utilization of fisheries resources in STP waters, and adjacent areas, to estimate the biomass of fish stocks, the acceptable level of operation, accessibility, alternative resources and the fishing

effects on the ecosystem (fish stocks, bycatch, discards, vulnerable species, etc.).

**4.** Promoting alternatives to the construction of artisanal fishing vessels that lead to the reduction of logging for this purpose.

**5.** Conducting studies on the possible consequences of oil exploitation for fishing and for the environment.

**6.** Conceiving measures to minimize the effects of oil exploitation on fishing and the environment.

**7.** Carrying out of awareness campaigns about responsible fishing and environmental impacts of related activities.

**8.** Create and/or strengthen organizational structures in the fisheries sector (e.g. community associations, cooperatives, partnerships) involving fishermen, traders,

industry, civil society, etc., and support/strengthening their capacities to act, including co-management.

**9.** Develop management plans and management support projects for MPAs, including its profitability through ecotourism and other activities alternative to fishing.

**10.** Participate in regional and international initiatives in the area of environmental conservation and protection, benefiting, this way, from management technical support.

**Estimated costs: 255,000 USD**

**External financing:**

**National contribution:** 10% of the project value

**Duration:** 3 Years

**Start date:** 2015

**TABLE 8 – ESTIMATED COSTS: PROJECT “MARINE AND COASTAL ENVIRONMENTS PROTECTION”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Identification of marine protected areas (MPAs) and areas of vulnerable species	20	10	5	5
2	Preparation of a map of ecological areas and a map of environmental risks, and define specific plans for sustainability of vulnerable areas.	30	10	10	10
3	Realization of an updated study on the potential for sustainable utilization of fisheries resources in STP waters, and adjacent areas	20	10	10	0
4	Promoting alternatives to the construction of artisanal fishing vessels, that lead to the reduction of logging for this purpose	60	20	20	20
5	Conducting studies on the possible consequences of oil exploitation for fishing and for the environment	20	10	10	0
7	Carrying out of awareness campaigns about responsible fishing and environmental impacts of related activities	45	15	15	15
8	Create and/or strengthen organizational structures in the fisheries sector	30	10	10	10
9	Develop management plans and management support projects for MPAs, including its profitability through ecotourism and other activities alternative to fishing	30	10	10	10
<b>Total</b>		<b>255</b>	<b>95</b>	<b>90</b>	<b>70</b>

PROJECT NO. 5: FIGHT AGAINST ILLEGAL  
UNREPORTED AND UNREGULATED FISHERY

**Priority:** Ensure the conservation of marine ecosystems and biological resources.

**Title:** Fight Against Illegal Unreported and Unregulated Fishery.

**Responsible Bodies:** MECI, MDOI.

**National Partners:** MIRNA, MAI, MADRP, MFAP, NGOs and local communities.

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs.

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU.

**Objectives**

- Eliminate and/or reduce illegal, unreported and unregulated fishing by strengthening the “Fisheries Direction of the MADRP” capabilities in monitoring, control and surveillance of fisheries.
- Discontinue the use of the STP flag, as a flag of convenience for fishing boats, and start the reform of the vessel registration system.

**Activities**

1. Implementation of a Joint Committee with the participation of relevant stakeholders (DP-MADRP, INP, IMAP, the Port Authority) to establish an effective system for the registration and licensing of ships and surveillance of fishing activities;
2. Conducting a study on the definition of best options for Monitoring, Control and Surveillance (MCS) of fishing activities;

3. Preparation of MCS programs for artisanal, semi-industrial and industrial fishing.
4. Recruitment and training of observers on board (inspectors/controllers).
5. Strengthen the fisheries monitoring centre (facilities, equipment, training);
6. Strengthening the participation of STP in regional and international meetings (CECAF, ICCAT, IMO) to enhance communication and cooperation in the fight against Illegal, Not declared, Not regulated fishing (INN) and consider the joining of STP to other initiatives (International MCS Network);
7. Study of the implications, to national institutions, of the reinforcement of the STP participation in regional organizations of fisheries management, and appraise the obligations and benefits, for STP, relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks;

**Estimated costs: 165,000 USD**

**External Financing:**

**National contribution:** 10% of the project value

**Duration:** 3 years

**Start date:** 2015

**TABLE 9 – ESTIMATED COSTS: PROJECT “FIGHT AGAINST ILLEGAL FISHERING”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Implementation of a Joint Committee with the participation of relevant stakeholders (DP-MADRP, INP, IMAP-STP, the Port Authority)	15	5	5	5
2	Conducting a study on the definition of best options for monitoring, control and surveillance (MCS) of fishing activity	10	5	5	0
3	Preparation of MCS programs for artisanal, semi-industrial and industrial fishing	30	10	10	10
4	Recruitment and training of observers on board (inspectors/controllers)	50	10	20	20
5	Strengthen the fisheries monitoring centre (facilities, equipment, training)	50	20	20	10
6	Strengthening the participation of STP in regional and international meetings (CECAF, ICCAT, IMO)	5	0	5	0
7	Study of the implications, to national institutions, of the reinforcement of the STP participation in regional organizations of fishery management	5	5	0	0
<b>Total</b>		<b>165</b>	<b>55</b>	<b>65</b>	<b>45</b>

**3.3.2. ACTION PLAN FOR THE CONSERVATION OF INLAND WATERS ECOSYSTEMS AND SUSTAINABLE USE OF THEIR RESOURCES**

**TABLE 10 – STRATEGIC AXIS: INLAND WATERS ECOSYSTEMS**

Country: São Tomé and Príncipe Title: Action Plan and Strategy for Biodiversity Conservation	Initial Program Cost: USD 440,000 Duration: 6 years (2015-2020)
Strategic Axis: Inland Waters Ecosystems	Elaboration Date: 2015

LOGIC INTERVENTION	ACTION PLAN	COMPLIANCE INDICATORS	SOURCES OF VERIFICATION
<b>GENERAL OBJECTIVE</b>			
1. Conservation of biological diversity of the Inland Waters Ecosystems			
<b>SPECIFIC OBJECTIVE</b>			
1.1. Identify components of biological resources of inland waters and evaluate their potential	Conservation of Biodiversity and Sustainable Use of Biological Resources of Inland Waters	Plan for the Conservation and Exploitation of Biological Resources of Inland Waters. Completed	MIRNA Reports
1.2. Stimulate the recovery of these resources	Preparation of Studies on the Fauna of Inland Waters	Plan for the Inventory of the Fauna of Inland Waters. Completed	
	Preparation of the Plan for the Management of Marshy Areas	Master Plan for the Marshy Areas. Completed and in implementation	
	Creation of Protected Areas in Humid Ecosystems	Biodiversity Inventory of Humid Ecosystems. Completed, and with the Conservation Plan in implementation	

PROJECT: CONSERVATION OF BIODIVERSITY AND BIOLOGICAL RESOURCES OF INLAND WATERS

**Priority:** Ensure the conservation and sustainable use of biological resources of the STP inland waters.

**Title:** Conservation of Biodiversity and Biological Resources of Inland Waters

**Responsible Bodies:** MIRNA

**National Partners:** MADRP, NGOs and local communities.

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs.

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU.

**Objectives**

- Identify the wetlands that may have a national and/or international importance, in terms of biological diversity;
- To inventory the faunal and floristic species in these areas and determine their relative importance;

- Identify the different ecosystem components of inland waters and determine their potential in the field of biological resources;
- Create protected wetlands with management plans that involve members of the surrounding communities, for the conservation and sustainable management of biological resources therein;
- Establish a system to ensure the protection of endangered aquatic species;
- Adopt a coherent and sustainable policy for the conservation of inland waters ecosystems and to ensure their proper implementation, through greater involvement and accountability, particularly of all structures and actors involved in the process.

**Activities**

1. Strengthening of human, material and technical sectors responsible for dealing with inland waters ecosystems and biological resources contained therein;
2. Inventory of the biodiversity of aquatic ecosystems;
3. Identification and assessment of species and ecosystems of the wetland;
4. Implementation of a database;
5. Definition, classification and adoption of a management plan for the areas to be protected;
6. Cartography of those areas and, in general, of inland waters ecosystems;
7. Preparation of a Conservation Plan for biological resources of inland waters;

8. Organization and specialized training of groups, oriented to the development and rational use of resources;
9. Promotion of IEC programs among people and riverside communities;
10. Monitoring and evaluation of activities;
11. Dissemination of results.

**Estimated costs: 440,000 USD****External financing:****National contribution:** 10% of the project value**Duration:** 3 years**Start date:** 2015**TABLE 11 – ESTIMATED COSTS: PROJECT “CONSERVATION OF THE DIVERSITY OF INLAND WATERS BIOLOGICAL RESOURCES”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, material and technical sectors responsible for dealing with inland waters ecosystems and biological resources contained therein	100	50	30	20
2	Inventory of biodiversity of aquatic ecosystems	75	30	30	15
3	Identification and assessment of species and ecosystems of the wetland	40	20	20	–
4	Implementation of a database	20	–	10	10
5	Definition, classification and adoption of a management plan for the areas to be protected	50	–	30	20
6	Cartography of those areas and, in general, of inland waters ecosystems	50	–	30	20
7	Preparation of a Conservation Plan for biological resources of inland waters	20	–	10	10
8	Organization and specialized training of groups oriented to the development and rational use of resources	30	–	20	10
9	Promotion of IEC programs among people and riverside communities	30	10	10	10
10	Monitoring and evaluation of activities	20	–	10	10
11	Dissemination of results.	5	–	–	5
<b>Total</b>		<b>440</b>	<b>110</b>	<b>200</b>	<b>130</b>

### 3.3.3. ACTION PLAN FOR THE CONSERVATION OF THE FOREST ECOSYSTEMS AND SUSTAINABLE USE OF THEIR RESOURCES

**TABLE 12 – STRATEGIC AXIS: FOREST ECOSYSTEMS**

Country: São Tomé and Príncipe Title: Action Plan and Strategy for Biodiversity Conservation	Initial Program Cost: USD 1,449,000 Duration: 6 years (2015-2020)
Strategic Axis: Forest Ecosystems	Elaboration Date: 2015

LOGIC INTERVENTION	ACTION PLAN	COMPLIANCE INDICATORS	SOURCES OF VERIFICATION
<b>GENERAL OBJECTIVE</b>			
1. Conservation of biological diversity of the Forest Ecosystems			
<b>SPECIFIC OBJECTIVES</b>			
1.1. Promote the sustainable exploitation of productive forests	Administration and sustainable forest management	The Sustainable Forest Management Plan. Established	MADRP reports
1.2. Restore the areas of degraded forests	Management and reforestation	Degraded forest areas. Reforested	MADRP reports
1.3. Make Natural Parks and protected areas a key element in the agrarian development	Promoting the sustainable management of the buffer zones of National Parks (Obô)	Population of the peripheral zone of the Natural Park integrated in its management	MIRNA Reports
1.4. Conduct a thorough inventory of wild fauna in each habitat	National inventory of wild animals	A plan for the conservation and sustainable use of wildlife resources. Completed and in implementation	MIRNA Reports
1.5. Prepare technical filling cards on the main tree species in the country	Creation of an <i>Arboretum</i>	An inventory and a reference collection of the main trees in the country. Completed	MADRP reports
1.6. Systematically update the catalogue of floristic species, most notably the endemic	Enlargement and enrichment of the current Botanical Garden and <i>Herbarium</i>	Bom Sucesso Botanical Garden with a greater extent and floristic diversity	Botanical Garden Reports
1.7. Integrate traditional practices and customs in the conservation strategy of forest biodiversity and sustainable use of resources	Listing and description of traditional practices and customs related to the resources of the Forest Biodiversity	A Conservation Plan based on Traditional Methods. Completed and in implementation	MIRNA and MADRP Reports

PROJECT NO. 1: ADMINISTRATION  
AND SUSTAINABLE MANAGEMENT OF FORESTS

**Priority:** Ensure environmentally sound management of forests

**Title:** Administration and Sustainable Management of Forests

**Responsible Bodies:** MADRP.

**National Partners:** MIRNA, MECF, Small Farmers, medium and large agricultural enterprises, local communities and NGOs

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation

**Objectives**

- Improve the form of exploitation of all kinds of productive forests;
- Restore degraded areas of productive forests;
- Define the principles and methods to be applied for the sustainable use of biological resources of the different types of forests;
- Identify the role of the different elements that are part of the forest ecosystems, and its role in maintaining the ecological functions in that ecosystem;
- Implement the Forest Development Plan.

**Activities**

1. Strengthening of human, material and technical capacity in sectors that deal with forestry issues;
2. Gathering and analysis of available information;
3. Socioeconomic survey on the use of forest products;
4. Inventory and evaluation of all types of forests;
5. Analysis and interpretation of collected data;
6. Thematic cartography of all types of forests;
7. Identification of biological resources currently explored;
8. Inventory of the main users;
9. Determination of ecological factors that allow for improving forest management;
10. Update and approval of the Forestry Development Plan;
11. Education, awareness and training of the population.

**Estimated costs: 345,000 USD**

**External financing:**

**National contribution:** 10 % of the project value

**Duration:** 3 years

**Start date:** 2015

**TABLE 13 – ESTIMATED COSTS: PROJECT “ADMINISTRATION AND SUSTAINABLE MANAGEMENT OF FORESTS”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, material and technical capacity in sectors that deal with forestry issues	60	30	15	15
2	Gathering and analysis of available information	15	5	5	5
3	Socioeconomic survey on the use of forest products	20	10	5	5
4	Inventory and evaluation of all types of forests	75	40	15	15
5	Analysis and interpretation of collected data	15	8	4	3
6	Thematic cartography of all types of forests	50	25	15	10
7	Identification of biological resources currently explored	30	10	10	10
8	Inventory of the main users	10	5	3	2
9	Determination of ecological factors that allow for improving forest management	30	15	10	5
10	Update and approval of the Forestry Development Plan	25	15	5	5
11	Education, awareness and training of the population	20	10	5	5
<b>Total</b>		<b>345</b>	<b>173</b>	<b>92</b>	<b>80</b>

PROJECT NO. 2: CONSERVATION  
OF THE TREE SPECIES WITH COMMERCIAL VALUE

**Priority:** Creating the basis for an ecologically sustainable exploitation of wood resources.

**Title:** Conservation of the Tree Species with Commercial Value

**Responsible Bodies:** MADRP

**National Partners:** MIRNA, Small Farmers, medium and large Agricultural Enterprises, local communities and NGOs

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO, and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation

**Objectives**

- To enhance the basic knowledge on the main trees that make up the national forests, with special attention to endemic and/or indigenous species, and their phenotypic and genetic characteristics;
- Classify the different identified species according to the different soil and climatic zones, and strengthen their conservation and possible multiplication;
- To promote the technological and research capabilities in the field of conservation of forests, with particular attention to endemic and/or indigenous species;
- Establish a national reference collection on the main trees of the country and promote access to it;
- Restore degraded forest ecosystems, in order to safeguard the diversity of national arboreal heritage;
- Involve decision-makers and users in the conservation plans of forest biodiversity and sustainable use of resources inherent to it;
- To have a legal, institutional, organizational and financial framework, able to encourage and promote active participation of local populations and communities in the forest conservation process;

**Activities**

1. Strengthening of human, technical and material capacities of the sectors that deal with the issue of forests;
2. Definition and establishment of selection criteria for species to be studied and to make its inventory;

3. Gathering and analysis of available information on the selected main tree species, including endemic and/or indigenous species;

4. Gathering and processing of seeds of selected species and establishment of a reference collection of them;

5. Creation of a seed bank of endemic and/or indigenous species;

6. Implementation of the Arboretum and formulation of its action plan;

7. Establishment of a national system of evaluation of the nature and forest resources, in order to identify degraded areas, and estimation of recovery costs;

8. Rehabilitation of degraded areas;

9. Promoting research activities aiming to conservation and sustainable use of forest resources;

10. Adoption of legislative, institutional, organizational and financial measures, that promote and ensure the active participation of the population in the forest conservation process;

11. Acquisition and use of information and experiences from other countries and international organizations specialized in this field;

12. Promotion of information, education and communication programmes, along with political and administrative leaders and the common people;

13. Monitoring and evaluation of activities;

14. Dissemination of results.

**Estimated costs: 670,000 USD**

**External financing**

**National contribution:** 10 % of the project value

**Duration:** 2 years

**Start date:** 2015

**TABLE 14 – ESTIMATED COSTS: PROJECT “CONSERVATION OF TREE SPECIES WITH COMMERCIAL VALUE”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, technical and material capacities of the sectors that deal with the issue of forests	125	75	30	20
2	Definition and establishment of selection criteria for species to be studied and to make its inventory	25	10	15	–
3	Gathering and analysis of available information on the selected main tree species, including endemic and/or indigenous species	45	25	20	–
4	Gathering and processing of seeds of selected species and establishment of a reference collection of them	65	–	35	30
5	Creation of a seed bank of endemic and/or indigenous species	20	–	10	10
6	Implementation of the Arboretum and formulation of its action plan	80	30	30	20
7	Establishment of a national system of evaluation of the nature and forest resources, in order to identify degraded areas, and estimation of recovery costs	80	–	50	30
8	Rehabilitation of degraded areas	65	–	25	40
9	Promoting research activities aiming to conservation and sustainable use of forest resources	30	10	10	10
10	Adoption of legislative, institutional, organizational and financial measures, that promote and ensure the active participation of the population in the forest conservation process	60	–	30	30
11	Acquisition and use of information and experiences from other countries and international organizations specialized in this field	30	10	10	10
12	Promotion of information, education and communication programmes, along with political and administrative leaders and the common people	25	5	10	10
13	Monitoring and evaluation of activities	15	5	5	5
14	Dissemination of results	5	–	–	5
<b>TOTAL</b>		<b>670</b>	<b>170</b>	<b>280</b>	<b>220</b>

PROJECT NO. 3: CONSERVATION OF ENDANGERED SPECIES OF THE WILD FAUNA

**Priority:** Identifying the components of biological diversity

**Title:** Conservation of Endangered Species of the Wild Fauna

**Responsible Bodies:** MADRP / MIRNA

**National Partners:** NGOs, Local Communities and Local Government

**International Partners:** UNEP, IUCN, WWF, GTZ and FAO

**Financial Partners:** GEF, UNDP, USAID, IFAD, WB, ADB

**Objectives**

- Carry out an inventory of wild fauna in its main ecosystems;
- Acquire basic knowledge necessary for the sustainable use of resources of wild fauna, and to enable the management of hunting activities, as well as the valuation of its products;

- Promoting the integration of conservation and sustainable use of wild fauna in the development process of STP.

**Activities**

1. Strengthening of human, material and technical sectors that deal with the problem of wild fauna;
2. Gathering and analysis of available information on the wild species;
3. Information and awareness among the hunters and the authorities involved;
4. Inventory of biological diversity of wildlife;
5. Creation and management of the corresponding databases.

**Estimated costs: 131,000 USD**

**External financing:**

**National contribution:** 10 % of the project value

**Duration:** 2 years

**Start date:** 2015

**TABLE 15 – ESTIMATED COSTS: PROJECT “CONSERVATION OF ENDANGERED SPECIES OF THE WILD FAUNA”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR	
			2016	2017
1	Strengthening of human, material and technical sectors that deal with the problem of wild Fauna	40	20	20
2	Gathering and analysis of available information on the wild species	15	7.500	7.500
3	Information and awareness among the hunters and the authorities involved	6	3	3
4	Inventory of biological diversity of wildlife	20	15	5
5	Creation and management of the corresponding databases	50	30	20
<b>Total</b>		<b>131</b>	<b>75,5</b>	<b>55,5</b>

PROJECT NO. 4: REVITALIZATION OF *EX-SITU* CONSERVATION

**Priority:** Promote research in the field of botany, for the conservation of biological diversity.

**Title:** Revitalization of *Ex-Situ* Conservation.

**Responsible Bodies:** MADRP

**National Partners:** MIRNA, Small Farmers, Medium and Large Agricultural Enterprises, Local Communities and NGOs.

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs.

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation.

**Objectives**

- Extend the Botanical Garden and systematically renew the National Herbarium;
- Increase the knowledge of the STP flora;
- Establish a national collection of floristic species, most notably the endemic;
- Promote and facilitate access to these collections to researchers, scholars, students and other groups also interested in deeper knowledge about the national flora;
- Disseminate information and knowledge about the floristic richness of the country, through playful and leisure activities, including field trips, excursions, guided tours and specialty contests.

**Activities**

1. Strengthening of human, technical and material capacity on sectors dealing with the problem of the Botanical Garden and Herbarium;
2. Identification of new areas for expansion of existing facilities;
3. Improvement of basic structures to better accommodation and treatment of existing species, in particular the endemic and endangered;
4. Inventory of new species to be transferred to the Botanical Garden and the Herbarium;
5. Founding of the reference collection of floristic species;
6. Monitoring and evaluation of results.

**Estimated costs: 250,000 USD**

**External financing:**

**National contribution:** 10% of the project value.

**Duration:** 3 years

**Start date:** 2015

**TABLE 16 – ESTIMATED COSTS: PROJECT “REVITALIZATION OF EX-SITU CONSERVATION”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, technical and material capacity on sectors dealing with the problem of the Botanical Garden and Herbarium	30	20	10	–
2	Identification of new areas for expansion of existing facilities	10	10	–	–
3	Improvement of basic structures to better accommodation and treatment of existing species, in particular the endemic and endangered	100	20	40	40
4	Inventory of new species to be transferred to the Botanical Garden and the Herbarium	50	20	20	10
5	Founding of the reference collection of floristic species	40	10	20	10
6	Monitoring and evaluation of results	20	–	10	10
<b>Total</b>		<b>250</b>	<b>80</b>	<b>100</b>	<b>70</b>

PROJECT NO. 5: VALUATION OF TRADITIONAL USES AND COSTUMES LINKED TO BIODIVERSITY RESOURCES

**Priority:** Strengthening *in situ* conservation of biological diversity  
**Title:** Valuation of Traditional Uses and Costumes Linked to Biodiversity Resources  
**Responsible Bodies:** MIRNA  
**National Partners:** MADR MECI, media, local communities and NGOs  
**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs  
**Financial Partners:** GEF, UNDP, WB, French cooperation

**Objective**

- Inventory of the main traditional knowledge in the protection and conservation of biodiversity and sustainable use of its resources, in order to integrate them in the evaluation and preservation process and in the conservation strategy.

**Activities**

- Strengthening of human, material and technical capacity of the sectors that deal with ecosystem conservation processes;

- Gathering and analysis of available relevant information;
- Inventory and analysis of practical and traditional knowledge of biodiversity conservation and sustainable use of its components;
- Analysis of the existing legislation on access, protection and promotion of property rights of holders of traditional knowledge on biodiversity conservation and the sustainable use of its resources;
- Inventory of knowledge related to medicinal plants, used in different parts of the country;
- Information and awareness of people on the methods and traditional techniques for biodiversity conservation;
- Evaluation and dissemination of results.

**Estimated costs: 53,000 USD**  
**External financing:**  
**National contribution:** 10% of the project value  
**Duration:** 2 years  
**Start date:** 2015

**TABLE 17 – ESTIMATED COSTS: PROJECT “VALUATION OF TRADITIONAL PRACTICES AND CUSTOMS, LINKED TO BIODIVERSITY RESOURCES”**

(UNIT: 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR	
			2015	2016
1	Strengthening of human, material and technical capacity of the sectors that deal with ecosystem conservation processes	10	5	5
2	Gathering and analysis of available relevant information	6	3	3
3	Inventory and analysis of practical and traditional knowledge of biodiversity conservation and sustainable use of its components	10	7	3
4	Analysis of the existing legislation on access, protection and promotion of property rights of holders of traditional knowledge on biodiversity conservation and the sustainable use of its resources	2	1	1
5	Inventory of knowledge related to medicinal plants, used in different parts of the country	10	5	5
6	Information and awareness of people on the methods and traditional techniques for biodiversity conservation	10	5	5
7	Evaluation and dissemination of results	5	2	3
<b>Total</b>		<b>53</b>	<b>28</b>	<b>25</b>

### 3.3.4. ACTION PLAN FOR THE CONSERVATION OF THE MIXED FARMING ECOSYSTEMS AND SUSTAINABLE USE OF THEIR RESOURCES

**TABLE 18 – STRATEGIC AXIS: MIXED FARMING ECOSYSTEMS**

Country: São Tomé and Príncipe	Initial Program Cost: USD 1,170,000
Title: Action Plan and Strategy for Biodiversity Conservation	Duration: 6 years (2015-2020)
Strategic Axis: Mixed Farming Ecosystem	Elaboration Date: 2015

LOGIC INTERVENTION	ACTION PLAN	COMPLIANCE INDICATORS	SOURCES OF VERIFICATION
<b>GENERAL OBJECTIVE</b>			
1. Conservation of biological diversity of agro-ecosystem			
<b>SPECIFIC OBJECTIVES</b>			
1.1. To gather data and relevant information on the Agrarian Ecosystems, with a view to a better management and sustainable use of resources	Inventory of the biological resources of agro-ecosystems	A database with the main biological resources of the agro-ecosystems. Established	MADRP reports
1.2. To constitute a national reference collection on the major food crops and vegetables	Establishment of a base collection of major food crops and vegetables of STP	A collection of major food crops and vegetables. Established	MADRP reports
1.3. To promote the conservation, valuation and sustainable use of spontaneous fruit species	Establishment of a collection of spontaneous fruit species, with a view to conservation, recovery and sustainable use	A collection of the main spontaneous fruit species. Established	MADRP reports
1.4. Identify species more adaptable to different soil and climatic zones	Enrichment of plant and animal genotype fields, with the contribution of foreign and indigenous genes	Genotype fields. Installed and/or enriched	MADRP reports
1.5. Safeguard the identity of the genetic characteristics of locally adapted livestock species	Creation of a Centre for Livestock Research and Development	Research Centre on livestock species. Created and running	MADRP reports

PROJECT NO. 1: VALUATION OF AGRARIAN ECOSYSTEMS

**Priority:** Identification of the components of biological diversity

**Title:** Valuation of Agrarian Ecosystems

**Responsible Body:** MADRP

**National Partners:** MIRNA; MECI; small and medium-sized agricultural enterprises; the Chamber of Commerce, Industry, Agriculture and Services; NGOs and local communities

**International Partners:** FAO, UNEP, IUCN and NGOs

**Financial Partners:** FEM, IFAD, USAID, UNDP, EU, French cooperation

**Objectives**

- To have relevant data and information on the Agrarian Ecosystem, in order to protect the diversity of cultivated plant heritage through a better management and sustainable use;
- Deepen and enrich, in particular, the base knowledge on the main national food and fruit crops, including spontaneous species;
- Promote cooperation between national institutions for agricultural research and their foreign and international counterparts;
- To favour the conservation and sustainable use of local varieties, and promote the breeding of improved varieties;
- Establish a national reference collection on major food and fruit crops, including when spontaneous.

**Activities**

**1.** Strengthening of human, technical and material capacities of the sectors and services responsible for the study, conservation and enhancement of Agrarian Ecosystems;

**2.** Gathering and analysis of available information on those ecosystems;

**3.** An inventory of the biological diversity of the Agrarian Ecosystems, with particular focus on food and vegetable species (including when spontaneous) and of its location;

**4.** Mapping the Agrarian Ecosystems and implementation of the respective database;

**5.** Preparation of a chart of distribution of food and fruit species, including when spontaneous;

**6.** Establishment of a reference collection of such species;

**7.** Promoting scientific and technical research, particularly on spontaneous food and fruit species;

**8.** Define and implement a relevant plant improvement, multiplication and extension program;

**9.** Development of relevant information, education and communication programmes, along with the spreader agents and beneficiaries of the program;

**10.** Monitoring and evaluation of the planned activities;

**11.** Dissemination of results.

**Estimated costs: 440,000 USD**

**External financing:**

**National contribution:** 10% of the project value

**Duration:** 3 years

**Start date:** 2015

**TABLE 19 – ESTIMATED COSTS: PROJECT “VALUATION OF AGRARIAN ECOSYSTEMS”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, technical and material capacities of the sectors and services intended for the study, conservation and enhancement of Agrarian Ecosystems	80	35	30	15
2	Gathering and analysis of available information on those ecosystems	15	10	5	–
3	An inventory of the biological diversity of the Agrarian Ecosystems, with particular focus on food and vegetable species (including when spontaneous) and of its location	15	10	5	–
4	Mapping the Agrarian Ecosystems and implementation of the respective database	85	15	30	40
5	Preparation of a chart of distribution of food and fruit species, including when spontaneous	25	–	15	10
6	Establishment of a reference collection of such species	35	–	15	20
7	Promoting scientific and technical research, particularly on spontaneous food and fruit species	60	10	30	20
8	Define and implement the relevant plant improvement, multiplication and extension program	75	20	30	25
9	Development of relevant information, education and communication programmes, along with the spreader agents and beneficiaries of the program	15	5	5	5
10	Monitoring and evaluation of the planned activities	30	10	10	10
11	Dissemination of results	5	–	–	5
<b>Total</b>		<b>440</b>	<b>115</b>	<b>175</b>	<b>140</b>

PROJECT NO. 2: CREATION OF A CENTRE FOR RESEARCH AND DEVELOPMENT ON LIVESTOCK

**Priority:** Development of applied research programs, which allow for the control and preservation of livestock biological diversity and to increase productivity of the different breeds

**Title:** Creation of a Centre for Research and Development of Livestock

**Responsible Bodies:** MADRP

**National Partners:** MIRNA; Small Farmers; Medium and Large Agricultural Enterprises; Local Communities and NGOs

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA and French cooperation

**Objectives**

- To deepen the base knowledge on the main livestock species existing in the country, including indigenous breeds;
- To safeguard the identity of the genetic characteristics of locally adapted breeds and promote its vulgarization;

- To disseminate and make more accessible information about existing indigenous breeds in the country;
- To search on the identity of their genetic and phenotypic characteristics and define programs for their protection and breeding;
- To promote the technological and research capabilities within the scope of animal husbandry and veterinary medicine;
- Increase the income from livestock production through increased productivity of breeds;

**Activities**

1. Strengthening of human, technical and material capacities of the sectors called to deal with the problem of animal research, particularly on germplasm management and genetic improvement;
2. Gathering and analysis of available information on this subject;
3. Inventory of existing breeds of major livestock species and their territorial distribution;

4. Inventory of the main existing autochthonous breeds and determining their degree of vulnerability;
5. Creation of the Centre for Research and Development of Livestock and definition of its Activities Program;
6. Gathering and judicious use of information and experiences from other countries and international organizations specialized in this field;
7. Analysis and definition of criteria for selection within the species to be studied;
8. Creating conditions for the implementation of meadows, facilities, equipment and other means required to increase breeding value;

9. Developing increased breeding value techniques for the selected species;
10. Monitoring and evaluation of the planned activities;
11. Dissemination of results.

**Estimated costs: 730,000 USD**

**External financing:**

**National contribution:** 10% of the project value.

**Duration:** 3 years

**Start date:** 2015

**TABLE 20 – ESTIMATED COSTS: PROJECT “CREATION OF A RESEARCH AND DEVELOPMENT CENTRE FOR LIVESTOCK”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Strengthening of human, technical and material capacities of the sectors called to deal with the problem of animal research, particularly on germplasm management and genetic improvement	140	25	75	40
2	Gathering and analysis of available information on this subject	10	10	–	–
3	Inventory of existing breeds of major livestock species and their territorial distribution	10	5	5	–
4	Inventory of the main existing autochthonous breeds and determining their degree of vulnerability	15	10	5	–
5	Creation of the Centre and definition of its Activities Program	350	75	150	125
6	Gathering and judicious use of information and experiences from other countries and international organizations specialized in this field	15	5	5	5
7	Analysis and definition of criteria for selection within the species to be studied	5	–	5	–
8	Creating conditions for the implementation of meadows, facilities, equipment and other means required to increase breeding value	80	30	30	20
9	Developing increased breeding value techniques for the selected species	60	–	30	30
10	Monitoring and evaluation of the planned activities	35	10	10	15
11	Dissemination of results	10	–	5	5
<b>Total</b>		<b>730</b>	<b>170</b>	<b>320</b>	<b>240</b>

**3.3.5. ACTION PLAN AND STRATEGY FOR  
A FRAMEWORK FOR INSTITUTIONAL, LEGAL  
AND SOCIOECONOMIC BIODIVERSITY ASPECTS**

**TABLE 21 – INSTITUTIONAL, LEGAL AND SOCIOECONOMIC FRAMEWORK**

Country: São Tomé and Príncipe Title: Action Plan and Strategy for Biodiversity Conservation	Initial Program Cost: USD 1,111,000 Duration: 6 years (2015-2020)
Strategic Axis: Institutional, Legal and Socioeconomic Framework	Elaboration Date: 2015

LOGIC INTERVENTION	ACTION PLAN	COMPLIANCE INDICATORS	SOURCES OF VERIFICATION
<b>GENERAL OBJECTIVE</b>			
1. The conservation of Biodiversity and the use of their resources, based on a coherent, stronger and up-to-date institutional and legal framework			
<b>SPECIFIC OBJECTIVES</b>			
1.1. To develop mechanisms for the equitable sharing of benefits from the sustainable use of these resources	Establishing appropriate legal and administrative rules, to ensure the conservation of biodiversity and the inherent sustainable use of resources	Laws and regulations related to the conservation of biodiversity. Approved and in force	MIRNA Reports
1.2. To develop research in biotechnology, for the conservation of biological diversity and the sustainable use of its components	Development of a national legal framework on biosafety and promoting scientific research within the scope of biotechnology	Legislation on biosafety. Approved and in force	MIRNA Reports
1.3. To have human, technical and material capacity, which ensure a better <i>ex-situ</i> conservation of biological diversity	Strengthening the institutional capacity of the sectors responsible for the <i>ex situ</i> conservation	National staff, trained and with adequate technical competence, attached to the issue of biodiversity	MIRNA Reports
1.4. Encourage changes in attitude and behaviour of the population in relation to biological diversity	Information, education and communication (IEC) programs on Biological Diversity.	National authorities and population, in general, sensitized and active in biodiversity conservation	MIRNA Reports
1.5. To promote and encourage research to improve knowledge about the different ecosystems of the country and the animal and plant species. 1.6. To promote the expertise, in biodiversity, of researchers and trainers. 1.7. To disseminate research results	Scholarships grants for scientific research	Amount of grants awarded in the field of Biodiversity  Amount of workshops realized for the presentation of research results	Reports from MECF and the DGA-MIRNA
1.8. To promote the social learning and global appropriation of the biodiversity concept in the different sectors of society 1.9. Awareness, information and training of the whole society on the concepts of biodiversity and its conservation and preservation	Information and awareness on biodiversity in STP	The issue of information and awareness on biodiversity to be a specific function of MIRNA	DGA-MIRNA Reports

PROJECT NO. 1: DEVELOPMENT OF SPECIALIZED LEGISLATION ON BIODIVERSITY CONSERVATION AND ON THE SUSTAINABLE USE OF THE INHERENT RESOURCES

**Priority:** Establishing appropriate legal and administrative rules, to ensure the conservation of biodiversity and the sustainable use of inherent resources

**Title:** Development of Specialized Legislation on Biodiversity Conservation and the Sustainable Use of the Inherent Resources

**Responsible Bodies:** MIRNA

**National Partners:** National Assembly; tutelary Ministries for Justice and for Human Rights, MADRP, MECI, MDOI, MFAP and MAI, NGOs, economic agents and local communities

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU

**Objectives**

- To develop research for the conservation of biological diversity and inherent resources;
- To develop mechanisms for the equitable sharing of benefits from the exploitation of these resources.

**Activities**

1. Information and awareness of the target population;
2. Gathering and analysis of information from this population;
3. Formulation of legislation drafts, reflecting the wide diversity of the matter;
4. Conducting seminars at the district and national level for the necessary validation of the thus obtained texts;
5. Approval, by proper authority, and subsequent publication of the various validated diplomas;
6. Monitoring and evaluation of its implementation.

**Estimated costs: 80,000 USD**

**External financing:**

**National contribution:** 10 % of the project value.

**Duration:** 2 years

**Start date:** 2015

**TABLE 22 – ESTIMATED COSTS: PROJECT “DEVELOPMENT OF SPECIALIZED LEGISLATION ON BIODIVERSITY CONSERVATION AND SUSTAINABLE USE OF ITS RESOURCES”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR	
			2015	2016
1	Information and awareness of the target population	10	10	–
2	Gathering and analysis of information from this population	20	20	–
3	Formulation of legislation drafts, reflecting the wide diversity of the matter	30	20	10
4	Conducting seminars at the district and national level for the necessary validation of the thus obtained texts	15	–	15
5	Approval, by proper authority, and subsequent publication of the various validated diplomas	–	–	–
6	Monitoring and evaluation of its implementation	5	–	5
<b>Total</b>		<b>80</b>	<b>50</b>	<b>30</b>

PROJECT NO. 2: CREATION OF A NATIONAL LEGAL FRAMEWORK ON BIOSAFETY AND THE PROMOTION OF SCIENTIFIC RESEARCH IN BIOTECHNOLOGY

**Priority:** Establishment of legal and administrative standards, suitable for the production, importation and use of living organisms genetically modified, as well as products derived from them

**Title:** Creation of a National Legal Framework on Biosafety and the Promotion of Scientific Research in Biotechnology

**Responsible Bodies:** MIRNA.

**National Partners:** All concerned public and private structures, proper NGOs and local communities

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU

**Objectives**

- To develop research in biotechnology in the conservation of biological diversity and the sustainable use of its components;
- To develop mechanisms for cooperation and equitable sharing of benefits in technology transfer;
- To check the introduction into the country of modified living organisms;
- To ensure and control the environmentally safe handling of genetically modified organisms.

**Activities**

1. Socioeconomic survey on the use of biotechnology;
2. Information and awareness of the population and decision-makers;
3. Preparation of the statute draft on biosafety;
4. Regional and national workshops to validate this draft;
5. Approval, by proper authority, and subsequent publication of the validated draft;
6. Promotion of research on biotechnology;
7. Application of appropriate procedures for the assessment and management of risks to the environment, related to the handling of living modified organisms;
8. Monitoring and evaluation of the Project.

**Estimated costs: 112,000 USD**

**External financing:**

**National contribution:** 10% of the project value

**Duration:** 2 years

**Start date:** 2015

**TABLE 23 – ESTIMATED COSTS: PROJECT “CREATING A NATIONAL LEGAL FRAMEWORK ON BIOSAFETY”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR	
			2015	2016
1	Socioeconomic survey on the use of biotechnology	10	5	5
2	Information and awareness of the population and decision-makers	7	4	3
3	Preparation of the statute draft on biosafety	5	5	-
4	Regional and national workshops to validate this draft	15	5	10
5	Official approval of the draft and subsequent publication	-	-	-
6	Promotion of research on pertinent biotechnology	40	20	20
7	Application of appropriate procedures for the assessment and management of risks to the environment, related to the handling of living modified organisms	25	10	15
8	Monitoring and evaluation of the project	10	5	5
<b>Total</b>		<b>112</b>	<b>54</b>	<b>58</b>

PROJECT NO. 3: STRENGTHENING INSTITUTIONAL CAPACITY OF THE SECTORS RESPONSIBLE FOR *EX-SITU* CONSERVATION

**Priority:** Strengthening *ex situ* biodiversity conservation capacity

**Title:** Strengthening Institutional Capacity of the Sectors Responsible for *Ex-Situ* Conservation

**Responsible Bodies:** MADRP.

**National Partners:** MIRNA, MECF and MFAP; Small, Medium and Large agricultural enterprises; local communities and NGOs

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation

**Objectives**

- To have human, technical and material capacity, which ensure better *ex-situ* conservation of biological diversity.

**Activities**

1. Strengthening of human, material and technical capacity in sectors that deal with the *ex-situ* conservation;
2. Assessment of the measures, policies and facilities necessary to ensure better *ex-situ* conservation of the biological diversity;
3. Identification of national priorities for *ex-situ* conservation and research;
4. Implementation of national *ex-situ* conservation facilities.

**Estimated costs: 275,000 USD**

**External financing:**

**National contribution:** 10% of the Project value

**Duration:** 4 years

**Start date:** 2015

**TABLE 24 – ESTIMATED COSTS: PROJECT “STRENGTHENING THE INSTITUTIONAL CAPACITY OF THE SECTORS RESPONSIBLE FOR EX-SITU CONSERVATION”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR			
			2015	2016	2017	2018
1	Strengthening of human, material and technical capacity in sectors that deal with the <i>ex-situ</i> conservation	100	40	30	15	15
2	Assessment of the measures, policies and facilities necessary to ensure better <i>ex-situ</i> conservation of the biological diversity	30	10	10	5	5
3	Identification of national priorities for <i>ex-situ</i> conservation and research	25	10	5	5	5
4	Implementation of national <i>ex-situ</i> conservation facilities	120	40	40	20	20
<b>Total</b>		<b>275</b>	<b>100</b>	<b>85</b>	<b>45</b>	<b>45</b>

PROJECT NO. 4: CONDUCTING PROGRAMS OF INFORMATION, EDUCATION AND COMMUNICATION ON THE CONSERVATION OF BIOLOGICAL DIVERSITY, DESIGNED FOR POLITICAL AND ADMINISTRATIVE RESPONSIBLES, TECHNICAL STAFF, PROFESSIONAL AND ECONOMIC AGENTS WHOSE BUSINESS DEALS CLOSELY WITH THE TOPIC, NGOs AND THE POPULATION IN GENERAL

**Priority:** Promote the responsible participation of the target population in the sustainable management of biological diversity.

**Title:** Conducting Programs of Information, Education and Communication on the Conservation of Biological Diversity, Dedicated to Political and Administrative Responsible, Technical Staff, Professional and Economic Agents whose Business Deals Closely with the Topic, NGOs and the Population in General

**Responsible Bodies:** MIRNA.

**National Partners:** MADRP, MECF, the Media, NGOs and local environmentalist groups\*.

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs.

**Financial Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU

#### Objectives

- To promote changes in attitude and behaviour of the population in relation to biological diversity;
- To promote the emergence, in the population, of an attitude of respect, defence and enhancement of biological diversity and sustainable use of the inherent resources.

#### Activities

1. Gathering of information about negative attitudes and behaviours of the population in relation to biodiversity;
2. Definition of IEC programs, differentiated according to the target groups;
3. Set up and training teams for the implementation of programmes;
4. Preparation of the support equipment for the realization of the programs;
5. Organisation of the Implementation Plan for the anticipated goals;
6. Implementation of IEC programs;
7. Monitoring and evaluation of the accomplished activities;
8. Dissemination of results.

**Estimated costs: 175,000 USD**

**External financing:**

**National contribution:** 10 % of the project value.

**Duration:** 2 years

**Start date:** 2015

**TABLE 25 – ESTIMATED COSTS: PROJECT “IMPLEMENTATION OF IEC PROGRAMS”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR	
			2015	2016
1	Gathering of information about negative attitudes and behaviours of the population in relation to biodiversity	45	35	10
2	Definition of IEC programs, differentiated according to the target groups	10	10	–
3	Set up and training teams for the implementation of programmes	10	10	–
4	Preparation of the support equipment for the realization of the programs	25	20	5
5	Organisation of the Implementation Plan for the anticipated goals	5	5	–
6	Implementation of IEC programs	60	20	40
7	Monitoring and evaluation of the accomplished activities	15	5	10
8	Dissemination of results	5	–	5
<b>Total</b>		<b>175</b>	<b>105</b>	<b>70</b>

\* Groups of citizens previously prepared, within the framework of PNADD, to information and sensibilization activities, concerning Environment and Sustainable Development of Local Communities.

PROJECT NO. 5: PRODUCTION OF FILMS, CARDS AND POSTERS, STAMPS AND ATLAS, OF THREATENED OR ENDANGERED SPECIES OF THE WILD FAUNA AND FLORA

**Priority:** Strengthening of *in situ* conservation of biological diversity

**Title:** Production of Films, Cards and Posters, Stamps and Atlas, of Threatened or Endangered Species of the Wild Fauna and Flora

**Responsible Bodies:** MIRNA

**National Partners:** MADRP, MECI, local communities and NGOs

**International Partners:** FAO, UNEP, IUCN, WWF, GTZ, UNESCO and international NGOs

**Financial Partners:** GEF, UNDP, WB, French cooperation

**Objectives**

- To strengthen popular participation in conservation and sustainable use of biological diversity, through awareness-based processes of didactic and educational materials with highly informative impact;
- To inform the general public of the threats to certain plant and animal species, through the publication of the atlas and production of films, documentaries, stamps, postcards and other illustrative materials.

**Activities**

1. Strengthening of human, material and technical capacities in sectors that deal with threatened or endangered wild species;
2. Gathering and analysis of available information on this species;
3. Information and awareness of users of the wildfauna and wild flora resources;
4. Inventory of threatened or endangered species;
5. Analysis and interpretation of the collected data;
6. Mapping of habitats of the species under study;
7. Production of films, postcards, posters, stamps and atlas;
8. Dissemination of the results.

**Estimated costs: 104,000 USD**

**External financing:**

**National contribution:** 10% of the project value

**Duration:** 2 years

**Start date:** 2015

**TABLE 26 – ESTIMATED COSTS: PROJECT “PRODUCTION OF FILMS, POSTCARDS, POSTERS, STAMPS AND ATLAS, OF ENDANGERED SPECIES”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR	
			2015	2016
1	Strengthening of human, material and technical capacities in sectors that deal with threatened or endangered wild species	15	10	5
2	Gathering and analysis of available information on this species	5	3	2
3	Information and awareness of users of the wildfauna and wild flora resources	4	2,5	1,5
4	Inventory of threatened or endangered species	25	15	10
5	Analysis and interpretation of the collected data	10	5	5
6	Mapping of habitats of the species under study	10	5	5
7	Production of films, postcards, posters, stamps and atlas	25	15	10
8	Dissemination of the results	10	5	5
<b>Total</b>		<b>104</b>	<b>60,5</b>	<b>43,5</b>

PROJECT NO. 6: SCHOLARSHIPS FOR RESEARCH ON BIODIVERSITY

**Priority:** Identification of the components of biological diversity

**Title:** Scholarships for Research on Biodiversity

**Responsible Bodies:** MIRNA

**National Partners:** MADRP, MDOI, MAI, local communities and NGOs

**International Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU

**Objectives**

- Granting of two annual scholarships for biodiversity research in STP (one in each of the first two years) for those who are already employed in STP and are trained in related fields.
- Within the scholarships awarded by the MECF, there are also included one annual scholarship for each of the next three years, in the field of biodiversity, for those who want to study in STP in related fields

**Activities**

1. Promote a scholarship service through the MECF
2. Publication of the research final work.
3. Disclosure of the work through a workshop.
4. Monitoring and evaluation of the planned activities

**Estimated costs: 230,000 USD****External financing:****National contribution:** 10% of the project value**Duration:** 6 years**Start date:** 2015**TABLE 27 – ESTIMATED COSTS: PROJECT “SCHOLARSHIPS FOR RESEARCH ON BIODIVERSITY”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR					
			2015	2016	2017	2018	2019	2020
1	Promote a scholarship service through the MECF	0	0	0	0	0	0	0
2	Granting of scholarships	100	10	20	20	20	20	10
3	Publication of the research final work	50	0	10	10	10	10	10
4	Disclosure of the work through a Workshop	50	0	10	10	10	10	10
5	Monitoring and evaluation of the planned activities	30	5	5	5	5	5	5
<b>Total</b>		<b>230</b>	<b>15</b>	<b>45</b>	<b>45</b>	<b>45</b>	<b>45</b>	<b>35</b>

PROJECT NO. 7: INFORMATION, EDUCATION AND COMMUNICATION ON BIODIVERSITY

**Priority:** Identification of the components of biological diversity**Title:** Information, Education and Communication on Biodiversity**Responsible Bodies:** MIRNA**National Partners:** MDOI, MAI, MADRP, local communities and NGOs**International Partners:** GEF, UNDP, WB, ADB, IFAD, BADEA, French cooperation, EU**Objectives**

- To promote information, education and communication on biodiversity

**Activities**

1. Preparation and distribution, in the society at large, of compendia on biodiversity and its valorisation;
2. Incorporation, in the curriculum manuals, of contents, including pictures, that reflect the importance of biodiversity and the need for its conservation;
3. Monitoring and evaluation of the planned activities.

**Estimated costs: 135,000 USD****External financing:****National contribution:** 10% of the project value**Duration:** 3 years**Start date:** 2015**TABLE 28 – ESTIMATED COSTS: PROJECT “INFORMATION, EDUCATION AND COMMUNICATION ON BIODIVERSITY”**

(UNIT 1,000 USD)

NO.	ACTIVITIES	TOTAL COST	YEAR		
			2015	2016	2017
1	Preparation and distribution, in the society at large, of compendia on biodiversity and its valorisation	60	20	20	10
2	Incorporation, in the curriculum manuals, of contents, including pictures, that reflect the importance of biodiversity and the need for its conservation	60	20	20	20
3	Monitoring and evaluation of the planned activities.	15	5	5	5
<b>Total</b>		<b>135</b>	<b>45</b>	<b>45</b>	<b>45</b>

### 3.3.6 ACTIVITIES AND BUDGET SUMMARY

**TABLE 29 – ACTIVITIES AND BUDGET SUMMARY**

PROJECT NO.	PROJECT NAME	UNITARIAN COST	TOTAL
<b>STRATEGIC AXIS: COASTAL AND MARINE ECOSYSTEMS</b>			<b>2,160,000</b>
1	Ordinance of the Coastal Zone Territory and Sustainable Management of its Resources	435,000	
2	Sustainable Management of the Exclusive Economic Zone	705,000	
3	Development of the Artisanal Fisheries	600,000	
4	Protection of the Marine and Coastal Environment	255,000	
5	Fight Against Illegal Unreported and Unregulated Fishing	165,000	
<b>STRATEGIC AXIS: INLAND WATERS ECOSYSTEMS</b>			<b>440,000</b>
1	Conservation of Biodiversity and Biological Resources of Inland Waters	440,000,00	
<b>STRATEGIC AXIS: FOREST ECOSYSTEMS</b>			<b>1,449,000</b>
1	Development of Sustainable Management of Forests	345,000	
2	Conservation of Tree Species of Commercial Value	670,000	
3	Conservation of Endangered Fauna Species	131,000	
4	Revitalization of <i>Ex-Situ</i> Conservation	250,000	
5	Valorisation of Traditional Uses and Costumes, Linked to Biodiversity Resources	53,000	
<b>STRATEGIC AXIS: MIXED FARMING ECOSYSTEMS</b>			<b>1,170,000</b>
1	Valorisation of the Agricultural Ecosystem	440,000	
2	Creation of a Centre for Livestock Research and Development	730,000	
<b>STRATEGIC AXIS: FRAMEWORK OF THE INSTITUTIONAL, LEGAL AND SOCIOECONOMIC ASPECTS</b>			<b>1,111,000</b>
1	Preparation of Specialized Legislation	80,000	
2	Implementation of a National Legal Framework	112,000	
3	Strengthening Institutional Sectorial Capacity	275,000	
4	Carrying out Information, Education and Communication Programs	175,000	
5	Realisation of Films, Cards and Posters, Stamps and Atlas	104,000	
6	Scholarships for Research on Biodiversity	230,000	
7	Information, Education and Communication in the Field of Biodiversity	135,000	
<b>Total</b>		<b>6,330,000</b>	<b>6,330,000</b>

### **3.4. LOGICAL FRAMEWORK OF INTERVENTION (IMPLEMENTATION, MONITORING AND EVALUATION)**

#### **3.4.1. CREATING MECHANISMS FOR THE IMPLEMENTATION OF THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN**

The implementation of the National Biodiversity Strategy and Action Plan, having a multisectoral nature, needs the implementation of a coordinating structure. Therefore, in order for this structure to carry out conveniently its objective, it will need technical, material, scientific and legal support. The structure should draw up a business plan that will allow to continue, in a steadily way and for long-term, fairly financial sustainability. The overall objective of this structure is to promote conservation of biological diversity, by implementing activities provided for in its Action Plan of biological diversity.

- It is proposed therefore, the creation of a National Coordination Office, with the DGA, whose specific objectives are:
- The coordination of initiatives and projects concerning the conservation of biological diversity;
- The implementation and management of a sustainable funding mechanism for conservation activities on biological diversity and sustainable use of biological resources;

The coordination of all scientific work, taking place in the country, ensuring consistent sharing of data, so as its relevance.

Within the scope of the coordination of initiatives and projects, concerning the conservation of biological diversity, the structure shall have as aim:

- To act as a focal point for the network of all national public and private agencies involved in the conservation or enhancement of biological diversity;
- To support private initiatives aimed at the restoration of degraded ecosystems and the protection of biological diversity;
- To promote collaboration with the bodies and institutions involved within the scope of biodiversity;
- To sensitize the general public through publications and exhibitions of collections, specimens, films, documentaries and other means made available by any partner;
- To gather and manage information on biological diversity, with the aim of promoting sustainable use of natural resources and promote the exchange of scientific information;
- To act as a structural resource for the identification of training institutions and grants for scholarships and perfecting, in order to alert,

stakeholders and other interested individuals, for opportunities;

- To create and manage a national mechanism for coordination and exchange of scientific, technical, socioeconomic and cultural information, in the field of biological diversity;
- To promote the increase of the investment in the conservation of biological diversity and sustainable use of resources;
- To implement and maintain a database for the conservation and management of natural resources and biotechnology;

Within the scope of the implementation and management of a sustainable funding mechanism for the conservation activities of biological diversity and the sustainable use of biological resources, the structure will have the following tasks:

- Encouraging the private sector to adopt sustainable and responsible strategies, aimed at promoting the various products and services of natural resources, using a percentage of income in the respective conservation activities;
- Act as a structural resource to identify and support the mobilization of partnerships, both nationally and internationally, on environment activities;
- Act as promotion service provider (marketing) for long-term valuation of biological diversity, both nationally and internationally;
- Act as a structural resource in financing conservation of biological diversity activities, and assist the mobilization of funding;
- Act as a structural resource for the provision of services on assembling dossiers for the financing of sustainable exploitation of biological resources activities;
- Act as a structural recourse to attend national public and private agencies in organizing seminars and workshops concerning issues related to biological diversity;
- Promote the creation and manage of a special trust fund to strengthen the conservation of biological diversity and sustainable use of its resources.

#### **3.4.2. FINANCING STRATEGY OF THE NATIONAL COORDINATION OFFICE**

The operation of the National Coordination Office (NCO) should be supported by a management model, which would enable it to gradually take over, in the medium term, a certain financial sustainability that should be achieved in the long term. In addition to the use of funding from traditional sources (aid agencies,

bilateral and multilateral cooperation, donations and legacies, etc.) for their financing funds, the NCO should be founded on a financing strategy based on royalties. For example, the projects, structures or initiatives that benefit from NCO services must pay use taxes proportional to the level of the funds that the services, provided by the Office, have contributed to mobilize.

To optimize the production of those use taxes, the NCO will call for innovative mechanisms, such as:

- Promotion, in the national and international private sector (breweries, oil companies, airlines, travel agencies, shipping, national lottery, international journals, pharmaceutical companies, etc.), of the use of images, related with STP animals, plant species or their ecosystems, for the marketing of their products;
- Promotion of the use of images relating to animal and plant species in the postal stamps;
- Promotion of sponsorship and twinning with other cities or northern research centres, zoos and botanical gardens, etc., for projects or other initiatives

The implementation of a NCO website, as well as advertising folders, will constitute effective means to reach a wider audience, both nationally and internationally.

Nowadays it is also essential to use social media for awareness and education, so as for fundraising and support for projects.

### **3.5. FUNDING STRATEGY**

#### **3.5.1. OBJECTIVES OF THE FUNDING STRATEGY**

The documents produced will not have any use, at the end of this process, if their content is not objectively implemented on the ground of projects funded on a sustainable basis.

Most traditional lenders issue increasing reservations on the ability of individually support the weight of funding projects in developing countries. Several reasons are behind this attitude, especially pressure from their taxpayers, to whom governments impose a certain internal rationalization of expenditure, due to the fight against the deficit, as well as questions about the profitability of financing in developing countries. Finally, it seems completely legitimate that subscribers can, at certain point, put the issue of sustainability of projects, according to its new financial interventions.

In the era of globalization and emergence of the new economy, with the progressive emergence of new tools and procedures, it becomes imperative that the funding approach to the implementation of a National Biodiversity Strategy and Action Plan can produce the optimization of the stock of situations, instruments and even current predisposition of certain key actors, both at national and international level.

The development of a financing strategy is justified by the increasingly growing need for internalization of the financing mechanisms, which is the only way to provide the sustainability of projects. Further more, a clear and coherent financing strategy is a powerful way for fundraising from various sources, able to ensure a rational of complementarity. The financing strategy, which has as its backdrop the current local, national and international context, will also allow to look for important players until recently ignored, especially in what concern projects on the environment – the private sector.

Here it is proposed an approach, by which STP wants to mobilize all subscriber actors, with the aim of establishing a sustainable funding mechanism for the proposed activities on biological diversity, at the national action level. Subscriptions comprehend all forms of contribution, in kind or in cash. Also included in the contributions, there are the salary payments of the project's staff and the support from eventual external technicians and/or specialists.

Target subscribers:

#### **Nationally:**

- STP Government;
- Bilateral and multilateral cooperation;
- National private sector (in the areas of agriculture, agri-food, forestry, fisheries, civil engineering, oil-production, brewery, banks, insurance companies, hotels, airlines, etc.), comprising:
  - corporations;
  - business owners;
- Official companies and the National Lottery Services;
- National sponsors (traders or professional);
- Solidarity movements, national charities.

#### **Internationally:**

- Traditional aid agencies;
- Zoological and botanical parks;
- Foreign research centres having, within their research subjects, the priority of certain particular species of the biological diversity of STP;
- Airlines operating in São Tomé and Príncipe;
- The major magazines that deal with environmental issues (National Geographic, GEO Revue, etc.);
- International NGOs.

### 3.5.2. PROCESS STEPS

- Prepare a brief presentation document of the National Biodiversity Strategy and Action Plan of STP (colour fold for potential subscribers) and, if possible, a website or a social page with more details. The leaflet and website should contain not only the Strategy and the Action Plan, but equally demonstrate how prospective applicants should increase its involvement in this partnership;
- Carry on, as a first step, the identification of potential subscribers within each above-mentioned category;
- Conduct a promotional survey to selected potential subscribers. This first survey should enable the Project Coordination, responsible for the strategy, to meet the profile, the interests and the degree of actual or potential social involvement of each of the subscribers. The survey will also assess the extent to which potential subscribers are able to move forward in funding or material support to the proposed Activities. Finally, will give opportunity to potential subscribers to specify how their financial or material contribution can be made profitable from a promotional point of view. This survey should also allow the joint identification (project and subscribers) of the mechanisms through which subscribers will optimize the services of a possible supervisory framework of the implementation of the Action Plan of Biological Diversity. This assumes that, from the point of view of the actions to be implemented, the mandate, status and operating mode (including the types of financing of the new structure activities) should be the subject of previous discussions with the potential subscribers of the identified projects;
- It is highly recommended closely associate the Ministry of Cooperation with the financiers mobilization process;

- Organize a Round Table of Subscribers. Following the interest of the potential subscribers, it will be made the selection of organizations or individuals who will be invited to the Round Table. It is opportune to mention that there are, in certain places, in certain northern countries, notably in Canada, mechanisms that enable engineering firms, or other, quick access to bilateral cooperation funding, and this could be used in similar cases. It is therefore strongly recommended to identify and invite some of these firms, which operate or have interests in STP, even if they are not identified as direct subscribers;
- Having, within a global view of the conservation strategy of biological diversity of STP, identified the oil resources, as a key tool that should play a positive and indispensable role in the conservation of biodiversity, will be an imperative to mobilize the financial contribution of this sector.

### 3.5.3. PREPARATION OF A ROUND TABLE WITH THE SUPPORT OF AN INTERNATIONAL CONSULTING

- Production of a fold;
- Implementation of a promotional Website;
- Finish the potential subscribers list;
- Preparation and sending of a survey questionnaire to potential subscribers (by mail and/or Internet). It will be necessary to previously contact potential subscribers in order to sensitize them, so that they can answer the questions of the survey and express their views and expectations;
- Identification of participants to the Round-table;
- Preparation and dispatch of invitations;
- Holding the Round-table.





## **ATTACHMENTS**

**A1 – MAJOR ENDEMIC PLANTS (22 *ORCHIDACEAE* NOT INCLUDED)**

**A2 – MAIN INDUSTRIAL TREE SPECIES**

**A3 – MAIN FOOD PLANT SPECIES**

**A4 – MAIN MEDICINAL PLANT SPECIES**

**A5 – MAIN ORNAMENTAL PLANT SPECIES**

**A6 – MAIN ENDEMIC INLAND BIRDS**

**A7 – LIST OF ENDANGERED ANIMAL SPECIES**

**A8 – MAIN WILD TERRESTRIAL ANIMALS**

**A9 – INVENTORY OF MOLLUSCS**

**A10 – LIST OF MAIN CRUSTACEAN (CLASS *MALACOSTRACA*)**

**A11 – LIST OF MAIN CETACEAN**

**A12 – MAIN SEABIRD SPECIES**

**A13 – COMMERCIAL SPECIES CAPTURED IN ARTISANAL FISHERIES**

## A1 – MAJOR ENDEMIC PLANTS (22 ORCHIDACEAE NOT INCLUDED)

(Indexed by Family)

FAMILY	BINOMIAL NOMENCLATURA	VERNACULAR NAME	REF.	ECOFAC 2	D.G.
Acanthaceae	<i>Brachystephanus occidentalis</i> Lindau		Ex	HO 7390, JL 95/012	S,E
	<i>Heteradelphia paulowilhelmia</i> Lindau				S,E
	<i>Justicia thomensis</i> Lindau		Ex	HO 7302, FO 184	S,E
Anisophylleaceae	<i>Anisophyllea cabole</i> Henriq.	Pau caboré, cabolé	E.St, Ex	FO 120	S,E
Apocynaceae	<i>Tabernaemontana</i> spp. aff. <i>Stenosiphon</i>		Ex		E,P
	<i>Tabernaemontana stenosphon</i> Stapf	Cata d'Obô	Ex	FO 166, JL 95/068	S,E
	<i>Marsdenia exellii</i> C. Norman in Exell		Ex		S,E
Araliaceae	<i>Polyscias quintasii</i> Exell	Gueguê fasso, Vela	Ex	FO 163	E,S,P
Balsaminaceae	<i>Impatiens buccinalis</i> Hook.f.	Camarões	Ex	FO 617, HO 750	S,E
	<i>Impatiens manteroana</i> Exell		Ex		E,P
	<i>Impatiens thomensis</i> Exell		Ex	HO 7596, HO 7550	S,E
Begoniaceae	<i>Begonia baccata</i> Hook. F.	Fiá boba vermelha	Ex	HO 7485, JL 97/320	S,E
	<i>Begonia crateris</i> Exell	Fiá boba d'Obô	Ex		S,E
	<i>Begonia fusialata</i> var. <i>principensis</i> J.J. De Wild				E,P
	<i>Begonia loranthoides</i> Hook. F. ssp. <i>loranthoides</i>				E,S,P
	<i>Begonia mollerii</i> (C. DC.) Warb.		Ex		S,E
Boraginaceae	<i>Ehretia scrobiculata</i> Hiern		Ex		E,P
Cannabaceae	<i>Celtis pratii</i> Priemer ex Engl.	Quaco branco	Ex		E,S,P,A
Celastraceae	<i>Maytenus monodii</i> Exell		Ex		S,E
Commelinaceae	<i>Palisota pedicellata</i> K. Schum.		Ex	FO 531, JL 95/078	E,S,P,A
Cyatheaceae	<i>Cyathea welwitschii</i> Hook.				
Cyperaceae	<i>Carex leptocladus</i> C. B. Clarke		Ex	JL 94/560, JL 95/021	S,E
	<i>Cyperus sylvicola</i> Ridl.		Ex		S,E
	<i>Hypolytrum grande</i> (Uitt.) Koyama		Ex		E,P
	<i>Mapania ferruginea</i> Ridl.		Ex	JL 95/031	E,S,P
Dichapetalaceae	<i>Dichapetalum bocageanum</i> (Henriq.) Engl.	Melambo	Ex		S,E
Ericaceae	<i>Erica thomensis</i> (Henriq.) Dorr & E.G.H.Oliv.	Urze	Ex	JL 94/557, HO 7370	S,E
Euphorbiaceae	<i>Croton stellulifer</i> Hutch.	Cubango, Cobango	EX, Fi	JL 97/348	E,S,P
	<i>Discoclaoxylon occidentale</i> (Mull. Arg.) Pax & K. Hoffm.	Quina n° 2	Ex, Fi	HO 7437, FO 22	E,S,P
	<i>Drypetes glabra</i> (Pax) Hutch.	Mamon d'obô	Ex, Fi	HO 7235, FO 621	S,E
	<i>Drypetes henriquensii</i> (Pax) Prain	No-no, Mamon d'Obô	Ex, Fi		S,E
	<i>Erythrococca columnares</i> (Müll. Arg.) Prain		Ex		E,P
	<i>Erythrococca mollerii</i> (Pax) Prain	Coedano n° 2	Ex, Fi	HO 7285, FO 597	S,E
	<i>Grossera elongata</i> Hutch.		Ex		E,P
Hernandiaceae	<i>Hernandia beninensis</i> Welw. Ex Henriq.	Bungá, pau candeia	Ex, Fi		E,S,B
Leeaceae	<i>Leea tinctoria</i> Lindl. Ex Baker	Celé-alé, Celé-celé	Ex, Fi	JL 94/511, HO 7243	S,E
Lobeliaceae	<i>Lobelia barnsii</i> Exell		Ex	HO 7374, HO 7703	S,E
Melastomataceae	<i>Calvoa confertifolia</i> Exell				S,E
	<i>Calvoa crassinoda</i> Hook. f.				S,E

FAMILY	BINOMIAL NOMENCLATURA	VERNACULAR NAME	REF.	ECOFAC 2	D.G.
	<i>Calvoa grandifolia</i> Cogn.		Ex	HO 7399, FO 516	E,S,P
	<i>Calvoa integrifolia</i> Cogn.				S,E
	<i>Calvoa sinuata</i> Hook. F. Ex Triana				E,P
	<i>Tristemma littorale</i> Benth. ssp. <i>biafranum</i> Jac.-Fél. var. <i>insulare</i> Jac. Fél.				S,E
	<i>Tristemma mauritanum</i> J. F. Gmel. var. <i>thomense</i> (Ferr.) Jac.-Fél.				S,E
Meliaceae	<i>Trichilia grandifolia</i> Oliv.	Cola de macaco	Ex	HO 7576, JL 95/065	S,E
Moraceae	<i>Ficus chlamydocarpa</i> Mildbr. & Burret ssp. <i>fernandesiana</i> (Hutch.) C. C. Berg	Figo obato	Ex, Fi	JL 97/231, FO 622	S,E
Miristicaceae	<i>Staudtia pterocarpa</i> (Warb.) Warb.	Pau vermelho	ES, Fi	FO 338	S,E
Ochnaceae	<i>Campylospermum vogelii</i> (Hook. F.) Farron var. <i>molleri</i> (Van Thiegh)	Pau dumo	Ex	FO 550	E,S,P
	<i>Ouratea nutans</i> (Hiern) Exell		Ex		E,P
	<i>Rhabdophyllum arnoldianum</i> (De Wild. & Th. Dur.) var. <i>Quintasii</i> (Van thiegh.) Farron		Ex	SC 08	S,E
Oleaceae	<i>Jasminum thomense</i> Exell		Ex		S,E
Pandanaceae	<i>Pandanus thomensis</i> Henriq.	Pau esteira	Ex	HO 7712, FO 234	S,E
Phyllanthaceae	<i>Maesobotrya glabrata</i> (Hutch.) Exell		Ex	FO 551, FO 553	E,P
	<i>Phyllanthus physocarpus</i> Mull. Arg.		Ex		E,P
	<i>Thecacoris manniana</i> (Mull. Arg.) Mull. Arg.	Pau figado	Ex	FO 630	S,E
	<i>Thecacoris membranacea</i> Pax		Ex	JL 95/054	S,E
Piperaceae	<i>Peperomia thomeana</i> C. DC.		Ex		S,E
Podocarpaceae	<i>Afroparpus mannii</i> (Hook F.) C. N. Page	Pinheiro de S. Tomé	Ex	HO 7617, FO 222	S,E
Rhamnaceae	<i>Lasiodiscus rozeirae</i> Exell		Ex		S,E
Rhizophoraceae	<i>Cassipourea glomerata</i> Alston		Ex		S,E
Rubiaceae	<i>Aidia quintasii</i> (K. Schum.) G. Taylor	Muindo	Ex		S,E
	<i>Aidia wattii</i> G. Taylor	Inhé muela	Ex		S,E
	<i>Aulacocalyx pallens</i> (Hiern) Bridson & E. Figueredo ssp. <i>pallens</i>	Teia-teia pequena	Ex		S,E
	<i>Belonophora coffeoides</i> Hook. f.		Ex		S,E
	<i>Bertiera pedicellata</i> (hiern) Wernham		Ex	JL 95/075, FO 517	E,S,P
	<i>Craterispermum montanum</i> (Heirn)	Macambrará	Ex, Fi	HO 7569	E,S,P,A
	<i>Ecpoma cauliflorum</i> (Hiern) N. Hallé		Ex	HO 7556	S,E
	<i>Lasianthus africanus</i> Hiern		Ex		E,S,P
	<i>Mussaenda tenuiflora</i> Benth. var. <i>principensis</i> G. Taylor		Ex		E,P
	<i>Mussaenda tenuiflora</i> Benth. var. <i>thomensis</i> G. Taylor		Ex	FO 522	S,E
	<i>Pauridiantha composii</i> (G. Taylor)		Ex		S,E
	<i>Pauridiantha insularis</i> (Hiern) Bremek.		Ex		S,E
	<i>Pavetta monticola</i> Hiern		Si, Ex	HO 7498, HO 7586	E,S,A
	<i>Psychotria guerkeana</i> K. Schum.		Ex	JL 95/548	S,E

FAMILY	BINOMIAL NOMENCLATURA	VERNACULAR NAME	REF.	ECOFAC 2	D.G.
	<i>Psychotria molleri</i> K. Schum.	Pau duno	Ex		S,E
	<i>Psychotria nubicola</i> G. Taylor		Ex		S,E
	<i>Psychotria principensis</i> G. Taylor	Café silvestre	Ex	FO 581	E,P
	<i>Psychotria thomensis</i> G. Taylor		Ex		S,E
	<i>Sabicea exellii</i> G. Taylor		Ex	HO 7367, JL 97/630	S,E
	<i>Sabicea ingrata</i> K. Schum.		Ex	HO 7476, FO 466	S,E
	<i>Sabicea ingrata</i> K. Schum. var. <i>insularis</i> (Wernham) Joffroy		Ex	FO 324, FO 473	E,S,A
	<i>Sabicea thomensis</i> Joffroy.				S,E
	<i>Tarenna nitiduloides</i> G. Taylor		Ex, Fi		S,E
Salicaceae	<i>Casearia mannii</i> Mast.				E,S,P
	<i>Homalium henriquesii</i> Gilg. Ex Engl.	Quebra machado	Ex, Fi	HO 7586	S,E
Sapindaceae	<i>Chytranthus mannii</i> Hook. f.	Pessegueiro	Ex	FO 107, HO 7685	E,S,P
Sapotaceae	<i>Chrysophyllum calophyllum</i> Exell		Ex		E,P
	<i>Chrysophyllum henriquesii</i> Engl.		Ex		E,P
	<i>Vincentella densiflora</i> (Baker) Pierre		Ex		S,E
Scrophulariaceae	<i>Thunbergianthus quintasii</i> Engl.	Musa fria	Ex, Fi	HO 7397, HO 7456	S,E
Theaceae	<i>Balthasaria mannii</i> (Oliver) Verdc.		Ex		S,E
Thymelaeaceae	<i>Dicranolepis thomensis</i> Engl. & Gilg.		Ex	HO 7679, FO 539	S,E
	<i>Peddiea thomensis</i> Exell	Tchapo d'Obô	Ex	FO 168, JL 95/017	S,E
Urticaceae	<i>Elastostema thomense</i> Henriq.		Ex, Fi	HO 7289, FO 585	S,E
Violaceae	<i>Pilea manniana</i> Wedd.		Ex	HO 7354, HO 7360	S,E
	<i>Rinorea chevalieri</i> Exell		Ex, Fi	HO 7724, FO 343	S,E
	<i>Rinorea insularis</i> Engl.		Ex		E,P
	<i>Rinorea thomensis</i> Exell	Tesse	Ex, Fi		S,E
Vitaceae	<i>Cyphostemma curvipodum</i> (Baker) Desc.		Ex		S,E
Zingiberaceae	<i>Renalmia sancti-thomae</i> I.M.Turner		Ex	HO 7388, HO 7588	S,E

**REF.:** References

**Ex:** Exell (1973), – **E.St:** Espírito Santo – **Fi:** Figueiredo – **Si:** Silva

**D.G.:** Geographic Distribution.

**E:** Endemic to the Gulf of Guinea islands – **S:** São Tomé – **P:** Príncipe – **A:** Annobón – **B:** Bioco

## A2 – MAIN INDUSTRIAL TREE SPECIES

(Indexed by Family)

FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME	PLANT FORMATION
Anacardiaceae	<i>Pseudospondias microcarpa</i> A. Rich.	Zenzém	Sec. F.
Anisophylleaceae	<i>Anisophyllea cabole</i> Henriq.	Pau cabore, cabolé	D.F.
Arecaceae	<i>Elaeis guineensis</i> Jacq.	Palmeira	Sec. F.
Boraginaceae	<i>Cordia platythyrsa</i> Bak.	Tabaque	Sec. F.
Calophyllaceae	<i>Mammea africana</i> Sabine	Magloso, Oba, Pau mamão	Sec. F.
Cannabaceae	<i>Trema orientalis</i> (L.) Blume	Pau cabra	Alt. F.
	<i>Celtis mildbraedii</i> Engl.	Pó capiton	Sec. F.
	<i>Celtis prantlii</i> Priemer ex Engl.	Quaco branco	Sec. F.
Clusiaceae	<i>Symphonia globulifera</i> L.f.	Óleo barão, pau amarelo	Alt. F.
Euphorbiaceae	<i>Sapium ellipticum</i> (Hochst.) Pax.	Pau-maria	Alt. F.
	<i>Bridelia stenocarpa</i> Müll. Arg.	Muindo	Sec. F.
	<i>Hevea brasiliensis</i> Müll. Arg.	Borracha	Sec. F.
	<i>Tetrorchidium didymostemon</i> (Baill.) Pax & K.Hoffm.	Pau mole, Branco, Pó mole	Sec. F.
Fabaceae	<i>Albizia lebbek</i> (L.) Benth.	Acácia	Sec. F.
	<i>Falcataria moluccana</i> (Miq.) Barneby & J.W.Grimes	Acácia	Sec. F.
	<i>Erythrina</i> spp. L.	Eritrina	Sh. F.
	<i>Pentaclethra macrophylla</i> Benth	Muandim, Sicupira, Uba	Sh. F.
Hypericaceae	<i>Harungana madagascariensis</i> Lam. Ex Poiret	Pau sangue	Sec. F.
Lauraceae	<i>Cynnamomum burmannii</i> (Nees & T.Nees) Blume	Canela brava	Sec. F.
Malvaceae	<i>Theobroma cacao</i> L.	Cacaueiro	Sh. F.
Meliaceae	<i>Trichilia grandifolia</i> Oliver	Cacau do mato, Cola-de-macaco	Alt. F.
Meliaceae	<i>Carapa procera</i> DC	Gogô	Sh. F.
Meliaceae	<i>Cedrela odorata</i> L.	Cedrela	Floresta sombra
Moraceae	<i>Ficus mucosa</i> Welw. ex Ficalho	Figo ploco, Figo porco	Sec. F.
	<i>Artocarpus altilis</i> (Parkinson) Fosberg	Fruteira	Sh. F.
	<i>Artocarpus heterophyllus</i> Lam.	Jaqueira	Sh. F.
	<i>Milicia excelsa</i> (Welw.) C.C.Berg	Amoreira, molela	Sh. F.
Myristicaceae	<i>Staudtia pterocarpa</i> (Warb.) Warb.	Pau vermelho	Alt. F.
	<i>Pycnanthus angolensis</i> (Welw.) Warb.	Pau Caixão	Sec. F.
Myrtaceae	<i>Syzygium guineense</i> Wall.	Matchanzochi	Alt. F.
	<i>Psidium guyava</i> L.	Goiabeira	Sec. F.
Phyllanthaceae	<i>Uapaca guineensis</i> Müll.Arg.	Nespla d'Obô, manguê	Alt. F.

FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME	PLANT FORMATION
	<i>Cleistanthus</i> spp. Post & Kuntze	Viro	Sec. F.
	<i>Margaritaria discoidea</i> (Baill.) G.L.Webster	Pau-ferro	Sec. F.
<i>Podocarpaceae</i>	<i>Afrocarpus mannii</i> (Hook.f.) C.N.Page	Pinheiro da terra, Pinheiro de São Tomé, Ofó	Alt. F.
<i>Rubiaceae</i>	<i>Canthium glabriflorum</i> Hiern	Nono	Alt. F.
	<i>Hymenodictyon biafranum</i> Hiern	Pau claudina	Alt. F.
	<i>Pauridiantha floribunda</i> (K. Schum. & K. Krause) Bremek.	Nicolau	Alt. F.
<i>Rutaceae</i>	<i>Zanthoxylum gillettii</i> (De Wild.) P.G.Waterman	Marapião	Sh. F.
<i>Salicaceae</i>	<i>Homalium henriquesii</i> Gilg ex Engl.	Quebra machado	Alt. F.
<i>Sapotaceae</i>	<i>Chrysophyllum africanum</i> A.DC	Zamumo	Alt. F.
	<i>Chrysophyllum albidum</i> G.Don	Untueiro	Sec. F.
	<i>Manilkara obovata</i> (Sabine & G.Don)	Azeitona	Sec. F.
<i>Scytopetalaceae</i>	<i>Scytopetalum kamerunianum</i> Engl.	Vilo branco, Viro-branco	Alt. F.

**Alt. F.** – Altitude forest; **D.F.** – Dense forest; **Sec. F.** – Secondary forest; **Sh. F.** – Shadow forest dedicated to agricultural exploitation

### A3 – MAIN FOOD PLANT SPECIES

(Indexed by Family)

FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME
<i>Amaryllidaceae</i>	<i>Allium cepa</i> L.	Cebola
<i>Anacardeaceae</i>	<i>Mangifera indica</i> L.	Mangueira
	<i>Spondias dulcis</i> Sol. Ex Parkinson	Cajamangueira
	<i>Anacardium occidentale</i> L.	Cajueiro
<i>Araceae</i>	<i>Xanthosoma</i> spp. Schott	Matabala
<i>Arecaceae</i>	<i>Cocos nucifera</i> L.	Coqueiro
	<i>Elaeis guineenses</i> Jacq.	Palmeira-de-andim
<i>Brassicaceae</i>	<i>Brassica oleracea</i> L.	Couve
<i>Bromeliaceae</i>	<i>Ananas comosus</i> (L.) Merr.	Ananás
<i>Burseraceae</i>	<i>Dacryodes edulis</i> Lam.	Safuzeiro
<i>Caricaceae</i>	<i>Carica papaya</i> L.	Mamoeiro
<i>Dioscoreaceae</i>	<i>Dioscorea</i> spp. L.	Inhame
<i>Euphorbiaceae</i>	<i>Manihot esculenta</i> Crantz	Mandioqueira
<i>Fabaceae</i>	<i>Vicia</i> spp. L.	Feijoeiro
<i>Lauraceae</i>	<i>Persea americana</i> Mill	Abacate
	<i>Cinnamomum zeilanicum</i> J.Presl.	Caneleira
<i>Moraceae</i>	<i>Artocarpus altilis</i> (Parkinson) Fosberg	Fruteira
	<i>Artocarpus heterophyllus</i> Lam.	Jaqueira
	<i>Treculia Africana</i> Decne.	Izaquente
<i>Musaceae</i>	<i>Musa</i> spp. L.	Bananeira
<i>Myrtaceae</i>	<i>Psidium guajava</i> L.	Goiabeira
	<i>Eugenia brasiliensis</i> Lam.	Grumichama
	<i>Eugenia uniflora</i> L.	Pitangueira
<i>Oxalidaceae</i>	<i>Averrhoa carambola</i> L.	Caramboleira
<i>Poaceae</i>	<i>Zea mays</i> ssp <i>mays</i> L.	Milho
<i>Rosaceae</i>	<i>Rubus rosifolius</i> Sm.	Morango
<i>Rutaceae</i>	<i>Citrus aurantium</i> (L.)	Limoeiro
<i>Sapindaceae</i>	<i>Chytranthus mannii</i> Hook.f.	Pessegueiro
<i>Solanaceae</i>	<i>Solanum americanum</i> Mill.	Lossua
	<i>Solanum macrocarpon</i> L.	Maquequé
	<i>Capsicum frutescens</i> L.	Pimentão
	<i>Solanum lycopersicum</i> L.	Tomateiro

#### A4 – MAIN MEDICINAL PLANT SPECIES

(Indexed by Vernacular Name)

VERNACULAR NAME	BINOMIAL NOMENCLATURE	UTILIZATION
Abóbora	<i>Cucurbita</i> spp. L.	Ear pain
Alho	<i>Allium cepa</i> L.	Diarrhea
Alho d'Obô	<i>Psychotria peduncularis</i> Salisb.	Infections
Ananás	<i>Ananas comosus</i> (L.) Merr.	Abortions
Arruda	<i>Ruta chapelensis</i> L.	Anthelmintic
Bananeira	<i>Musa paradisiaca</i> L.	Diarrhea
Bengue	<i>Alchornea cordifolia</i> Müll.Arg.	Diarrhea
Cacueiro	<i>Theobroma cacao</i> L.	Malaria
Cajueiro	<i>Anacardium occidentale</i> L.	Diarrhea
Cana Macaco	<i>Costus giganteus</i> Welw. ex Ridl.	Kidneys
Capim-d'água	<i>Commelina difusa</i> Burm.F.	Eye problems
Caroceiro	<i>Terminalia catappa</i> L.	Diarrhea
Cata-grande	<i>Rauvolfia dichotoma</i> K.Shum.	Malaria
Cedrela	<i>Cedrela odorata</i> L.	Malaria
Chimon-coiá	<i>Lagenaria siceraria</i> (Molina) Standl.	Rheumatism
Coedano	<i>Cestrum laevigatum</i> Schlecht	Against scabies
Coleira	<i>Cola acuminata</i> Schott & Endl.	Eyes and ears problems
Eritrineira	<i>Erythrina</i> spp. L.	Antihemorrhagic
Fiá-alfobaca	<i>Peperomia pellucida</i> (L.) Kunth	Veneral diseases
Fiá-budo	<i>Elephantopus mollis</i> Kunth	Diarrhea
Fiá-pleto	<i>Datura metel</i> L.	Rheumatism
Fiá-salaconta	<i>Canna indica</i> L.	Against scabies
Fiá-sanzom	<i>Momordica charantia</i> L.	Aphrodisiac, Abortions
Figo-obata	<i>Ficus chlamydocarpa</i> ssp. <i>fernandesiana</i> (Hutch.) C.C.Berg	Diarrhea
Fissanjá	<i>Adenia cissampeloides</i> (Planch. ex Hook.) Harms	Constipation, diarrhea, dysentery
Folha ponto	<i>Achyranthes aspera</i> L.	Antihemorrhagic
Folha-da-mina	<i>Bryophyllum pinnatum</i> (Lam.) Oken	Bruises, incised wounds
Goiabeira	<i>Psidium guajava</i> L.	Diarrhea
Ipé	<i>Olea capensis</i> L.	Aphrodisiac
Libô muncambú	<i>Vernonia amygdalina</i> Delile	Malaria
Limão	<i>Citrus aurantium</i> L.	Malaria
Macambrará	<i>Craterispermum montanum</i> Hiern	Aphrodisiac
Maioba	<i>Cassia occidentalis</i> L.	Malaria
Mamoeiro	<i>Carica papaya</i> L.	Aphrodisiac
Mamonó	<i>Ricinus communis</i> L.	Ear pain
Mangueira	<i>Mangifera indica</i> L.	Diarrhea
Maquequé	<i>Solanum macrocarpum</i> L.	Rheumatism
Marapião	<i>Zanthoxylum gillettii</i> (De Wild.) P.G.Waterman	Toothaches
Matabala	<i>Xanthosoma sagittifolium</i> (L.) Schott	Eye pain

VERNACULAR NAME	BINOMIAL NOMENCLATURE	UTILIZATION
Matchanzoche	<i>Syzygium guineense</i> Wall.	Aphrodisiac
Matruço	<i>Chenopodium ambrosioides</i> L.	Diarrhea, massage, bruises, Antihelminthic
Micocó	<i>Ocimum gratissimum</i> L.	Fever, Aphrodisiac
Muandí	<i>Pentaclethra macrophylla</i> Benth.	Rheumatism
Mucumbli	<i>Lannea welwitschii</i> (Hiern) Engl.	Kidney pain, bruises
Muindro	<i>Bridelia micrantha</i> (Hochst.) Baill	Massage
Mussandá	<i>Ficus kamerunensis</i> Warb.	Eye pain, bruises, Incised wounds
Mutopa	<i>Maesa lanceolata</i> Forssk	Urinary tract
Nicolau	<i>Pauridiantha floribunda</i> (K. Schum. & K. Krause) Bremek.	Anemia
Olhadató	<i>Centella asiatica</i> (L.) Urban	Ear pain
Palmeira-de-andim	<i>Elaeis guineensis</i> Jacq.	Against scabies
Pau-cabra	<i>Tremna orientalis</i> (L.) Blume	asthma, yellow fever, gonorrhea
Pau-caixão	<i>Pycnanthus angolensis</i> (Welw.) Warb.	Toothaches , Antihemorrhagic
Pau-óleo	<i>Santiria trimeria</i> (Oliv.) Aubrév.	Purgative
Pau-purga	<i>Croton dracnopsis</i> L.	Purgative
Pau-quina	<i>Cinchona</i> spp. L.	Malaria, bruises, abortions
Pau-sangue	<i>Harungana madagascarensis</i> Lam. ex Poir.	Restorative, Anemia
Pau-três	<i>Allophylus africanus</i> P.Beauv.	Aphrodisiac, Malaria
Pau-três	<i>Allophylus grandifolius</i> (Bak.) Radlk.	Belly aches, Aphrodisiac
Pimpinela	<i>Sechium edule</i> (Jacq.) Sw.	Diarrhea
Pinincano	<i>Leonitis nepetifolia</i> (L.) R.Br.	Belly aches
Selo-sum-zom-maia	<i>Erygium foetidum</i> L.	Belly aches
Tichile-blanco	<i>Drymaria cordata</i> (L.) Willd. ex Schult.	Diarrhea
Ucuetê	<i>Costus giganteus</i> Welw. ex Ridl.	Rheumatism

## A5 – MAIN ORNAMENTAL PLANT SPECIES

(Indexed by Family)

FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME
<i>Acanthaceae</i>	<i>Heteradelphia paulowilhelmia</i> Lind.	Heteradelfia
<i>Amaranthaceae</i>	<i>Iresine herbstii</i> Hook. ex Lindl.	Coração-magoado
<i>Araceae</i>	<i>Anthurium andreaeanum</i> Lind.	Antúrio
<i>Balsaminaceae</i>	<i>Impatiens buccinalis</i> Hook f.	Camarões
	<i>Impatiens thomensis</i> Exell	Impacien
	<i>Impatiens manteroana</i> Exell	Impacien
<i>Begoniaceae</i>	<i>Begonia baccata</i> Hook f.	Begónia, Folha-boba
	<i>Begonia subalpestris</i> A.Chev.	Begónia-gigante
	<i>Begonia thomeana</i> C.DC	Begónia-de-São-Tomé
<i>Cyatheaaceae</i>	<i>Cyathea mannii</i> Hook	Feto gigante
	<i>Cyathea welwitschii</i> Hook	Feto
<i>Dracaenaceae</i>	<i>Dracaena arborea</i> (Willd.) Link	Pau-sabão
	<i>Dracaena acutissima</i> Hua	Língua-de-sogra
	<i>Sansevieria trifasciata</i> Prain	Língua-de-sogra
<i>Ericaceae</i>	<i>Erica thomensis</i> (Henriq.) Dorr & E.G.H.Oliv.	Erica
<i>Heliconiaceae</i>	<i>Heliconia rostrata</i> Ruiz & Pavón	Bico-de-papagaio
<i>Malvaceae</i>	<i>Hibiscus rosa-sinensis</i> L.	Hibisco
<i>Melastomataceae</i>	<i>Calvoa grandifolia</i> Cogn.	Calvoa
	<i>Tristemma mauritanium</i> J.F.Gmel.	Tristema
<i>Nyctaginaceae</i>	<i>Mirabilis jalapa</i> L.	Losá-bilança
<i>Orchidaceae</i>	<i>Cyrtorchis henriquensiana</i> (Ridl.) Schlecht	Fia-língua-de-vaca
	<i>Calanthe sylvatica</i> (Thouars) Lindl.	Calante
<i>Pandanaceae</i>	<i>Pandanus thomensis</i> Henriq.	Pau-esteira
<i>Rosaceae</i>	<i>Rosa</i> spp. L.	Roseira
<i>Scrophulariaceae</i>	<i>Thunbergianthus quintasii</i> Engl.	Musa-fria
<i>Zingiberaceae</i>	<i>Renealmia grandiflora</i> Baker	Renealmia
	<i>Etlingera elatior</i> (Jack) R.M.Sm.	Rosa-porcelana
	<i>Hedychium coronarium</i> J.Koenig	Gengibre branco

## A6 – MAIN ENDEMIC INLAND BIRDS

(Indexed by Order)

ORDER	VERNACULAR NAME	BINOMIAL NOMENCLATURE
<b>São Tomé</b>		
Columbiformes	Muncanha	<i>Aplopelia larvata</i> Temmink
Passeriformes	Bico largo	<i>Amaurocichla bocagii</i> Sharpe
	Enjoló	<i>Crithagra concolor</i> Bocage
	Papa-figo	<i>Oriolus crassirostris</i> Hart.
	Tchin-tchin-xolo	<i>Thomasophantes sanctithomae</i> Hart.
	Tomé-gaga, papa-moscas	<i>Terpsiphone atrochalybeia</i> Thomson
	Tchili-tchili-de-S.Tomé	<i>Zosterops ficedulinus</i> Hart.ssp. <i>feae</i> Salvadori
	Tordo-de-S.Tomé	<i>Turdus olivaceofuscus</i> Hart.
Pelecaniformes	Galinhola-de-S.Tomé	<i>Bostrychia bocagei</i> Chapin
Strigiformes	Kitoli	<i>Otus hartlaubi</i> Giebel
<b>Príncipe</b>		
Columbiformes	Muncanha-do-Príncipe	<i>Aplopelia larvata</i> ssp. <i>principalis</i> Hart.
Passeriformes	Tordo-do-Príncipe	<i>Turdus xanthorhynchus</i> Salvadori
	Estorninho	<i>Lamprotornis ornatus</i> Daudin
	Merlo	<i>Ploceus princeps</i> Bonaparte
	Chibi	<i>Anabathmis hartlaubii</i> Hart.
	Tchiliquito, olho grosso	<i>Speirops leucophaeus</i> Hart.
	Tchili-tchili-do-Príncipe	<i>Zosterops ficedulinus</i> Hart. ssp. <i>ficedulinus</i> Hart.
	Chibi-fixa	<i>Horizorhinus dohrni</i> Hart.
	Rabo-de-peixe	<i>Dicrurus modestus</i> ssp. <i>modestus</i> Hart.
Pelecaniformes	Galinhola-do-Príncipe	<i>Bostrychia olivacea</i> Du Bus De Gisignies
<b>São Tomé e Príncipe</b>		
Columbiformes	Pombo-do-mato	<i>Columba thomensis</i> Bocage
	Cessa	<i>Treron sanctithomae</i> Gmlin
	Rola	<i>Columba malherbii</i> Verreaux & Verreaux
Coraciiformes	Conóbia, Pica-peixe	<i>Corythormis thomensis</i> Salvadori
Passeriformes	Camussela	<i>Ploceus grandis</i> Gray
	Chota café	<i>Serinus rufrobrunneus</i> Gray
	Selelé	<i>Anabathmis newtonii</i> Bocage
	Selelé-mangotchi	<i>Dreptes thomensis</i> Bocage
	Truquí	<i>Prinia mollerii</i> Bocage
	Olho-grosso	<i>Zosterops lugubris</i> Hart.
	Picanço	<i>Lanius newtoni</i> Bocage

## A7 – LIST OF ENDANGERED ANIMAL SPECIES

(Indexed by decreasing Threat level)

THREAT LEVEL	CLASS	ORDER	FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME
Ex	Insecta	Lepidoptera	Nymphalidae	<i>Charaxes defolvata</i> Joicey & Talbot	Borboleta
			Lycaenidae	<i>Iolus bellina</i> Plötz	Borboleta
E	Aves	Ciconiformes	Threskiornithidae	<i>Bostrychia bocagei</i> Chapin	Galinholas de S.Tomé
				<i>Bostrychia olivacea</i> Du Bus de Gisignies	Galinholas de Príncipe
		Passeriformes	Laniidae	<i>Lanius newtoni</i> Bocage	Picanço
			Fringilidae	<i>Crithagra concolor</i> Bocage	Pardal de S.Tomé
				<i>Crithagra rufobrunnea</i> Gray	Chota-café (Ilhéu de Boné de Joquei)
		Zosteropidae	<i>Zosterops ficedulinus</i> ssp. <i>ficedulinus</i> Hartlaub	Tchili-tchili do Príncipe	
		Pelecaniformes	Sulidae	<i>Sula leucogaster</i> Boddaert	Pato Marinho
	Procellariiformes	Procellariidae	<i>Pterodroma madeira</i> Mathews	gaivota	
	Gastropoda	Archaeogastropoda	Neretidae	<i>Neritilia manoeli</i> Dohrn	Molusco de água doce do Príncipe
	Insecta	Lepidoptera	Papilionidae	<i>Graphium leonidas santamarthae</i> Joicey & Talbot	Borboleta
				<i>Graphium leonidas thomasius</i> Le Cerf	Borboleta
	Reptilia	Testudines	Cheloniidae	<i>Chelonia mydas</i> L.	Tartaruga Ambo
				<i>Eretmochelys imbricata</i>	Tartaruga Sarda
<i>Lepydochelys olivacea</i>				Tartaruga Bastarda	
Dermochelyidae			<i>Dermochelys coriacea</i> Vandelli	Tartaruga Ambulância	
V	Aves	Columbiformes	Columbiidae	<i>Columba thomensis</i> Bocage	Pombo de Mato
		Passeriformes	Muscicapidae	<i>Amaurocichla bocagii</i> Sharpe	Passarinho
		Psittaciformes	Psittacidae	<i>Psittacus erithacus</i> L.	Papagaio
	Gastropoda	Archaeogastropoda	Skeneidae	<i>Teinostoma fernandesi</i> Rubio & Rolán	Molusco marinho de Príncipe
				<i>Teinostoma funiculatum</i> Rubio & Rolán	Molusco marinho de Príncipe
		Neogastropoda	Buccinidae	<i>Paradoxa thomensis</i> Fernandes & Rolán	Molusco
	Insecta	Lepidoptera	Hesperiidae	<i>Coeliades bocagii</i> Sharpe	Borboletas de S.Tomé
	Mammalia	Chiroptera	Pteropodidae	<i>Myonycteris brachycephala</i> Bocage	Guémbu

THREAT LEVEL	CLASS	ORDER	FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME
R	Aves	Passeriformes	Zosteropidae	<i>Zosterops leucophoeus</i> Hartlaub	Tchiliquito de Príncipe
				<i>Zosterops ficedulinus</i> ssp. <i>feae</i> Salvadori	Tchili-tchili de São Tomé
			Nectariniidae	<i>Dreptes thomensis</i> Bocage	Selelê, mangotchi de S.Tomé
			Oriolidae	<i>Oriolus crassirostris</i> Hartlaub	Papafigo
		Strigiformes	Strigidae	<i>Otus hartlaubi</i> Giebel	Kitoli
I	Insecta	Lepidoptera	Lycaenidae	<i>Chilades sanctithomae</i> Sharpe	Borboleta
				<i>Leptotes terrenus</i> Joicey & Talbot,	Borboleta
			Nymphalidae	<i>Pseudacrea gamae</i>	Borboleta
		Odonata	Libellulidae	<i>Trithemis nigra</i> Longfield	Libelinha do Príncipe
	Mammalia	Chiroptera	Molossidae	<i>Chaerephon thomensis</i> Hilton-Taylor	Morcego de São Tomé
K	Insecta	Spirostreptida	Diplopoda	<i>Globanus</i> spp.	Milipeias
	Mammalia	Insectivora	Soricidae	<i>Crocidura poensis</i> Fraser	Musaranho
				<i>Crocidura thomensis</i> Bocage	Musaranho

**Ex** = extinct; **E** = endangered; **V** = vulnerable; **R** = Rare; **I** = undetermined; **K** = insufficiently known

## A8 – MAIN WILD TERRESTRIAL ANIMALS

(Indexed by Class/Order)

CLASS/ORDER	BINOMIAL NOMENCLATURE	VERNACULAR NAME
Amphibia/Anura	<i>Phrynobatrachus díspar</i> Peters	Akelê, rã
	<i>Phrynobatrachus leveleve</i> Uyeda, Drewes, and Zimkus	Akelê, raineta
	<i>Hyperolius malleri</i> Bedriaga	Akelê, raineta
	<i>Hyperolius thomensis</i> Bocage	Akelê, rã
	<i>Leptopelis palmatus</i> Peters	Akelê, sapo
	<i>Ptychadena newtoni</i> Bocage	Akelê, raineta
Amphibia/Gymnophiona	<i>Schistometopum ephèle</i> Taylor	Cecília
	<i>Schistometopum thomense</i> Bocage	Cobra-bobo-de-S.Tomé
Mammalia/Artiodactyla	<i>Sus domesticus</i> Erxleben	Porco-selvagem
Mammalia/Carnivora	<i>Mustela nivallis</i> L.	Aledunha
	<i>Civettictis civetta</i> Schreber	Lagaia
Mammalia/Chiroptera	<i>Hipposideros ruber</i> Noack	Fanaliche
	<i>Myonycteris brachycephala</i> Bocage	Guembú
	<i>Hipposideros thomensis</i> Bocage	Morcego focinho de folha
	<i>Chaerephon thomensis</i> Hilton-Taylor	Morcego sem cauda
	<i>Miniopterus minor</i> Peters	Morcego
	<i>Rousettus aegyptiacus</i> É.Geoffroy	Morcego
	<i>Eidolon helvum</i> Kerr	Morcego
Mammalia/Primates	<i>Cercopithecus mona</i> Schreber	Macaco
Mammalia/Rodentia	<i>Rattus norvegicus</i> Berkenhout	Rato castanho, Aledunha
	<i>Rattus rattus</i> L.	Rato preto
	<i>Mus musculus</i> L.	Ratinho
Mammalia/Soricomorpha	<i>Crocidura thomensis</i> Bocage	Musaranho-de-S.Tomé
	<i>Crocidura poensis</i> Fraser	Musaranho-do-Príncipe
Reptilia/Squamata	<i>Typhlops elegans</i> Peters	Cobra-bobo-do-Príncipe
	<i>Rhinotyphlops newtoni</i> Bocage	Cobra-escavadora
	<i>Naja melanoleuca</i> Hallowell	Cobra-Preta
	<i>Hapsidophrys principis</i> Boulenger	Cobra-verde-do-Príncipe
	<i>Hemidactylus greeffii</i> Bocage	Geco
	<i>Lygodactylus thomensis</i> Peters	Geco
	<i>Boaedon lineatus</i> Duméril & Bibron	Jita
	<i>Boaedon lineatus</i> Duméril & Bibron	Jita do Príncipe
	<i>Panaspis africana</i> Gray	Lagarto
	<i>Feylinia polylepis</i> Bocage	Lagarto-sem-patas
	<i>Hemidactylus principensis</i> Miller, Sellas & Drewes	Osga dourada
	<i>Afroablepharus africanus</i> Gray	Lagarto
	Reptilia/Testunides	<i>Pelusio gabonensis</i> Duméril
<i>Pelusio castaneus</i> Schweigger		Bencú dos pântanos

## A9 – INVENTORY OF MOLLUSCS

(Indexed by Class)

CLASS	FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME
Cefalópodes	<i>Octopodidae</i>	<i>Octopus</i> spp. Cuvier	Polvo
	<i>Ommastrephidae</i>	<i>Ommastrephes bartramii</i> Lesueur	Lula, calamar
	<i>Sepiidae</i>	<i>Sepia</i> spp. L.	Choco
Gastrópodes	<i>Achatinidae</i>	<i>Archachatina bicarinata</i> Bruguière	Búzio d'Obô
		<i>Archachatina marginata</i> Swainson	Búzio do mato
	<i>Buccinidae</i>	<i>Buccinum</i> spp. L.	Búzio-do-mar
		<i>Paradoxa thomensis</i> Fernandes & Rolán	Búzio-do-mar
		<i>Paradoxa confirmata</i> Fernandes & Rolán	Búzio-do-mar
	<i>Coeliacidae</i>	<i>Pyrgina umbilicata</i> Greef	Búzio terrestre (ST)
		<i>Thomea newtoni</i> Girard	Búzio terrestre (ST)
	<i>Marginellidae</i>	<i>Marginella melvilli</i> Tomlin & Shackleford	Búzio-do-mar (ST)
		<i>Marginella liparozona</i> Tomlin & Shackleford	Búzio-do-mar (ST)
		<i>Marginella charlmersi</i> Tomlin & Shackleford	Búzio-do-mar (ST)
		<i>Marginella gémula</i> Bavay in Dautzenberg	Búzio-do-mar (P)
		<i>Volvarina insulana</i> Gofás & Fernandes	Búzio-do-mar (STP)
		<i>Granulina parilis</i> Gofás & Fernandes	Búzio-do-mar (STP)
	<i>Cystiscidae</i>	<i>Plesiocysticus gutta</i> Gofás & Fernandes	Búzio-do-mar (STP)
		<i>Plesiocysticus josephyinae</i> Fernandes & Rolán	Búzio-do-mar (P)
		<i>Gibberula modica</i> Gofás & Fernandes	Búzio-do-mar (STP)
		<i>Gibberula cucullata</i> Gofás & Fernandes	Búzio-do-mar (STP)
		<i>Gibberula puntulun</i> Gofás & Fernandes	Búzio-do-mar (STP)
	<i>Muricidae</i>	<i>Muricopsis mariangelae</i> Rolán & Fernandes	Murex (ST)
		<i>Muricopsis matilae</i> Rolán & Fernandes	Murex (ST)
		<i>Muricopsis principensis</i> Rolán & Fernandes	Murex (P)
	<i>Mytilidae</i>	<i>Lithodomus</i> spp. Cuvier	
	<i>Neretidae</i>	<i>Neretina afra</i> Sowerby	Caramuso
		<i>Neretina manoeli</i> Dohrn	Caracol de água doce
	<i>Skeneidae</i>	<i>Teinostoma fernandesi</i> Rubio & Rolán	Caracol (P)
		<i>Teinostoma funiculatum</i> Rubio & Rolán	Caracol
	<i>Thyrophorellidae</i>	<i>Thyrophorella thomensis</i> Greef	Caracol terrestre (ST)
	<i>Turridae</i>	<i>Scaevatula pellisserpentis</i> Gofás	Búzio-do-mar (STP)
		<i>Scaevatula amancioi</i> Rolán & Fernandes	Búzio-do-mar (P)
		<i>Cassispira sacerdotalis</i> Rolán & Fernandes	Búzio-do-mar (ST)
		<i>Agathothoma finalis</i> Rolán & Fernandes	Búzio-do-mar (STP)
	Pelecípodes	<i>Mytilidae</i>	<i>Lithodomus</i> spp. Cuvier
<i>Ostreidae</i>		<i>Ostrea</i> spp. L.	Ostra
		<i>Crassostrea</i> spp. Sacco	Ostra
<i>Veneridae</i>		<i>Venus</i> spp. L.	Ameijoa

ST: São Tomé – P: Príncipe – STP: São Tomé and Príncipe  
Source: Maria Manuela Bandeira NBSAP II 2013

## A10 – LIST OF MAIN CRUSTACEAN (CLASS MALACOSTRACA)

(Indexed by Vernacular Name)

FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME
<i>Penaeidea</i>	<i>Penaeus</i> spp. Fabricius	Camarão
	<i>Metapenaeus</i> spp. Wood-Mason	Camarão
	<i>Parapenaeus</i> spp. Smith	Camarão
<i>Palaemonidae</i>	<i>Macrobrachium zariquieyi</i> Holthuis	Camarão-branco-do-rio
	<i>Macrobrachium ravidens</i> Hilgendorf	Camarão-branco-do-rio
<i>Gobiidae</i>	<i>Sicydium bustamantei</i> Greeff	Manglolô
<i>Atyidae</i>	<i>Atya intermédia</i> Bouvier	Camarão-do-rio
	<i>Atya scabra</i> Leach	Camarão-do-rio
<i>Homolidae</i>	<i>Paramola cuvieri</i> Risso	Carangueijo aranha
<i>Portunidae</i>	<i>Callinectes</i> spp. Stimpson	Carangueijo
<i>Gecarcinidae</i>	<i>Cardisoma armatum</i> Herklots	Caranguejo
<i>Scyllaridae</i>	<i>Scyllarides herklotsii</i> Herklots	Cigarra, cavaco
<i>Palinuridae</i>	<i>Palinurus</i> spp. Weber	Lagosta
<i>Nephropidae</i>	<i>Nephrops</i> spp. Leach	Lagostim
<i>Cambaridae</i>	<i>Cambarus</i> spp. Erichson	Lagostim-do-rio
<i>Geryonidae</i>	<i>Geryon maritae</i> Manning & Holthuis	Santola

Source: Maria Manuela Bandeira NBSAP II 2013

## A11 – LIST OF MAIN CETACEAN

(Indexed by Family)

FAMILY	BINOMIAL NOMENCLATURE	VERNACULAR NAME
<i>Balaenopteridae</i>	<i>Balaenoptera musculus</i> L.	Baleia-azul
	<i>Balaenoptera borealis</i> Lesson	Baleia azul
	<i>Balaenoptera acutorostrata</i> Lacepède	Baleia azul
	<i>Balaenoptera edeni</i> Anderson	Baleia azul
	<i>Balaenoptera physalus</i> L.	Baleia azul
<i>Balaenopteridae</i>	<i>Megaptera novaeangliae</i> Borowski	Baleia-de bossa ou corcunda
<i>Delphinidae</i>	<i>Delphinus delphis</i> L.	Delfim

Source: Maria Manuela Bandeira NBSAP II 2013

## A12 – MAIN SEABIRD SPECIES

ISLANDS	SPECIE	CHARACTERISTICS	LOCALIZATION
São Tomé and Príncipe	<i>Phaethon lepturo</i> Daudin 'Robo-de-palha', 'Coconzucó's	Feeds on squid and flying fish; nests in cavities in rocky walls or in hollow trees in the forests	With wide distribution in Tinhosas Islets, Sete Pedras Islets, Rolas Islet, Santana Islet and Quixibá Islet
	<i>Egretta gularis</i> Bosc 'Garça marinha'	Largest percentage is white, but dark gray is common. Feeds on small fish	A species of the coastal and insular areas of Africa
	<i>Egretta garzetta</i> L. 'Garça-branca', 'Garça-riberinha'	Widely distributed in Africa. Feeds on fish and crustaceans, such as shrimp	beaches of Conchas, Agua Izé, Pantufo, etc.
	<i>Anous minutus</i> Boie 'Caiê-preto', 'Igulélé'	Dark brown plumage. Feeds on small fish and squid	Sete Pedras Islet Tinhosa Grande Islet and Pedra Galé Islet
	<i>Onychoprion fuscatus</i> L, 'Caiê-branco', 'Gaivina-fosca'	Back and wings of the same dark color. Feeds on fish and squid	Tinhosas Islets (mainly Tinhosa Grande Islet)
São Tomé	<i>Microcarbo africanus</i> Gmelin 'Pata de água', 'Corvo marinho'	During the breeding season, plumage black with green or bronze reflections; back with gray feathers or white feathers with black tips. Feeds on fish and shrimp.	In the vicinity of the bridge over the 'lô Grande' river
Príncipe	<i>Sula leucogaster</i> Dodaer 'Malvaxi', 'Pato-marinho'	Easily identified by dark blue spots in the neck, near the beak base. Feeds near the coast.	Tinhosas Islets, Boné do Joquei, Mosteiro and Pedra da Galé Islet
	<i>Bubulcus ibis</i> L. 'Garça boieira', 'Carraceira'	Adults with orange color in the head. Feeds on insects, spiders, little lizards	

Source: Maria Manuela Bandeira NBSAP II 2013

## A13 – COMMERCIAL SPECIES CAPTURED IN ARTISANAL FISHERIES

(Indexed by Family)

VERNACULAR NAME	FAMILY	BINOMIAL NOMENCLATURE	
Asno cota	<i>Acanthuridae</i>	<i>Prionurus biafraensis</i> Blache & Rossignol	
Colepinha malabo	<i>Albulidae</i>	<i>Albula vulpes</i> L.	
Asno	<i>Balistidae</i>	<i>Balistes punctatus</i> J.F.Gmelin	
Agulha espada	<i>Belonidae</i>	<i>Ablennes hians</i> Valenciennes	
Agulha quio, Zanve		<i>Tylosurus acus rafale</i> Collette & Parin	
Linguado	<i>Bothidae</i>	<i>Bothus guibei</i> Stauch	
Alada	<i>Carangidae</i>	<i>Elagatis bipinnulata</i> Quoy & Gaimard	
Bebeca		<i>Trachinotus ovatus</i> L.	
Bonito		<i>Caranx crysos</i> Mitchell	
Carapau		<i>Decapterus punctatus</i> G.Cuvier	
Carapau		<i>Selar crumenophthalmus</i> Bloch	
Corcovado, alho-grosso		<i>Caranx hippos</i> L.	
Osso mole		<i>Uraspis secunda</i> Poey	
Pata Pata		<i>Blepharis crinitus</i> Mitchill	
Pata Pata		<i>Selene dorsalis</i> Gill	
Tubarão		<i>Carcharhinidae</i>	<i>Rhizoprionodon acutus</i> Rüppell
Sardinha		<i>Clupeidae</i>	<i>Sardinella maderensis</i> R.T.Lowe
Longo	<i>Sardinella aurita</i> Valenciennes		
Sardinha caça	<i>Sardinella cameronensis</i> Regan		
Colombeta	<i>Coryphaenidae</i>	<i>Coryphaena equiselis</i> L.	
Linguado	<i>Cynoglossidae</i>	<i>Cynoglossus senegalensis</i> Kaup	
Coió	<i>Dactylopteridae</i>	<i>Dactylopterus volitans</i> L.	
Cozinheiro	<i>Drepanidae</i>	<i>Drepane africana</i> Osório	
Peixe piloto	<i>Echeneidae</i>	<i>Remora brachyptera</i> R.T.Lowe	
Colepinhã balabo	<i>Elopidae</i>	<i>Elops senegalensis</i> Regan	
Vermelho sangue	<i>Emmelichthyidae</i>	<i>Erythrocles monody</i> Poll & Cadenat	
Cozinheiro	<i>Ephippidae</i>	<i>Chaetodipterus goreensis</i> Cuvier	
Mulato/Bala Bala	<i>Epinephelidae</i>	<i>Paranthias furcifer</i> Valenciennes	
Voador, concom	<i>Exocetidae</i>	<i>Cheilopogon melanurus</i> Valenciennes	
Agulha buzina	<i>Fistulariidae</i>	<i>Fistularia petimba</i> Lacépède	
Parente	<i>Gerridae</i>	<i>Eucinostomus melanopterus</i> Bleeker	
Bujigo	<i>Haemulidae</i>	<i>Parakuhlia macrophthalmus</i> Osório	
Bujigo		<i>Pomadasys peroteti</i> Cuvier	
Roncador		<i>Pomadasys rogerii</i> Cuvier	
Tubarão	<i>Hemigaleidae</i>	<i>Paragaleus pectoralis</i> Garman	
Maxipombo	<i>Hemiramphidae</i>	<i>Hemiramphus balao</i> Lesueur	
Caqui	<i>Holocentridae</i>	<i>Holocentrus ascensionis</i> Osbeck	
Caqui (mãe)		<i>Sargocentron hastatum</i> Cuvier	
Mãe de caqui		<i>Myripristis jacobus</i> Cuvier	

VERNACULAR NAME	FAMILY	BINOMIAL NOMENCLATURE	
Peixe Andala	<i>Istiophoridae</i>	<i>Istiophorus albicans</i> Latreille	
Sopa	<i>Kyphosidae</i>	<i>Kyphosus incisor</i> Cuvier	
Bulhão	<i>Labridae</i>	<i>Bodianus speciosus</i> Bowdich	
Rainha		<i>Xyrichthys novacula</i> L.	
Bica	<i>Lethrinidae</i>	<i>Lethrinus atlanticus</i> Valenciennes	
Tchintchin de fundo	<i>Lobotidae</i>	<i>Lobotes surinamensis</i> Bloch	
Peixe novo	<i>Lutjanidae</i>	<i>Apsilus fuscus</i> Valenciennes	
Vermelho terra		<i>Lutjanus fulgens</i> Valenciennes	
Peixe cabra	<i>Malacanthidae</i>	<i>Branchiostegus semifasciatus</i> Norman	
Asno buçeta	<i>Monacanthidae</i>	<i>Cantherhines</i> spp. Swainson	
Asno de fundo		<i>Aluterus</i> spp. Cloquet	
Tainha	<i>Mugilidae</i>	<i>Mugil curema</i> Valenciennes	
Salmonete	<i>Mullidae</i>	<i>Pseudupeneus prayensis</i> Cuvier	
Moreia verdadeira	<i>Muraenidae</i>	<i>Lycodontis afer</i> Bloch	
Moreia	<i>Ophichthidae</i>	<i>Echelus myrus</i> L.	
Moreia		<i>Echelus pachyrhynchus</i> Vaillant	
Barbudo	<i>Polynemidae</i>	<i>Galeoides decadactylus</i> Bloch	
Tchintchin	<i>Pomacanthidae</i>	<i>Abudefduf marginatus</i> Bloch	
Tchintchin		<i>Holacanthus africanus</i> Cadenat	
Peixe sol	<i>Priacanthidae</i>	<i>Heteropriacanthus cruentatus</i> Lacepède	
Bulhão congo	<i>Scaridae</i>	<i>Sparisoma rubripinne</i> Valenciennes	
Roncador	<i>Sciaenidae</i>	<i>Pseudotolithus senegalensis</i> Valenciennes	
Atum flogó	<i>Scombridae</i>	<i>Thunnus obesus</i> Lowe	
Atum judeo		<i>Katsuwonus pelamis</i> L.	
Atum oledê		<i>Thunnus albacares</i> Bonnaterre	
Fulu Fulu		<i>Auxis thazard</i> Lacepède	
Fulu Fulu		<i>Euthynnus alletteratus</i> Rafinesque	
Peixe fumo		<i>Acanthocybium solandri</i> Cuvier	
Peixe serra		<i>Scomberomorus tritor</i> Cuvier	
Canga		<i>Scorpaenidae</i>	<i>Pontinus kuhlii</i> Bowdich
Come molê			<i>Scorpaena laevis</i> Troschel
Peixe sabão		<i>Serranidae</i>	<i>Rypticus saponaceus</i> Bloch & Schneider
Bacalhau	<i>Epinephelus aeneus</i> Saint-Hilaire		
Badejo	<i>Epinephelus fasciatus</i> Forsskål		
Badejo branco	<i>Epinephelus goreensis</i> Valenciennes		
Bobô quema	<i>Cephalopholis taeniops</i> Valenciennes		
Capitão	<i>Anthias anthias</i> L.		
Cota uê, cota oyo	<i>Cephalopholis nigri</i> Günther		
Garoupa	<i>Epinephelus adscensionis</i> Osbeck		

VERNACULAR NAME	FAMILY	BINOMIAL NOMENCLATURE
Bonga, Boga	<i>Sparidae</i>	<i>Boops boops</i> L.
Malagueta		<i>Pagellus bellottii</i> Steindachner
Mamaminha/Vermelho dente		<i>Dentex congocensis</i> Poll
Pargo		<i>Pagrus caeruleostictus</i> Valenciennes
Vermelho fundo		<i>Dentex macrophtalmus</i> Bloch
Barracuda	<i>Sphyraenidae</i>	<i>Sphyraena barracuda</i> G.Edwards
Pescada		<i>Sphyraena sphyraena</i> L.
Tubarão martelo	<i>Sphyrnidae</i>	<i>Sphyrna zygaena</i> L.
Tubarão tolo		<i>Sphyrna couardi</i> Cadenat
Rainha	<i>Synodontidae</i>	<i>Trachinocephalus myops</i> J.R.Foster
Coelho	<i>Tetraodontidae</i>	<i>Lagocephalus laevigatus</i> L.
Lenha (rainha)	<i>Uranoscopidae</i>	<i>Uranoscopus polli</i> Cadenat

Source: Manuel Teixeira, 2002

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## GLOSSARY

### **Protected areas**

Territory preserved, because of their particular ecological situation, to allow the free exercise of the evolution of natural factors

### **Biotechny**

Technique for the use of animals and plants to the advantage of man

### **Biotechnology**

Every technological application that uses biological systems of living organisms or their derivatives to make or modify the products or procedures of specific use

### **Biotope**

Area with stable characteristics, in which are located adapted organisms living in equilibrium – ecological niche

### **BSE**

Bovine Spongiform Encephalopathy – mad cow disease,

### **Hunting**

Every action that aims to pursue, capture or kill a wild animal, so as the gathering of eggs and the destruction of nests of birds and reptiles

### **Carrying capacity**

Maximum number of individuals of a species that a territory enables to live and rebuild in good general condition, without this adversely affects the quality of their habitat

### **Carcass**

Dead body of an animal slaughtered for food, with the head, limbs, and entrails removed

### **'Chiquilá'**

Form of savings made through salary or part of it, for several months, the result of which is distributed, once or more a year, between colleagues of a given service, upon a verbal agreement

### **Consanguinity**

Family relationship between those who come from the same parents or the same race; offspring from inbreeding – e.g. Boar covering its nearest descendant

### **Conservation of biological diversity**

Management of human interactions with the diversity of life forms and ecosystems, in order to maximize the present benefits, and preserve its potential to meet the needs and aspirations of future generations

### **Ex situ conservation**

Conservation of the elements constituent of biological diversity outside their natural habitat

### **In situ conservation**

Conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domestic or cultivated species, in the environment where they developed their specific characteristics

### **Biological diversity**

Variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems

### **Species**

Largest group of individual organisms where two are capable of reproducing fertile offspring under natural conditions

### **Genetic diversity**

Diversity of genes from different plants, animals and microorganisms living on earth. The species consist of individuals with different genetic traits that can be inherited

### **Ecosystem**

Dynamic complex of communities of plants, animals and microorganisms and their non-living environment, which, by their interaction, form a functional unit

### **Threatened species**

Potentially endangered species on its territory

### **Domestic or cultivated species**

All species whose evolutionary process has been influenced by man in order to respond to their needs

### **Endangered species (E)**

Species which survival is unlikely if the causal factors continue operating. It also includes species whose numbers have been reduced to a critical level or their habitat has been reduced so drastically that they are considered to be in immediate danger of extinction

### **Endemic species**

Species that exists spontaneously in nature only in a particular territory and nowhere else in the world

### **Extinct species (Ex)**

Species not found in the wild over the last 50 years

### **Eradicated species**

Species that existed in a territory, where it is no longer, but that there is somewhere in the world

### **Undefined species (I)**

Species of which there are not enough data to clearly categorize

**Vulnerable species (V)**

Species whose reproduction rate probably will change, in short term, to the category of endangered, if the causal factors continue to operate. It also include de species whose population is decreasing due to over-exploitation, extensive destruction of its habitat or other environmental disturbance

**Game species**

Set of wild animals, likely to be the subject of hunting

**Rare species (R)**

Species whose number is small globally and that is not endangered or vulnerable but is at risk

**Ichthyologic fauna**

Set of fish that live in a given region

**Habitat**

Place or type of site where an organism or a population exists in the natural state

**Incidence**

Rate that indicates the number of new cases of diseased animals of a particular species on the total population, for a known period of time

**Artificial insemination**

Artificial fertilization of the egg, insemination act

**Genetic material (germplasm)**

Plant, animal, microbial or other material, containing functional units of heredity

**Monitoring**

Supervision and control of the implementation of the established plan and management

**Mortality**

Ratio between the number of dead animals and total number of animals from a holding, region, village, district or country

**Country of origin of genetic resources**

Country possessing these genetic resources *in situ*

**Country provider of genetic resources**

Every country providing genetic resources collected from *in situ* sources, including populations of wild and domesticated species, or collected from *ex situ* sources, being or not the country of origin

**Natural park**

Preserved area for the protection, conservation and natural evolution of wildlife, which include sites, landscapes and geological formations of particular scientific or aesthetic value

**Live weight**

The whole animal weight before killing

**Local race**

Concept used to classify livestock traditional diversity within species explored in the country.

**Biological resources**

Germplasm (organisms or their functional units of heredity), populations or any other biotic component of ecosystems, with an actual or potential value for humanity

**Genetic resources**

Genetic material with actual or potential value

**Carcass yield (CY%)**

Rate calculated by the ratio of the dressed weight (DW) (housing) on live weight (LW).  $CY\% = DW/LW \cdot 100$

**Biological reserve (natural)**

Zone or region containing remarkable ecosystems, traits or animal or plant species with a national scientific importance, and where man's action is prohibited or reduced. A biological reserve is said to be integral if the action of man is prohibited, and is said to be directed if certain human interventions are allowed

**Special reserve or sanctuary**

Preserved area for the protection of characteristic fauna or flora communities or protection of animal or plant species at particular risk, as well as the biotope indispensable to its continuity

**Technology**

Set of procedures, instruments and objects of a technic, art or craft

**Sustainable utilization**

Use of the components of biological diversity in a way and at a rate that does not lead to their long-term impoverishment, thus safeguarding the necessary potential to meet the needs and aspirations of present and future generations

**Exclusive economic zone (EEZ)**

Legal concept introduced by the 1982 United Nations Convention on the Rights of the Sea, which determines the rights of a country on its waters up to 200 miles from its shores

**Protected area**

Geographically delimited area, designated or regulated, and managed in order to achieve specific conservation objectives

**Zoo-genetics**

Concept commonly used by FAO in the context of biodiversity related to domestic animals bred for profit

**Zoo-technician**

Expert on conventional livestock husbandry techniques

