# THE STATE OF ERITREA
MINISTRY OF LAND, WATER AND ENVIRONMENT
DEPARTMENT OF ENVIRONMENT

REVISED NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN FOR ERITREA (2014-2020)
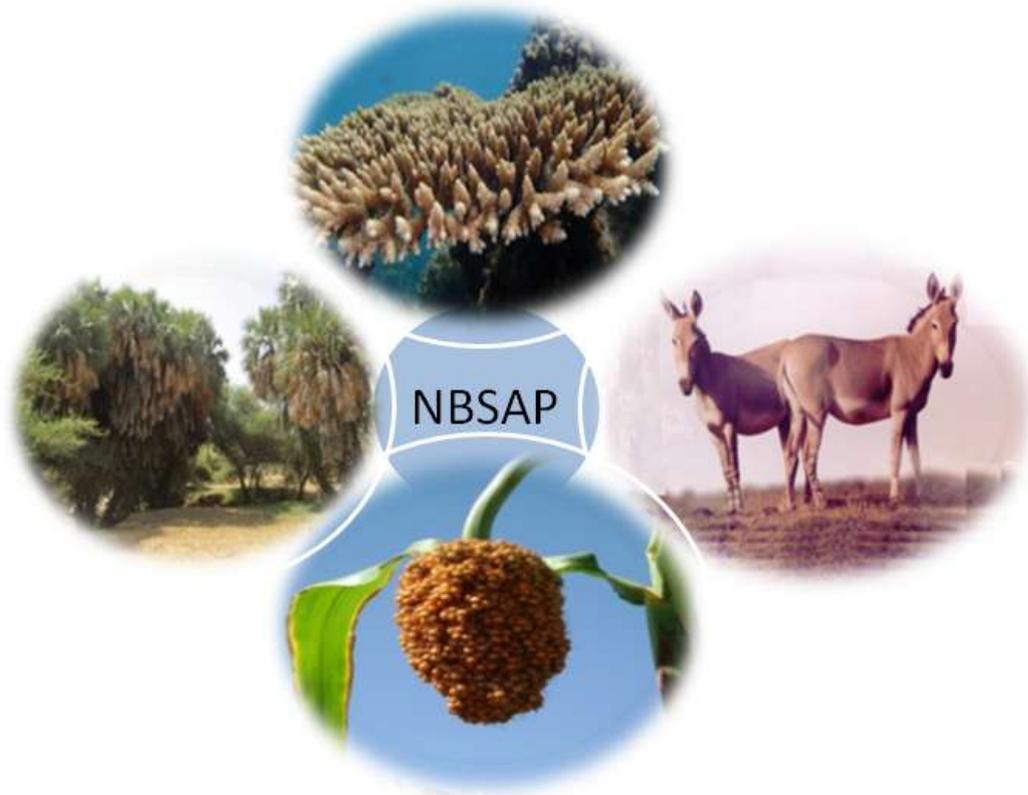
NBSAP

November 2015
Asmara, Eritrea

UNEP

Convention on Biological Diversity

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Eritrea prepared and adopted its first National Biodiversity Strategy and Action Plan (NBSAP) in August 2000, recognizing the significance of having it as an overall policy position and intervention guide document on biodiversity. In consonance with Eritrea's commitment to the Convention on Biodiversity (CBD), the NBSAP-2000 aimed at defining the strategic goals to reduce and halt biodiversity loss, promote the value of biodiversity, undertake policy and legal reforms and build capacity for planning and implementation.

Despite the effort exerted to implement the NBSAP-2000, fourteen years after its validation, the country still faces major challenges and emerging issues that require adoption of a new and revised NBSAP version as a strategic framework in response to related issues that today present serious threats to our national biodiversity.

From the global perspective, the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets provide a new orientation and a more dynamic approach to the objectives of the CBD. The new internationally consented vision of living in harmony with nature, adopted by the CBD Strategic Plan, proposes 20 global biodiversity targets to be achieved by 2020 in order to address the underlying causes and drivers of biodiversity loss, human induced and natural pressures and inequity in sharing benefits from biodiversity and ecosystem services. Eritrea fully concurs with such an approach in dealing the challenges that threaten its biodiversity.

Taking all of the above into consideration, the Government of the State of Eritrea decided to revise its first NBSAP and has come with a new one. Besides being first and foremost a timely response to the state of our national biodiversity, this new NBSAP harmoniously matches Decision X/2 paragraph 3 C of the CBD-COP, which calls on all Parties of the Convention to review and as appropriate update their respective NBSAPs.

On behalf of the Government of the State of Eritrea and myself, I would like to take this opportunity to acknowledge and thank both GEF and UNEP for their technical and financial support in preparing this revised NBSAP 2014-2020. While expressing Eritrea's unwavering determination to do everything within its means to implement its NBSAP, I would also like underscore the need for international cooperation on the basis of the principles and spirit of the Convention in order to successfully implement the global NBSAPs.

Tesfai Ghebreselassie

Minister of Land, Water and Environment

Asmara, December 2014

ACRONYMS

AZE   Alliance for Zero Extinction Sites (AZE)
BD: Biological Diversity or Biodiversity
CBD: Convention on Biological Diversity
CBO: Community Based Organization
COMSAT: College of Marine Science and Technology
COP: Conference of the Parties
CITE: Convention on International Trade in Endangered Species of wild Fauna and Flora
CMI: Coastal and Marine Islands
DKB: Debubawi Keih Bahri (Southern Red Sea)
DoE: Department of Environment
DoL: Department of Land
DoWR: Department of Water Resources
EIA: Environmental Impact Assessment
EIT: Eritrean Institute of Technology
FAO: Food and Agriculture Organisation
FWA: Forestry and Wildlife Authority
GDP: Gross Domestic Product
GEF: Global Environment Facility
GOE: Government of Eritrea
HAC: Hamelmalo Agricultural College
ICAM: Integrated Coastal Area Management
ICARDA: International Centre for Agricultural Research in the Dry Areas
ICRISAT: International Crops Research Institute for the Semi-Arid Tropics
ITPGRFA: International Treaty of Plant Genetic Resources for Food and Agriculture
IPM: Integrated Pest Management
IUCN: International Union for Conservation of Nature
MARPOL: International Convention for the Prevention of Pollution from Ships
MoEM: Ministry of Energy and Mines
MoA: Ministry of Agriculture
MoLG: Ministry of Local Government
MoMR: Ministry of Marine Resources
MoND: Ministry of National Development
MoT: Ministry of Tourism
MoLWE: Ministry of Land Water and Environment
MSY: Maximum Sustainable Yield
NAPA: National Adaptation Programme of Action
NARI: National Agricultural Research Institution
NBSAP: National Biodiversity Strategy and Action Plan
NEMP-E: National Environmental Management Plan for Eritrea
NGO's: Non-Governmental Organisations
NUEW: National Union of Eritrean Women
NUEYS: National Union of Eritrean Youth and Students
ODS   Ozone Depleting Substances
PA: Protected Area
PGR: Plant Genetic Resource
PHS   Population and Health Survey
PIC: Planning and Implementation Committee
PPAs: Proposed Protected Areas
SDM: Semenawi and Debubawi Bahri
SFM: Sustainable Financial Management
SKB: Semenawi Keih Bahri (Northern Red Sea)

SLM: Sustainable Land Management
UNDP: United Nations Development Programme
UNEP: United Nations Environment Programme
UNESCO: United Nations Educational, Scientific and Cultural Organizations
UNFCCC: United Nations Framework Convention on Climate Change

ACKNOWLEDGMENT

The successful preparation of the revised National Biodiversity Strategy and Action Plan (NBSAP) for Eritrea is as a result of the hard work, and devotion of many institutions and stakeholders.

We extend our great thanks to H.E. Mr.Tesfai Ghebreslassie, Minister of Land, Water and Environment, for his precious contributions and continuous support to the entire process of the project.

We would like to extend our appreciation to the Department of Environment Staff members for coordinating, facilitating, for their valuable contribution on the project.

We would also thanks to the Ministry of Agriculture (Department of Agricultural Extension, Regulatory Services), National Agricultural Research Institute (NARI), Ministry of National Development, Ministry of Energy and Mines (Department of Energy), Ministry of Marine Resources, Department of Land, Department of Water Resources, Zone Branch Offices of the Ministry of Land, Water and Environment, Forestry and Wildlife Authority, Eritrea Institute Technology(EIT), and Hamelmalo College of Agriculture (HAC) for their valuable contribution in revising the NBSAP. The experts of these stakeholders also deserve a special appreciation for providing their technical support to the Department of Environment with updated and reliable information.

We wish like to express our gratitude the consultant Mr. Asghedom Tewelde, for providing us valuable consultancy services on harmonizing the objective, scope and output of the assignment, compiling and reviewing of the different sections of the document, and assuring the delivery, content, technical quality and accuracy of the document.

Finally, we would like to extend our acknowledgement and gratitude to the UNEP, GEF and CBD Secretariat for their financial assistance and facilitation to revise the document.

Mogos Woldeyohannes

Director General
Department of Environment
Ministry of Land, Water and Environment
Asmara, December 2014

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PREFACE

The preparation of the National Biodiversity Strategy and Action Plan (NBSAP-2014) is the result of Government of Eritrea's support to natural resource protection as priority for biodiversity conservation and its sustainable use. It expresses the government's commitment of the Convention on Biological Diversity (CBD) particularly directed towards meeting the national biodiversity targets aligned with the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets.

The strategic objectives of the NBSAP-2014 are focused to mitigate the existing situational trend in biodiversity loss. To ensure positive changes along conservation of biodiversity and sustainable use promoting awareness raising programs at all levels on the value of biodiversity is vital. In addition, the NBSAP-2014 vision statement expresses the value and as well its conservation and wise use of biodiversity resources. It further stresses on the active participation of all stakeholders in order to sustain a healthy environment and proper sharing of benefits to meet the development needs and well-being.

Biodiversity trends in Eritrea have been relatively difficult to state owing to the inadequacy of integrated approaches and mechanisms for data collection and interpretations. Biodiversity provides the basis of all needs and thus its protection and wise utilization is paramount. The NBSAP-2014 seeks sustainable development through manageable biodiversity conservation and sustainable use and also needs to attain wider agendas for the biodiversity conservation and utilization while meeting human well-being. Therefore, the NBSAP is a guiding strategic document directed towards the achievement of the conservation and sustainable use of biodiversity and livelihood development as stipulated in the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets.

The NBSAP -2014 comprises six major parts as highlighted below:

The first part (Chapter 1: Introduction) addresses the general background of the country in view of the CBD implementation and associated issues.

The second part (Chapter 2: Country Profile) describes the broad geographic and socio-economic context of Eritrea within which any biodiversity strategy should be included. This section provides information on the geography of Eritrea and also on the main socio-economic systems across the country.

The third part (Chapter 3: The Status of Biodiversity in Eritrea) documents what is currently known about the distribution and condition of biodiversity across both agricultural, terrestrial and marine environments. Eritrea does contain a wide range of ecosystem types within a small geographic area. And this diversity is an important component of Eritrea's potential as a tourist destination. Eritrea is home to a number of globally rare and endangered species (e.g. African wild ass; Nubian Ibex) as well as being part of one of the world's major centres of crop diversity. These plant genetic resources have the potential to make a major contribution to national and global agriculture.

The fourth part (Chapter 4: National Policy, Legislative and Institutional Framework) reviews the evolving policy, legislative and institutional framework that create an enabling environment for conservation and sustainable use of Eritrea's biodiversity. The policy and

legislative framework of the country is as its initial stage and in progress. These policies and legislations are expected to provide vital opportunities for an integrated biodiversity conservation and sustainable use.

The fifth and most important part of the NBSAP (Chapter 5: Strategic Goals and Action Plan for Biodiversity) describes the principal components of the NBSAP including the Vision, Mission, Strategic Objectives, General Targets, Ecosystem-specific Targets and Actions of the Plan supported by matrix of actions. This chapter also includes the Alliance for Zero Extinction Sites (AZE) that aimed at conservation for the critically endangered and endangered species such as Somali Wild Ass (*Equus africanus somalieness),* elephant *(Loxondata Africana), Nubian Ibex,* marine turtles: Hawksbill *(Eritmochelys impricata),* Green turtle *(Chelonia mydas),* Loggerhead *(Caretta caretta),* Olive ridley *(Lepidochyles olivacea), and and* endangered trees and shrups such as *Juniperus procera, Olea europea sub-spp Africana, Hyphaene thebaica, Boscia angustifolia, Colutea abyssinica, Dalbergia melanoxylon, Diospyros mespiliformis, Flueggia virosa, Mimusops kummel, Sclerocary abirrea, Senna alexandriana, Syzygium guineense, Tamarindus indica, Vangueria madagascariensis, Ximenia Americana and* Aloe (*A.neosteudneri* and *A. schoelleri).*
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The final part (Chapter 6: Implementation Arrangement) expresses the institutional mechanism for the coordination and implementation of the NBSAP-2014 and the need for monitoring and evaluation of the NBSAP at regular basis.

The document encompasses a total of twenty General Targets in five Strategic Goals and Eighteen Ecosystem-specific Targets in three broad ecosystems categories have been derived and defined to ensure the effective realisation of the strategic goals for the conservation and sustainable use of biodiversity that should be met by 2020.

It has been prepared in a broad participatory process including governmental ministries, regional administrative bodies, academia, professionals, civil societies and consultants. It is believed that it will open a new roadmap to a successful implementation for the proper conservation and utilization of biodiversity resources of the country. Hence, it is assumed that all stakeholders would play their roles and make valuable inputs for the effective and efficient implementation of NBSAP 2014-2020.

CHAPTER 1: INTRODUCTION

1.1   Background and Context

Eritrea as a Country Party to the UNCBD, among other things, has prepared and adopted the first NBSAP in August 2000, as a reference document in order to stick to commitments accepted with the ratification of the CBD. The NBSAP-2000 was formulated taking into consideration the country's more dependency on the biodiversity resources for socio-economic benefits and future conservation programmes.

Life and development in Eritrea are based on natural resources; and the National Environmental Management Plan for Eritrea (NEMP-E, 1995) was drafted to ensure that human activities in both terrestrial and marine areas would result in long-lasting global environmental benefits. As an agrarian society, Eritrean dependence on agriculture is highly substantial; and safeguarding the productivity of the land is a major concern. Eritrea's pressing environmental problems are directly related to land degradation, deforestation, soil loss and the expansion of desertification, especially in the critical areas where agricultural output is vital (5th CBD National Report, 2014).

To reverse the adverse environmental problems, various measures such soil and water conservation, area closures, afforestation, rehabilitation of degraded areas both in land and coastal areas...etc have been undertaking by the government in collaboration with development partners and local communities. The Government of Eritrea with assistance from its development partners has made substantial investment in the environmental sector, the largest of which is the GEF Funded Projects (GEF 1 – GEF 5) on different focal areas that amount US$ 22.62 million GEF component with a total co-financing of US$ 41.55 million.

The newly revised and updated NBSAP-2014 includes Eritrea's biodiversity targets in line with the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets, to what might realistically be achieved over the next six years with respect to biodiversity conservation and sustainable use.

The NBSAP presents Eritrea's overall policy position with respect to biodiversity and attempts to position this policy in the context of the government's major development objectives for the next six years. The NBSAP builds upon the Government's previous commitment to broader environmental protection plans as enshrined National Environmental Management Plan – Eritrea (NEMP-E, 1995) and other relevant environment policies and legislations. NBSAP 2014 strategic goals, targets, actions and activities to positively impact on biodiversity conservation and sustainable use in line with the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets.

1.2   The Convention on Biological Diversity (CBD)

The United Nations Convention on Biological Diversity (UNCBD) was adopted in May 1992 and Eritrea formally acceded on 21st March 1996. The objectives of the Convention are to promote the conservation of biological diversity; sustainable use of its components; and the fair and equitable sharing arising out of the utilization of genetic resources. The Department of Environment (DoE) of the Ministry of Land, Water and Environment (MoLWE) has

assumed responsibility for co-ordination of CBD-related activities within Eritrea, although biodiversity-related activities are implemented by a wider range of government and public agencies. Under the CBD, Eritrea has, like other signatory countries, agreed to a number of specific obligations and opportunities for enhancement of biological diversity conservation and sustainable use. Amongst the obligations are the following:

- Preparation of a National Biodiversity Strategy and Action Plan (**Article 6**);
- Identification and monitoring of components of biological diversity important for its conservation and sustainable use (**Article 7**); and
- Preparation of regular reports on measures taken for the implementation of provisions of the Convention (**Article 26**).

The above obligations form part of a long-term commitment to activities that conserve and promote sustainable use of natural resources viz. biodiversity within member countries.

CHAPTER 2: COUNTRY PROFILE

2.1   Location

Eritrea is located in the Horn of Africa, lies north of the equator between latitudes 12^0 22′ and $18^0$02′ North and the longitudes $36^0$26′ and $43^0$13′ East and covers an area of 124,320 km^2. It is situated along the important Red Sea oil and shipping route connecting the Mediterranean Sea with the Indian Ocean. Eritrea shares boundaries with the Sudan in the West, Ethiopia in the South, Djibouti in the Southeast and with the Red Sea in the East. There are around 350 off shore islands, the prominent being the Dahlak Archipelago.

2.2   Population

The population of Eritrea is about 3.5 million of which 70-80% live in the rural areas and derive their livelihood from agricultural activities both crop and livestock production (PHS Eritrea, 2010). The population consists of nine ethnic groups: Tigrigna, Tigre, Saho, Afar, Hidareb, Bilen, Kunama, Nara, and Rashaida, each with its own language and cultural diversity.

2.3   Climate and Geography

The country exhibits a varied topography, rainfall and climate with altitude that ranges from 120 meters below sea level to over 3,000 meters above sea level. In regard to climate, soil types and other parameters, Eritrea is divided into six agro-ecological zones (Figure 1): (i) the Moist Highlands, (ii) Arid Highlands, (iii) Sub-Humid Highlands, (vi) Moist Lowlands, (v) Arid Lowlands and (vi) the Semi-Desert. Elevation ranges from 100 m (Semi-Desert) to 3018 m (Moist Highlands). Mean annual temperature ranges from 15^0C in the Moist and Arid Highlands to 32^0C in the Semi-Desert. Annual precipitation varies from less than 200 mm in the Semi-Desert to 800 mm in the Sub-Humid Zone. Over half of the total land area is not suitable for conventional agriculture due to steep topography unreliable rainfall conditions.

The coastal plains zone which is found adjacent to the Red Sea shoreline extends about 1060 km from the southern tip to the north (the state of the coast). The most serious climatic condition of the coastal zone is the shortage of rainfall for agricultural, domestic and other uses.
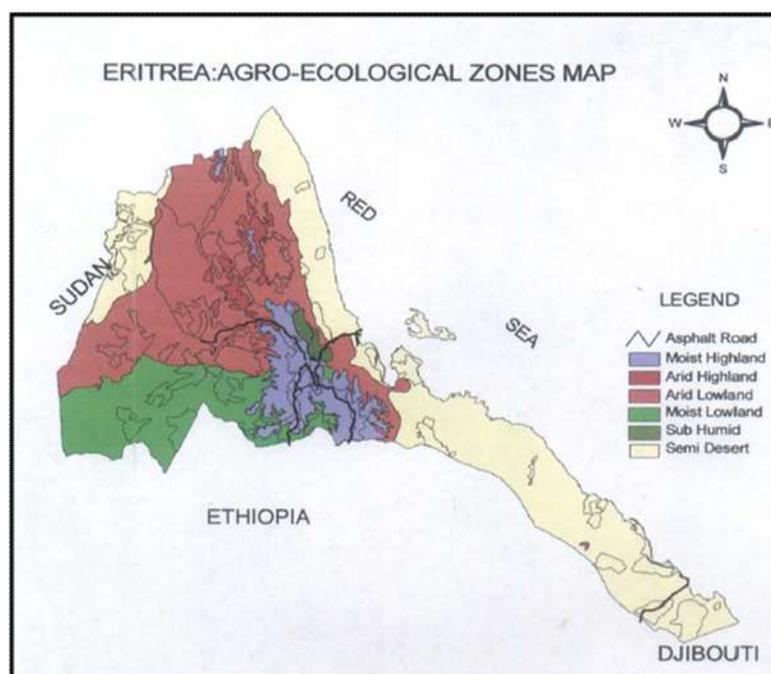
Figure 1: Agro-ecological zone of Eritrea (Source: DoL, 1997)
(This Map is not intended for political map)

2.4 Government

Administratively, the country is divided into six zobas (regions) namely Central, Southern, Anseba, Gash-Barka, Northern Red Sea and Southern Red Sea. The country has a decentralized form of governance and administration which entrusted with the responsibility for rural development on the regions called Zobas. The mandate and responsibilities of the various levels of administration are set-out in Proclamation for the Establishment of Regional Administration (PERA) No. 86/1996.

2.5 Economy

The war for liberation destroyed most of Eritrea's infrastructure and devastated its economy and environment. This compelled Eritrea to entirely reconstruct its social, economic, and physical infrastructure. The impact of the war on the economy of Eritrea was apparently seen in destruction of much civil infrastructure which had been built in the past 10-15 years. In addition tremendous efforts were made to formulate national economic and social development strategies and policies.

Agriculture and pastoralism are the main sources of livelihood for about 80 percent of Eritrea's population. The agricultural sector depends mainly on rain, with less than 10 percent of the arable land currently irrigated. Consequently, productivity is low. The agricultural sector, including livestock and fisheries, accounts for only one-fifth of the gross domestic product (GDP). Agriculture accounts for only 11.6% of the GDP as compared to 30.6% for industry, and 57.8% for services.

Eritrea has abundant natural resources including arable land (26% of the total area) of which only about 4% is under cultivation (PHS 2010). Although surface water is inadequate in Eritrea, there are adequate supplies of ground water, particularly in the western lowlands and in some parts of the coastal plains that can be used for both household and industrial purposes. Eritrea also has varied and extensive mineral resources including copper, gold, iron, nickel, silica, sulphur, and potash. Good quality marble and granite also exist in large quantities (Ministry of Land, Water and Environment, 1997). The Red Sea offers opportunities for the fishing industry, for expanding the salt extraction industry, tourism, and other resources.

Forestry and fishing currently account for less than 5% of GDP; artisanal fishing also makes a large contribution to the informal subsistence sector of the coastal economy. Historically, the fishing sector peaked in the 1950s at a catch of 25,000 tonnes when there were around 20,000 fisher-folk. Currently, the artisanal sector lands around 700 tonnes per annum; the commercial sector increased to 3,773 tonnes in 1995, but crashed to just 38 tonnes in 1997. The total Maximum Sustainable Yield (MSY) from the Eritrean Red Sea continental shelf area of 52,000 km^2 is estimated at around 65,000 tonnes (Fisheries Sector Report, 1999).

Eritrea's industrial base is still extremely narrow and is made up mostly of small- and medium- scale consumer-goods producing industries (food, beverages, leather goods, textiles, etc.) whose technology is largely out of date as a result of neglect of investment during the long war. Industry and manufacturing accounted for around 25% of GDP in 1995 but production of this sector was increasing by around 50% per annum.A summary of key physical, economic and social indicators is included in Table 1 below.

Table 1.Selected Physical, Economic and Social Indicators for Eritrea

Parameter	Measure	Unit
Land Area*	124,320	km^2
Forested*	1	% of land area
Coastline*	1200	Km
Continental shelf*	52,000	km^2
GDP Per capita**	544	USD
Social Indicators*		
Population	3.5	Million
Population Growth Rate	2.8	% per annum
Rural	35	%
Population Density	29	per km^2
Crude Birth Rate	33.9	per 1000
Crude Death Rate	5.9	per 1000
Life expectancy at birth	62	Years
Total Fertility Rate	4.8	Per woman (age 15-49)
Contraceptive prevalence rate	8	%
Health***		
Infant Mortality	45	per 1000 live births
Under 5 mortality	65	per 1000 live births
Under 5 underweight	38	%

Access to immunisation	83	%
Maternal mortality rate	486	per 100,000 births
Population per physician	17,778	
Population per hospital bed	1:1044	
Water****		
Access to safe water	78	%
Access to improved sanitation	11.3	%
% of urban population	>90	%
% of rural population	>70	%
Education*****		
Female literacy rate	56.5	%
Adult literacy rate	64.6	%
Literacy rate of 15-24 year-olds	85.2	%
Primary school enrolment	GER 98% NER 76.7%	% of relevant population
Junior secondary enrolment	GER 67.3% NER 38.3%	% of relevant population
Secondary school enrolment	GER31.7% NER 23.2%	% of relevant population
Pupils per teacher (Primary)	PR 1:41 MD 1:44 SEC: 1:54	
Pupils per textbook	PR 1:1 MD 1:1 SEC: 1:1	
Infrastructure*		
Telephone lines (Mobile 19%)	26	per 100 inhabitants

Source: * *PHS (2010)*
*** World Bank (2013)*
**** MoH-HRD report (2013)*
***** WRD assessment report (2011)*
****** MoE Research and Statistics (2012)*

CHAPTER 3: THE STATUS OF BIODIVERSITY IN ERITREA

Eritrea is endowed with rich biodiversity resources that need to be thoroughly studied. The Proposed Protected Areas (PPAs) of Semenawi and Debubawi Bahri (SDB); Buri-peninsula and the Gash-Barka Riverine Forests etc… harbour highly diversified flora such as *Juniperus procera, Olea Africana* and fauna that support considerable agricultural and fishing activities. The beauty of the avi-fauna and landscape of the Green Belt and Mountain Bizen of the Eastern escarpment of Eritrea are of high eco-tourism value.

Photo 1: Dense ruminant forest of *Juniperus procera*, Green belt (Semenawi Bahri), 2012

Photo 2: Dense ruminant forest of *Olea africana,* Mountain Bizen*, SKB, 2013*

Eritrea has records of about 600 bird species; and it is an important, migration route and stop-over location for many species of migratory birds. A total of 14 Important Bird Areas (IBA) have been identified for Eritrea. There are 12 species of global conservation concern (Redman et al. 2009). A total of 90 reptiles and 19 amphibian species have been recorded for Eritrea. There are two possible endemic reptiles" Loggerhead (*Caretta caretta)* and Olive Ridley (*Lepidochelys olivacea)* and one possible endemic amphibian, Demarchi's Frog (*Rana demarchii)* observed in Eritrea since 1993. In the absence of a comprehensive national checklist, a number of site-specific checklists are included in one list in which almost 700 species indicates that considerable plant diversity may persist in human-altered landscapes (5th CBD National Report, 2014).

Eritrea's dependence on agriculture is highly considerable. Hence, safeguarding the productivity of the land is a major concern. Indeed, Eritrea's pressing environmental problems are directly related to land degradation, deforestation, soil loss and the expansion of desertification, especially in the critical areas where agricultural output is vital.

The loss of biodiversity, along with climate change and desertification, were identified as the greatest challenges to sustainable development in Eritrea (NEMP-E, 1995; NAP, 2002; GEF Country Portfolio Evaluation Report, 2014, and 5th CBD National Report, 2014). The cutting down of trees for firewood, cultivation, for construction…etc are a significant

concern because of increased human encroachment upon forest areas and increased resource extraction. In Eritrea forest resources and vegetation covers are under serious threat i.e. the forest cover and forest quality are declining.

Although Eritrea possesses one of the least ecologically disturbed parts of the Red Sea relative to other enclosed water bodies, it is in increasing jeopardy. There is a potential risk of marine pollution, and environmental degradation from rapidly expanding maritime activities. Coastal habitat is being converted for urban and industrial development. Tourism and recreation usage are growing quickly. That's why proper conservation measures need to be instituted before the advent of environmental pressures. The areas identified as potential hotspots are: i) The zones of the Buri-Peninsula, ii) Hawakil Archipelago iii) The bay of Bara'sole. These areas harbour some of the world's most important coastal and marine environments, with unique coastal (aquatic/terrestrial) ecosystems and their associated species as important repositories of marine biodiversity on a global scale. There is also a rich cultural heritage that includes large numbers of significant archaeological, historical and sacred sites, which could be candidates for important UNESCO Cultural heritage sites.

The Southern part of the Eritrean Red Sea coast is rich in marine plants especially, the sea grass. A significant coverage of seaweed is also found, relatively less compared to the sea grass. But much abundance is found on the hard substratum of the Northern part. The coastal areas from Ghel'alo to Sahil and the Dahlak Archipelago Islands can be considered as Important Bird Area(IBA) for marine birds especially for the Palearctic migrants. The coastal villages are primary wintering ground and migratory stopover for shorebirds. The flat intertidal areas of the Eritrean Red Sea especially coastal areas of Wekerito and Fanus are ideal for roosting and foraging for seabirds. Depending on the commencing season enough information on those breeding birds commencing clutches and fledgling time should be recorded and the endangered seabird species such as *Socotra cormorant* should be given higher priority.

Photo 3: Socotra cormorant (*Phalacrocorax nigrogular*), Tio, 2012

Photo 4: Eurasian Spoonbill (*Platalea leucorodi),* breeding plumage nesting on mangrove, 2012

Photo5: Pink-backed pelican (Pelecan srufescens), Southe-rn Red Sea, 2012

The offshore islands are important areas of turtle foraging and nesting areas. However, feeding and nesting monitoring sites for sea turtle can be near coastal areas were poaching from fishermen is commonly observed. The species diversity for cetaceans is incomplete and nesting area of sea turtle for few islands is not confirmed, as most field surveys were conducted during the season of none-nesting.

Eritrea is recognized as a centre of origin and centre of diversity for a number of cereal crops; sorghum, wheat and barley; pulses, and vegetables. There are evidences of rich diversity of crop land-races. A full inventory of the local land-races for all crop types is required to fully document and sustainably manage the land races.

Habitat transformations, particularly from conversion to agriculture due to anthropogenic pressures are direct drivers of biodiversity decline in Eritrea. Cultivated systems (areas where at least 80% of the landscape is in croplands, shifting cultivation, or livestock production), and covers three quarter of Eritrean's terrestrial surface (5th CBD National Report, 2014). While the expansion of agriculture and its increased productivity is seen as successful story of enhanced production and food security of one key ecosystem service, this achievement has come at high and growing costs in terms of trade-offs with other ecosystem services, both through the direct impact of land cover change and as a result of release of nutrients into rivers and water withdrawals for irrigation and other services. Habitat loss also occurs in coastal and marine systems, though these transformations are relatively minimal and less documented.

The major threats to biodiversity conservation in the country can be summarized as follow:

(a) Over-exploitation of natural resources:

- Excessive collection of wood for domestic energy and construction and none timber forest products such as gums and incenses,
- Over grazing/over browsing by livestock,
- Excessive pollarding of multi-purpose trees, such as *Balanites aegyptiaca*, *Faidherbia albida* and *Terminalia brownii* for dry season fodder,
- Increases in fishing activity,and offshore development activities

(b) Habitat degradation and loss

- Excessive clearing of woodlands for agriculture especially in the South western part of the country,
- Shifting cultivation,
- Cutting of live trees for firewood, both for local consumption and urban centres of the country,
- Expansion of settlements, villages and towns,
- Invasive alien species (*Opuntia ficus indica* in the highland forest and *Prosopis juliflora* in the riverine forest) are invading natural habitats aggressively, and
- Pollution from on shore industry and urban waste flows
- Conversion of coastal habitats.

(c) Root cause

- Recurrent drought/ climate change and climate variation,
- Lack of EIA on developmental activities and increasing consumption,

- Inadequate environmental safeguards, rules and regulations lack of an environmental law,
- Capacity constraints including low awareness,
- Lack of comprehensive land-use planning and effective regulatory mechanisms etc.

To reverse the adverse environmental problems, various remedial measures have been undertaking by the government, non-governmental organizations and community based organizations. Apart from their active involvement in preparation and updating of the NBSAP document as members of the Technical Committee, they have done tremendous amount of work to implement the Conventions in various fields.

The Government of Eritrea with the assistance from development partners has made substantial investment in the environmental sector, the largest of which is the GEF Funded Projects. Table 2 summarizes GEF funded projects on different focal areas (GEF 1 – GEF 5) cycle from 1992-2014 in Eritrea.

Table 2: GEF funded projects on different focal area (GEF 1 – GEF 5) in Eritrea.

Focal Areas	Number of Projects	GEF Amount (US$ M)	Co-financing Amount (US$ M)
Biodiversity	4	11.3	11.41
Climate change	3	2.45	2.95
Land Degradation	2	6.17	23.92
POPs	2	2.49	3.24
Multi-focal area	1	0.19	0.02
Total	12	22.62	41.55

The Eritrea Biodiversity Stocktaking Assessment Report (DoE, 1999) and the National Biodiversity Strategy and Action Plan (NBSAP, 2000), categorized the Eritrean biodiversity under three main ecosystems. This new version (NBSAP 2014) has also maintained the three ecosystems as listed below:
- The terrestrial ecosystem
- The coastal, marine and islands ecosystem, and
- The agricultural ecosystem.

This report is still based on the previous reports. Each of the above stated ecosystems and/or biodiversity described below are the results derived from various relevant national and international reports and as well as through key stakeholders involvements.

3.1 Terrestrial Biodiversity

Terrestrial biodiversity is defined as the natural biological systems occupying the land area of Eritrea, excluding the marine systems and the biodiversity associated with agricultural systems. Obviously, there is a good deal of overlap between these systems, especially with regard to extensive rangeland and the coastal plains and islands of the Red Sea.

3.1.1 Terrestrial Biodiversity at the Ecosystem Level

In Eritrea a few studies of ecosystem biodiversity (*sensu stricto*) have been completed but a number of national land use classifications have been developed. Eco-geographical, agro-ecological, and vegetation cover classifications have been produced at coarse scales. These classifications capture the main regional ecological variations within the country but provide little detailed information about the species diversity, which exists within these regions. In almost all cases, the level of ecological/biodiversity information about particular ecosystems and habitats (e.g. *Juniperus* forest and riverine forest) is incomplete and in many cases, historical and unlikely to reflect the current situation.

Currently, Eritrea has no formal protected areas, which are legally gazetted, although a number of potential areas have been identified and partially surveyed. It is unlikely that more detailed biodiversity information will change these priorities, although additional locations may be identified. The absence of formal protected areas does not mean that land is not being conserved in Eritrea. The designation of the Semenawi and Debubawi Bahri, Buri-Irrori Hawakil Islands as well as Bara-Sole as protected area system in 2013 can be a practical intervention of the Government of Eritrea to ensure conservation of the critical biodiversity resources. The proposed protected areas outstrip both the NBSAP and Aichi Biodiversity Targets *in-situ*-conservation. Hence, more than one million hectare of terrestrial and marine ecosystem has been proposed for protected area establishment and that fund is secured from GEF/UNDP and local Government and expected to be implemented within 7 years. Wide spread area closures, at the village level throughout the country also provided clues of enhanced natural regeneration of the ecosystems at varied scale. Such areas would require rigorous monitoring and evaluation mechanism to ensure the dynamic changes in biodiversity status.

At this time, the status of natural terrestrial ecosystem biodiversity in Eritrea can be summarized conveniently under three broad categories:

Low biodiversity, but stable: Much land in Eritrea, for example, most of Agro-ecological zones: the Moist Lowlands, Arid Lowlands and the Semi-Desert(see Fig.1), currently has very low human population density and use. This situation is likely to remain the same for the near future at least and the biodiversity status of such regions can be considered to be relatively stable. These areas are quite similar ecologically and mostly low in terms of biodiversity richness, although they may contain interesting and important endemic species in particular places. The major threats to biodiversity in these areas are drought, and fire.

Moderate biodiversity and threatened: The land in Agro-ecological zones: the Moist Highlands, Arid Highlands, and Sub-Humid Highlands,(see Fig.1) has a higher overall level of biodiversity due to increased rainfall. This higher potential productivity also makes the land more suitable for agriculture and thus for associated human habitation and the additional pressures which this brings. In these areas, the potential for conflict between biodiversity conservation and sustainable use and conversion to alternative uses is high. Careful planning and strong management will be required to avoid loss of biodiversity. All of the key "pressure-point" locations identified in this NBSAP belong to this category.

Degraded land: Land of this type may be found in most agro-ecological zones, but degraded land within zones: the Moist Highlands, Arid Highlands, Sub-Humid Highlands,(see Fig.1)   is the most significant from a biodiversity perspective. Degraded land in these zones is likely to continue to lose its remaining biodiversity if it is left unmanaged. Active remedial intervention is required to restore this land to a self-sustaining, ecologically useful condition (either as natural habitat or as productive land for agriculture).

3.1.2   Terrestrial Biodiversity at the Species Level

As with terrestrial ecosystem diversity, knowledge of the status of individual terrestrial species is incomplete and in need of improvement before it can be used for realistic biodiversity planning. Although national lists have been compiled, these are mostly historical and recent records are few and insufficient to provide clear data on present-day distributions of species. A brief summary of these data is provided below. [Note: For animals below the vertebrate level, data are almost non-existent].

Mammals: A total of 136 mammal species have been listed in a recent compilation of existing information. This total includes 16 marine mammal species known to occur in Eritrean territorial waters, but excludes 9 domesticated mammals (sheep, goat, cow, pig, horse, donkey, camel, cat and dog). The population status of most of these wild species is poorly known at present, but has been ranked in 6 categories (Critical [Extinct], Critical, Endangered, Rare, Common, or of Unknown Status). This rapid assessment was undertaken by the staff of the Ministry of Agriculture, Forestry and Wildlife Authority and Marine Resources, with the aim of identifying needs for improving knowledge of terrestrial and marine wildlife. The status categories simply reflect observation status and do not reflect any direct assessment of threat. The summary results are given below.

Table 3. Assessment of population status of Eritrean mammals (2013)

Status category	Definition	Number of species
Critical (E)	Not reliably recorded since 1990 and certainly, or almost certainly, extinct in Eritrea	**9**
Critical	Not reliably recorded since 1990 but known from anecdotal (second-hand) evidence	**9**
Endangered	Known from less than 10 sighting and/or from less than 3 separate locations since 1990	**14**
Rare	Known from between 10 and 50 sighting and/or from between 3 and 10 separate locations since 1990	**14**
Common	Known from more than 50 sighting and/or from more than 10 separate locations since 1990	**25**
Unknown status	Not identifiable due to nocturnal habit, small size, lack of identification features, etc.	**65***
Total		**136**

*This total includes three species (Brown and Black Rat and Domestic Mouse) which are common, but not seen "in the field" by wildlife staff.

Table 3. demonstrates the crucial need for simple investment in improving baseline biodiversity data. Over 50% of mammal species cannot be ranked for status due to lack of knowledge. Only 20 taxa can be considered to be secure in conservation terms. The rest must be considered threatened until further survey work is completed.

At the species level, Eritrea is home to a number of globally rare and endangered species such as the African wild ass and Nubian Ibex.The current data are limited on Nubian ass (*Equus africanus africanus)*, but it is believed that the species still exists in the Nubian desert of northeast Sudan into northern Eritrea (Moehlman, 2002). Of the seventeen mammal taxa (species/sub-species) listed in 2013 IUCN Red List of Endangered Animals, which appear on the Eritrean checklist, only the Eritrean sub-species of the warthog (*Phacochoerus africanus aeliana)*, and Dugong (*Dugong dugon*) can be ranked as Common in Eritrea using the above criteria. The Dorcas gazelles (*Gazella dorcas*) and Soemmering‟s gazelle (*Gazella soemmerringi*) are listed under Vulnerable. Four species / subspecies, Gelada (*Theropithecus gelada*), Ethiopian Wolf (*Canis simiensis ruppell*), Walia Ibex (*Capra walie*), and Black Rhinoceros (*Diceros bicornis*) are certainly extinct in Eritrea. Two species / subspecies, African Wild Dog (*Lycaon pictus*), and Lion *(Panthera leo)* are considered Critical, probably extinct. Three, Hartebeest (*Alcelaphus buselaphus*), Red-fronted gazelle (*Gazella rufifrons*), Nubian Ibex (*Capra ibex nubiana*) are considered Endangered; and two mammals: Elephant (*Loxodonta africana*), African Wild Ass (*Equus africanu*) are considered Rare. Three bat species are of unknown status in Eritrea.

Photo 6: The Critically Endangered African wild ass (*Equus africanus somaliensis*), Southern Red Sea, 1998
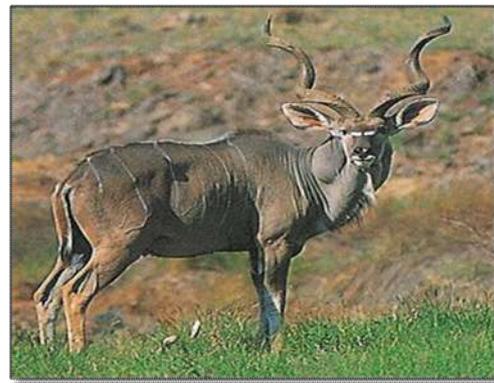
Photo 7: Greater Kudu (*Tragelaphus strepsiceros*), Mogo, Semenawi Bahri, 2013

It is also clear that a number of mammals, notably African elephant, African wild ass, Greater kudu, African civet, Dorcas gazelle, Red fronted gazelle, Soemmering's gazelle, Hunting dog, Salt dik-dik, Klipspringer, Aardvark, Leopard, Warthog, Wild pig, Common or Grey duiker, and Bush buck are recognized as species threatened with extinction 'The Forestry and Wildlife Conservation and Development Proclamation No. 155/2006' and require special attention at national level.

Birds: Eritrea has records of about 600 bird species. It is also very important, for migratory birds, providing migration route and stop-over location for many species. A total of 14 Important Bird Areas (IBA) have been identified in Eritrea. There are 12 species of global conservation concern recorded from Eritrea (Redman *et al* 2009). Arabian bustard, Black

winged lovebird, Secretary bird, and Common ostrich are also recognized as species threatened with extinction'The Forestry and Wildlife Conservation and Development Proclamation No. 155/2006' and require special attention at national level. Of the total of 600 species, around 320 are resident, of which about 50% have historical breeding records. Around 150 are Palearctic migrants moving South from Europe to Africa; of these, around 40 species are recorded as breeding in Eritrea. Around 45 are intra-African migrants, a few of which are thought to breed in Eritrea. The remainder are either vagrants or of unclear/unknown status.

Photo 8: Ostrich (*Struthio camelus*): Mogotaib, Riverine forest, 2013

Photo 9: Ostrich (*Struthio camelus*): Gubud-Engel, SKB, 2014

Photo 10: Near Threatened Arabian bustard (*Ardeotis arabs*), Ghelalo, SKB, 2013

Reptiles and Amphibians: Knowledge of biodiversity of reptiles and amphibians is extremely weak. A recent checklist could improve data. A total of 90 reptiles and 19 amphibian species have been recorded for Eritrea - this is almost certainly an underestimate because species which are common and widespread elsewhere in the Horn of Africa do not appear on the Eritrean list. There are two possible endemic reptiles" Loggerhead (*Caretta caretta)* and Olive Ridley (*Lepidochelys olivacea)* and one possible endemic amphibian, Demarchi's Frog (*Rana demarchii)* observed in Eritrea since 1993. On the other hand, many of the species on the list have been collected only a few times and may well be extinct from Eritrea.

Flora: Although historically, plant biodiversity in Eritrea has been relatively well documented, much of this information is only available outside of Eritrea (notably in Ethiopia and Italy). Within Eritrea today, plant biodiversity is under-collected and under-studied (Since the last three years various B.Sc and M.Sc theses have been carried out by the Eritrea Institute of Technology, Hamelmalo Agricultural College and the College of Marine Science and Technology); and these information must be included in the forth coming report

to enrich the knowledge base on Biodiversity of Eritrea. The regional Flora of Ethiopia and Eritrea[1] is still incomplete (only four volumes from a projected total of eight are available) and no national plant checklist exists. A number of regional vegetation descriptions exist and are summarised in the Eritrea Biodiversity Stocktaking Assessment Report. In the absence of a national checklist, a number of site-specific checklists are included in this report - one list of almost 700 species indicates that considerable plant diversity may persist in human-altered landscapes. A total of 33 tree species have been listed as endangered by the Forestry and Wildlife Division of the MoA, but the quantitative basis for this status is not clearly documented.

Photo 11: *Endangered Hyphaene thebaic* communit*y*, Mogoraib River, 2013

Photo 12*: Adansonia digitata tree,* Laelai Gash Riverine forest, 2009

Other taxa: For all other taxa (e.g. invertebrates and microbes), the level of knowledge of diversity makes compilation of national checklists impossible. There are a few collections of insect, plant and microbe agricultural pests at the Ministry of Agriculture (NARI) and at the Eritrean Institute of Technology (EIT) and Hamelmalo Agricultural College (HAC); a list of weeds and insect pests is provided in the Eritrea Biodiversity Stocktaking Assessment Report. This is one of the major gaps to be filled by the relevant institutions in the future.

3.2   **Coastal, Marine and Island Biodiversity**

The Eritrea's Coastal, Marine and Island (CMI) zone is situated in the southern sector of the Red Sea. The Red Sea is an almost enclosed, hot, saline body of water which harbours flora and fauna partially isolated from the Indo-Pacific Ocean at some time in the last 10-20,000 years. The diversity of the Red Sea is a sub-set of that found in the Indo-Pacific Region, and is beginning to show signs of divergence following isolation, especially amongst the 1248 spp. of fish.

The Eritrea's Coastal, Marine and Island (CMI) zone covers more than 121,000 square kilometers, including more than 350 offshore islands and 1,200 km of coastline (18% of the Red Sea continental coastline) not including the islands and is pristine relative to other parts of the Red Sea that have been disturbed by developmental activities. Eritrea's 1,200 km

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[1] Flora of Ethiopia and Eritrea; Volume 2 (Part2): Canellaceae to Euphorbiaceae (26 families); Volume 3:

coastal plain ranges from 20-60 km in width and contains 59% of the country's land area. It is largely underdeveloped due to its arid nature and the absence of any permanent rivers.

The Eritrean coastal plains are hot, dry and sparsely inhabited. This has contributed to the survival of a relatively pristine coastal and marine environment, of which the coral reefs and their associated fish assemblages represent the most diverse ecosystems in Eritrea. Nearly 90 marine and shore birds, 500 fishes and 44 genera of hard corals have been recorded (annex 1 and 3). In addition, the Eritrean coast is inhabited by up to 5 marine turtles, 16 or more cetaceans and the dugong - almost all of which are species of global conservation concern (annex 2).

Photo 13: Folacious - Montipora Spp.Gorgusum, 2014

Photo 14: Table coral - Acropora spp.Mojeidi island, 2014

Photo 15: Soft Coral - Dendronephthya Spp.Nakura-Dahlak, 2007
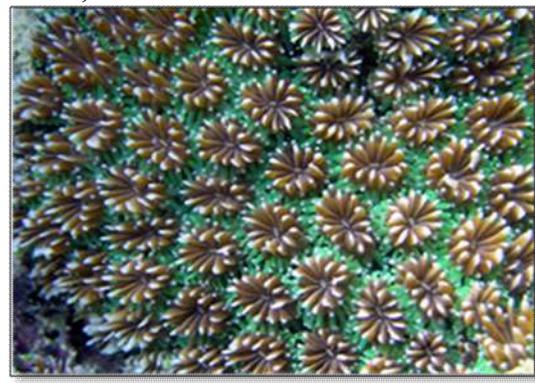
Photo 16: Encrusting - Galaxia spp. Sheik Said Iseland, 2012

Considerable surveys were conducted during the last decade to fully establish coastal and island sites which would be the best suited for protected area status. This should be decided before, or in parallel with, any increase in the levels of coral reef- based tourism. The number of coral reef sites of exceptional quality for dive tourism appears to be fairly limited - much of the Eritrea's reef is affected by natural turbidity, sedimentation and storm damage. Increases in commercial fishing activity, oil and gas production offshore and pollution from onshore industry and urban waste flows all represent potential threats to marine biodiversity. This NBSAP is prepared to ensure appropriate strategic and action plans related to coastal, marine and islands biodiversity for with great conservation value and sustainable use.

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The Red Sea supports the highest degree of endemism of any oceanic water body in the world – an estimated 18% of 1,248 fish species and 20% of 220 coral species. Biodiversity research in the region is fairly recent and has largely been conducted in the Northern half of the Red Sea (Sheppard et. al. 1992). However it has been noted that some groups of Red Sea organisms comprise the richest marine diversity West of Indonesia. However, because of its relatively small size, limited oceanographic circulation and high endemism, the Red Sea as a whole is particularly susceptible to pollution, loss of species and reduction in ecosystem productivity.

The extensive coral reefs, sea-grass meadows and mangroves support globally important biological diversity and maintain the ecological stability and productivity of the CMI systems. However, mangrove habitats are being eroded mainly due to human induced activities. Despite limited research, more than 250 species of reef fish from 49 families and 86 marine and shore bird species from 41 families have been recorded. The 210 islands of the Dehalak Archipelago support globally significant breeding populations of turtles and dugongs and serve as breeding, nesting and wintering sites for European, African and Asian migratory birds. Healthy relict populations of Eritrea's larger wildlife species, *e.g.* gazelle and wild ass, have also been found in the coastal and island areas.

Photo 17: Group of Camels grazing on mangrove *(Avicennia marina),* Hergigo, 2010

Photo 18: Olive ridleys Turtle *(Lepidochelys olivacea*) Ras Tarma DKB, 2005

The Dahlak Archipelago and its geological twin, the Farasan Archipelago in Saudi Arabia, are relicts of large Pleistocene reef platforms that have been modified over time by tectonic displacement and erosion. These platforms provide the substrata for modern reef development and their varied topography includes sand banks, shoals, shallow cemented areas, and large gullies up to 150 m deep, which cut into the archipelagos and support unusual species. The Red Sea is the only semi-enclosed water body in the world containing such archipelagos. While the Saudi islands are extensively developed, the Dahlak region is under populated and pristine, providing an ideal baseline for biodiversity research and

conservation. As a result, the entire Dahlak Archipelago has been proposed as a marine reserve (UNEP/IUCN).

3.3   Agricultural Biodiversity

Agricultural biodiversity include plants (utilised as food/feed, industrial, spices, medicinal, etc.), the wild relatives (these are parts of the terrestrial biodiversity) of these plants, animals, weeds and microbial. The diversity exists between species and within species in a given ecosystem.

Eritrea possesses highly variable agro-climatic condition with elevations ranging from below sea level to about 3000m, and temperature from semi-desert hot to warm, mild to temperate. There are two rainy seasons, one between June and September covering the greatest part of the country and the other from November to March covering the eastern and southern escarpment and the coastal zone.

The agricultural sector accounts for around 11.6% of total GDP and a much larger proportion of the subsistence economy which is not fully documented in national economic statistics (World Bank, 2012). Over 73% of the population is directly or indirectly engaged in either subsistence or commercial agricultural activities. From a biodiversity perspective, the agricultural sector has considerable importance both in global and local terms. The diversity of crop, forage, shrub and tree browse landraces found in Eritrea has global conservation significance because Eritrea is primary and secondary centre of diversity for a number of cultivated crops. More importantly, the genetic diversity of these and other crops and forages in Eritrea plays an important role in the agricultural strategy of farmers, especially those practising rain-fed agriculture. Cultivation of a range of different landraces provides on-farm conservation of the crops and securing total failure of crops and livestock under harsh conditions.

3.3.1 Crop genetic diversity:

The climatic and geographic variations create favourable conditions for the growth of different cultivated crop plants. Farmers, who follow traditional farming systems for centuries, have passed on the genetic diversity of these crops from generation to generation. Thus, a considerable amount of agricultural biodiversity is still being conserved in *in-situ* conservation.

Eritrean farmers are mostly depending on the landrace varieties. Recognizing this, the government has endeavoured to introduce improved varieties. Nowadays, the improved varieties account only 15 – 20% of the total field crop areas under cultivation. The farmers, who practice traditional farming systems, have conserved PGR on-farm for centuries by depending on their own planting material. On-farm conservation of PGR is taking place spontaneously at the level of individual farms throughout Eritrea. It is estimated that 3-4 landraces of each major crop species may be found in each "locality" but it is not clear how many landraces exist across all localities. Sometimes the same landraces have a different name in different localities; sometimes different landraces can have the same name in different locations. Landrace conservation at this uncoordinated level carries a risk that local landraces will be lost if (i) farmers suffer severe crop failure due to drought, pest damage or

war; or (ii) farmer's agricultural strategies change so that some varieties are no longer maintained. There is some evidence that this type of genetic erosion is happening but the extent is not clear due to lack of documentation of landrace distribution.

In addition, the farmers those maintain field crops also keep up to produce old varieties of orchard species. The NARI and the HAC are working much greatly to increase cultivation area under improved varieties by replacing those of have been under landraces varieties which consisting around 85% of the total field crops land. In such cases, efforts must be exerted to conserve the landraces from areas no previous collection mission is undertaken before they are lost. Landrace varieties possess a much wider genetic base than high yielding improved varieties. Therefore, the conservation of PGR ensures primary source of gene variation useful for today and future production improvement through breeding and selection programs.

Eritrea is centre of origin for several crops such as Okra (*Abelmoschuse sculentus*), *Taff* (*Eragrostis tef)*, Niger seed (*Guizotia abyssinica*), mustard (*Brassica carinata*), watermelon (*Citrullus lanatus*) and leafy vegetables (Amaranths (*Amaranthus caudatus).* Okra has been grown by farmers and it also grows as wild in the Western and Eastern lowlands of Eritrea. The wild relative reported existing in Eritrea is A. *ficulneus*. *Taff* and Niger seed mainly grow in the Central-Highland Agro-ecological Zone. *Taff* is an important crop as human food and animal feed. In most areas of the country, local bread called *Injera*is prepared from *Taff*. Identified landraces of *Taff* are *Sergen, Tsaedataff, Keihtaff, Chenger* (*Kuada*) and *Wafey*. It is common crop in the Central Highlands and South-western midlands of the country. It covers about 7.5% of all cereal crops production (MoA 2012). The progeny of *Taff* existing in Eritrea is *E. pilosa* and other 24 wild type of the genera *Eragrostis* are reported in Eritrea (Hedberg and Edwards, 1995, M.SC at EIT thesis 2014). The wild relatives found as weed, wild and these species are good animal feed. Water melon and melon grow in Eastern and Western Lowlands of Eritrea as cultivated and wild. One wild relative of water melon is reported in Eritrea a sub-species of *Cucumis melo*is available as wild. The native leafy vegetables such as mustard, amaranthus are important as resilience crops and their status is underutilized.

Photo 19: Several crops under cultivation, NARI, 2014

Photo 20: Sorghum landrace variety (*Amghe)* superior in *injera* (bread) quality. 2013

The country shares with other countries possible centre of origin for sorghum (*Sorghum bicolor*), sesame (*Sesamum indicum*) and pear millet (*Pennisetum glaucum* (L.) R. Br.). The

north east quadrant of Africa below the Sahara is the region where the greatest variation of the genus *Sorghum* is found (Dogget, H. (1988), Flora of Ethiopia and Eritrea, Vol. 7 1995). Looking at the wild sorghum relatives in the South western indicate that Eritrea is centre of origin for cultivated sorghum. Sorghum is in first place accounting for 46% of total cropped area and it is the most diverse crop considering number of landrace varieties. Unique traits were identified in Eritrean sorghum comparing with East and Central Africa collections (Tesfamicael *et al* 2014) submitted for publishing). Considering area cover pear millet is the second most important cereal crop in Eritrea, grown mainly by small farmers in low lands and mid lands. According the Flora of Ethiopia and Eritrea volume 7 twenty species of the genera *Pennisetum* are found in Eritrea and the species *P.violaceum*is believed to be the proginetor of pearl millet.

It is also centre of diversity for several crops such as barley, tetraploid wheat, chickpea, finger millet, grass pea and cowpea. The Russian scientist Vavilov (1992) was impressed with the diversity and by the many endemic characters of Eritrean crop varieties. As Vavilov identified Eritrean Center of Diversity among others centre of origin for sesame, castor bean, garden cress, okra, indigo, barley, sorghum, pearl millet, cowpea, flax, *Taff* (*Eragrostis tef*) polish wheat, hard wheat, emmer and poulard wheat. At present farmers grow *Triticum aestivum* and *T. durum* and with the later dominates the farmers' field. *Ales* (Emmer wheat, *T. dicoccun* (Schrank)) has been disappeared 3 – 4 decades ago. Efforts are underway to repatriate this valuable heritage crop. Barley has been grown in Eritrea for at least 5000 years (Harlan, 1969). Significant genetic diversity of Eritrean barley collected from small-scale farmers' fields were explored using Simple Sequence Repeats (SSR) markers (Backes G. *et al* 2008). Based on the SSR data, individual farmers' fields were found to possess 97.3% of the genetic variation present in the Eritrean barley. Finger millet (*Eleusine coracana)* predominantly grows in Debub and to some extent in Maekel administrative regions. The wild relatives of the crop found in Eritrea are *E. multiflora* (A. Rich)*, E. indica, E. floccifolia* (Forssk), and *E. flagellitera* (Nees). A wealth of cultivated and wild legume plant species is available in Eritrea. Pulses cover about 5.3% of all field crops production.

Photo 21: Landrace wheat varieties of Eritrea

Collection and conservation of genetic resources goes back to 1905, when some research activities were started at the Agricultural Research Station, at Paradiso, in Asmara (Brrdi, G., 1947). Though no duplicates are left in the country at least in 1920s, 1930s and 1970s exploration and collection of genetic resources were undertaken by different countries.

3.3.2 Pasture species:

Rangeland in Eritrea is estimated at 6 million hectares (49% of the total land mass of the country) and approximately 75% of the total population depends on livestock and livestock production (MoA 2012). By and large Eritreans are agro pastoralist and the contribution of crop and livestock is 1:10. About 5% of the total population is pastoralists, with another 25% classified as practicing agro-pastoralism. Almost all farming households own some livestock and many upland farmers move livestock to the lowlands in combined herds for grazing. The country is also home for many pasture species of leguminous and grasses. More the highlands of Eritrea are a rich source of leguminous and grass forage species. About 120 leguminous species have been reported to occur at elevations between 1500 and 2500 m above sea level (Hedberg and Edwards, 1989).

3.3.3 Trees and Shrubs Important for Agriculture:

There are several trees and shrubs important for agriculture which include for food, animal feed, medicine, soil fertility reclamation, shelter and fencing. Among the species most are indigenous tree and shrub species. Eritrean farmers manage in a traditional way a variety of wild species including indigenous trees and shrubs and habitats which benefit the sustainability of both agricultural and natural ecosystems. In many parts of Eritrea, the collection of wild-growing natural products is an important part of the overall household economy. For example, *beles*, the fruit of the introduced cactus, *Opuntia ficus-indica* provides food and income for a considerable number of people in the highlands every summer. However, *Opuntia ficus-indica* is considered as invasive alien species. Other important plant species such as *Aloe schoeleri* (around Kohaito), *Aloe neosteudneri* (has a restricted distribution in Eritrea on the summit of Mt Saber, near Gheleb), *Dracaena ombet* (around Semenawi Bahri), Bamboo (around Habrenkaka), and Sugar cane (around Golij) are endemic species in Eritrea that need to be further assessed to know their origin and distribution.

Photo 22: *Dracaena ombet ,* endemic and endangered species, Semenawi Bahri, 2006

Photo 23: *Aloe neosteudneri* threatened alien invasive species of *Opuntia ficus-indica*, 2006

Photo 24: *Aloe schoeleri* (critically endangered endemic species), Kohaito, 2006

3.3.4 Livestock diversity:

The production system of subsistence farmers is mostly agro-pastoralism and mixed farming, parallel to crops, and has a great importance in the economy of the people. In Eritrea there is great livestock diversity. In the livestock sector, the development objective is

to increase productivity through improved animal health, better feed stock supply and selection of improved breeding stock. Although this program will include introduction of livestock species for breeds, these will not affect/ deplete for the genetic of the indigenous breeds which are dominant in the harsher open-grazing systems that comprise 90% of the livestock sector adversely. Almost no significant works are undertaken to estimate the genetic variability and erosion within and among breeds of the different livestock species.

Photo 25: Arado breeds, lamza, Zoba Maekel , 2014

Photo 26: Hybrid oxen (Arado-barka), Merhano, 2014

Cattle: The total population of livestock of the country is estimated at 10.6 million of which cattle constitute 2.2 million (Table 4). The four indigenous breeds of cattle are Barka, Arado, Dowhen (Afar) and Arabo. The major indigenous breeds Barka and Arado found in the western lowlands and central highlands respectively. The other two breeds the Dowhen and Arebo located in the North-western and Eastern lowlands respectively. Barka has superior meat and milk production characters, hence exploiting these great potential for improvement of production through intensive management and breeding programs is in immense need.

Table 4: Estimated livestock population, nationwide (MoA, 2013).

Livestock type	Livestock Population (millions)
Cattle extensive –Traditional	2.24
Cattle intensive -Pure & cross breeds	0.02
Cattle Intensive – Local	0.01
Sub total	**2.27**
Goat	5.46
Sheep	2.49
Camel	0.37
Total	**10.6**

Goat: The most commonly reared indigenous types of goats are *Hassani Langae*, Barka, Tseads (Milege, Worre), Afar (Adal, Danakil), and the Central highland. All except the Central highland are found in the North, North and South western lowlands of the country.

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Sheep: There are four indigenous sheep breeds reared in the country namely: the *Rashaida*, *Hmale*, *Barka* and *Shamazana* (Akale-guzai*)*. The *Hmale*, and *Barka* are both found in the north eastern part of Gash-Barka administrative region. The *Rashaida* are found in the Northern Red Sea region, while the *Shmejana* sheep are common in the southern region of the country.

Equine: There are two types of donkeys, the lowland donkey (*Rif*) and the highland donkey. Mules and horses are confined to the central highlands. No characterization work has been conducted to indentify and estimate the variability among the types. It is believed that racing camels exist mainly in zoba Gash-Barka that need to be studied and conserved.The widely known camel types are the *Ariri*, *Arho* and *Rashaidi*. They are distributed in the Gash-Barka, Anseba and Northern and Southern Red Sea regions.

Poultry: Poultry production is important livestock production activities. The local poultry breeds show variability in feather colours, body sizes and in egg production. However, no significant phenotypic, genetypic and production based characterization is made. The MoA has planned to improve the local breeds' production capability through crossing with exotic breeds.

Bee: Bee keeping is also a very important activity. Bee colonies are mainly found in the central highlands and in the Eastern and Western escarpments; bees are managed mostly under traditional system but substantial efforts were made in promoting modern hives in order to improve the quality and quantity of honey and wax production. There are two wild sub-species of honeybee present in Eritrea, *Apis mellifera mentcosa* and *A. m. yemenitica*. In total of 15,964 traditional and 6,835 modern bee-colonies exist in the country.

3.3.5 Status of Agricultural Biodiversity

Crops: During the last 5 – 6 decades plants, animals and ecosystems have been seriously affected by genetic erosion potentially caused by war, drought and pests. Drought in Eritrea is the most limiting factor of crop production and also a cause of genetic erosion. The statistical data of the annual rainfall registered in the last 50 years shows a great decline in amount and an increase in the variability of rainfall distribution. The recurrent drought the country encountered during the last 2 – 3 decades and erratic nature of rainfall influence farmers choice on crop varieties. Due to these circumstances, farmers prefer varieties that cope with drought or early maturing crops are only selected and there is a condition of neglecting late maturing or long season varieties.

For instance study undertaken on sorghum indicate that early maturing variety, (47%) reported to consider as good variety by the household farmers while 32% express giving reasonable yield during unfavourable condition and 21% adaptability consideration (Abraha T. et. al, 2013). The same study explored that as result of recurrent droughts some varieties are disappearing including *Gunseber* (extinct), *Korokora* (in limited area), *Ajebsidu* (extinct), *Brown chimro* (in limited area), *Aklamoya* (extinct), *Arfaegedam* (in limited area), *Feterit* (in limited area), *Anseba* (in limited area), *Kinibiba* (extinction) and *Kibra* (in limited area).

Cultivation areas of other varieties such as *Hariray* and *Zengeda* were expanded. Pearl millet area coverage increased by 2 - 3 folds during the last two decades. These increments are as result of several reasons the most being preferred by farmers due to its more tolerance to drought compared with sorghum. Four row barley landrace varieties such as *Kuinto* is almost not growing due to lack of tolerance to drought while the six row and *Dessie variety* are under cultivation in limited areas of the Central highlands. Eritrea was recognized among others as centre of origin for emmer wheat (*Triticum diccocun*, Schrank). but currently the crop nearing extinction. However efforts are being taken by the MoA to repatriate the crop for cultivation by farmers. Most landrace varieties of maize used for several decades are disappearing which is among the most genetically eroded crops in the country. Currently, its cultivation is limited in areas with supplementary irrigation such as spate irrigation in Eastern lowlands and in the highlands of semi commercial farming as offset of vegetables or mixed crop.

Photo 27: Emmer wheat (*Triticum diccocun*), in the edge of extinction, 2014.

Disease and insects are also believed causing serious genetic threat to crops. Some landraces varieties are abandoned by farmers due to their susceptibility to pest. There is a worrying situation in the production of the wheat locally called *Manna keih* and *Manna guandie* are disappearing due to susceptibility of the variety to down mildew. Recently introduced new insects such as Woolly white fly (*Aleurothrixus flococosus*) affecting citrus crops, Banana White scale, Tomato leaf miner (*Tuta absoluta)* and Date palm white scale are affecting production severely. Stem rust (*Puccinia graminis*) is a very dangerous disease of wheat and barley in the world.

In Eritrea the spread of the disease was from surrounding the town Senafe up to the village Adi-awsha in 2010, but in 2011 it has spread into Debub administration region up to the village Tera-amni area (35%). The intensity and severity of the disease differs from low to very high (30-100%). Introduction of Ug99 race of the stem rust was first identified in 2010.

Area covered by pulses is steadily decreasing. The cultivated area of chick pea, the major pulse food crop sown is decreasing in certain areas due to heavy root rot attack problems. Other attributes such as neglecting are also affecting status of the PGR. Two – three decades back linseed and Niger seed were cultivated for home use and most of the yield for marketing. Mainly Niger seed importance in market was very high and farmers used to grow it as cash crop. The area planted with these crops significantly declined, primarily due to farmers preferring to grow basic food crops and availability of cheap imported edible oils.

Hence, genetic threat is affecting the diversities of these crops. From biodiversity point of view, native leafy vegetables are among the most important food crops. These vegetables are wild and grow in fields as weed but now days most of them are found very scares. The cause could be combination of drought and human intervention.

Pasture species: A collection mission undertaken in 2004 resulted in collection of a total of 238 accessions from 53 legume pasture species (Snowball R. *et al,* 2012). The pasture establishment during rainy season was poor and many species of pasture legumes encountered during the 2004 germplasm collecting mission were found to be scarce. The situation is not improving unless otherwise worsening. The pastures in the highlands are infertile and steep, hence fragile under continuous uncontrolled grazing regimes. The grazing area has been shrinking over the years because of over-grazing, extensive cultivation, improper utilization of water resources and deforestation. The removal of forest cover and constant grazing has depleted the resources of the browse layer. The pastures have no opportunity to recover because hungry animals are continuously searching for any edible plant that sprouts. Attempts to allow regeneration by closing land to grazing have shown promising results and are becoming models for recovery. However, generally because of the above mentioned reasons the most palatable species of herbage and browse are decreasing in quantity and leaving space for less palatable species. If the present trend of deterioration persists for much longer, it may not only destroy the palatable species completely but it could also change the land to bare soil and initiate the process of desertification.

Enclosures have been established in Mai Mine and Goluj sub-administrative regions of the Debub and Gash Barka regions respectively for purposes of regenerating the native pasture species and ultimately improve availability of grazing feed. In addition sites around Golij are enclosed and sowed with grass species of *Urochloa trichopus* (*Abertata*) which was collected from Mensura sub region.

Trees and Shrubs Important for Agriculture: The indigenous species status mainly the wild edible fruits are at risks. These species found in very limited areas in few numbers. The species those are very important for agriculture and their status of endangerment is presented in annex 4:

Livestock: At present, the diversity of indigenous livestock species is relatively intact - all breeds are still widely distributed, population numbers are increasing and the rate of introduction of improved stock from overseas is low. However, there is a need to characterize the indigenous breeds more clearly as part of the national livestock improvement program in order to guarantee that the best characters of the different varieties can be sustained for future breeding work.

Population of the cattle breeds Barka, mix of Barka and Hameria and Arado are increasing by 1%, based on the predicted/estimated population of cattle while the population of the exotic once such as the pure breed (Holstein) seems to be decreasing. Population of sheep and goat is increasing. Generally, the trend and status of camels and donkey are stable. However, the status and trends of horses and mules are declining i.e they are genetically eroded.

3.3.6 Agricultural biodiversity conservation

The Government of Eritrea initiated the establishment of a Gene Bank, administered under the Agricultural Research of the MoA, for the collection, conservation and documentation of PGR. The objective of biodiversity conservation is to minimise loss of PGR due to genetic erosion. Since 2012 genetic resources of plants, forest and animals conservation is administrate by the Genetic Resources Division of the NARI. There is an *ex-situ* collection of agro-biodiversity resources maintained by the Agricultural Crops Genetic Resources Unit of the division. The gene bank has limited capacity for collection, storage and characterization of agro-biodiversity. So far a total of 5000 accessions, predominantly cereals, legumes, oil crops and wild relatives have been collected and stored. This represents a considerable amount of the total crop landrace variation in Eritrea.

There are relatively good linkages between the gene bank and international organizations concerned with PGR conservation. Among these good linkages exist with ICRISAT, ICARDA, Biodiversity-International, FAO and ITPGRFA. Since the 1920s to 1991, when the country is independent,it was held under the Institute of Biodiversity - Ethiopia, Bari Germplasm Institute –Italy, Vavilov Institute of Germplasm – Russia and USA Gene bank. No duplicate of these old collections was left in Eritrea.

Eritrea possesses wealthy genetic resources of animals. Among these are indigenous cattle especially Barka breed. Barka breed form the backbone of relevant and sustainable livestock production in Eritrea because they are better adapted to survive and reproduce under harsh environments compared to high performing exotic breeds. Moreover, they require less input and management. No conservation and management of Animal Genetic Resources was conducted by the NARI despite characterization of sheep was conducted recently.

For safer maintenance and enhancement of PGR, *ex-situ* conservation must be complemented by *in-situ* and on-farm conservation methods. The gene bank has been assembling mainly orthodox seeds of field crops and wild species but urgently it should include vegetative propagated plants and old varieties of orchards in field gene banks.The Forest Genetic Resources Conservation Programme to be fully functional requires human and facilities capacity building support. No staff member is trained at long-term training in Forest Genetic Resources Conservation and Management or related. Even no appropriate storage facility, materials, and equipment are available. Therefore, establishing tree and shrubs seed bank, botanical garden and arboretum are priority task of the division.

There is an insufficient skill, experience, and facility or materials in Animal Genetic Resources Conservation and Management at the NARI. Hence technical and capacity building supports make the unit operational. Priority will be given to genotyping the Barka cattle breed for assessing genetic diversity for conservation and management of the resources and ultimately to exploit the resources in sustainable way. Providing technical and material support through project to strength on-farm conservation of Barka cattle breeds is urgent need. On-farm conservation of Barka cattle breed could be complimented by maintaining semen in cryopreservation method.

3.4 Taxonomic knowledge

Biodiversity monitoring requires trained manpower that could identify animals and plants up to the species level. Sustainable management and wise use of biodiversity pre-supposes a sound knowledge of the identity and inter-relationships of its constituent organism's i.e. good and adequate taxonomic capabilities.

In Eritrea, almost all of the institutions that are involved in some taxonomic activities claim that they lack capacity and trained manpower. However, activities related to taxonomy are done by individuals of other profession with inadequate experience in taxonomy at this time. In the institutions of higher education, Eritrea Institute of Technology (E.I.T.) is in a better position than other institutions with respect to facilities and trained taxonomists. The Department of Biology possesses herbarium with more than 5,000 plant collections and five staff, one PhD and four M.Sc. holders in the fields of plant taxonomy. In the College of Marine Sciences there is one staff member with PhD with experiences in fish taxonomy.

The role of taxonomic knowledge in the agro-biodiversity core area is primarily for promoting: (i) knowledge of crop and livestock diversity; and (ii) knowledge of the biota associated with crops and livestock (weeds, pests and pathogens; fodder and forage crops, etc.).The level of knowledge at both government and farm level appears to be quite strong – farmers know their crops and livestock but the knowledge base is not so strong, especially at the scientific level; there are few personnel fully-trained in identification of crop and livestock "pests".

Taxonomic knowledge of microbes, especially plant diseases and soil biota in general appear to be especially weak. More significant than a weakness in pure taxonomic knowledge, there is a lack of "associated knowledge" for pest species. Associated knowledge is the applied information needed for effective pest management and control; for example, the most up-to-date and relevant methods and materials for integrated pest management (IPM) which maximizes control with minimal use of chemical inputs.

CHAPTER 4: NATIONAL POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

The Government of the State of Eritrea (GoE) had outlined various biodiversity related policies, institutional and legal frameworks and practical measures to conserve and sustainable use of biological resources supported by various programmes and projects. In this NBSAP document the existing biodiversity related legal and institutional instruments have been briefly described below:

4.1   Institutional Context

4.1.1   National Level Institutional Context

In general term line ministries are directly or indirectly lead the natural resources conservation, development and management aspects. Their primary roles contain regulatory function, monitoring and evaluation, research and training.

The Ministry of National Development (MoND) has the overall responsibility of coordination of national developmental programmes and projects in collaboration with various developmental partners. The MoND maintains close linkages with all development partners and ensures cooperation with bilateral and multilateral agencies in support of developmental initiatives. It ensures integration within the GoE and other national and international supported Integrated Development Programmes.

The Ministry of Land, Water and Environment (MoLWE), the Forestry and Wildlife Authority (FWA), Ministry of Agriculture (MoA) and Ministry of Marine Resources (MoMR) are the main players for the bulk of environmental and natural resource management in Eritrea. MoLWE plays a coordinating and monitoring role, which includes the crucial responsibility of policy formulation, regulation, environmental guidelines and in general the management of natural resources. It also embody the facilitation and monitoring of the implementation of international agreements, conventions and treaties, with a view to promoting the country's conservation interests as well as meeting international obligations.

The Department of Environment (DoE) of the MoLWE has responsibility for monitoring the state of the environment. It is responsible for the development of standards to ensure environmentally sustainable practices and ecosystems integrations. Moreover, the DoE has a lead role in coordinating and regulating environmental issues.

The role and mandate of the Ministry of Agriculture(MoA) as defined in the Proclamation No.86 for the Establishment of Regional Administrations (PERA) entails five strategic namely: Policy Formulation and Sectoral Planning; Regulatory Functions (set and enforce standards and statutory responsibilities); Agricultural Research (commodity-based research and dissemination of research results); Promotion and Development of Agriculture (facilitate technical backstopping and demand driven delivery of and Support Services); and Human Resources Development (manage and develop MoA resources; good governance in

terms of accounting for and managing public funds: HRD and HRM). Strategically, the promotion and development of the agricultural programs and support services, i.e. research and extension in livestock production, field and horticultural crops, soil and water conservation, water harvesting and irrigation development, forestry and wildlife conservation and agro-infrastructure development services, the concomitant promotion and development of the human resources and regulatory aspects of these services are the determining factors in the mandates and duties of the agricultural sector. In this regard the MoA would be responsible for sustainable management of agricultural genetic resources and use and development of agro-biodiversity resources of the country.

The Ministry of Marine Resources (MoMR) has the mandate for promoting the development and the proper management and sustainable utilization of marine resources, and as well as enforcement of regulations and laws. It has authority to oversee all marine biodiversity areas and related community programs. The MoMR as an agency of the Government of the State of Eritrea is entrusted with the functions and authority to develop and manage the sustainable exploitation of the country's marine living resources, protect and preserve the marine habitat and work towards Integrated Coastal Zone Management (ICZM) including the islands areas.

The Forestry and Wildlife Authority (FWA), established in 2012, is mandated for the issuance of licenses, development and rational utilization of forest resources and responsible for Protected Areas (PAs) management such as coordination, technical backup, resources mobilization, monitoring and evaluation of forestry and wildlife resources. The government is still in the process of institutionalizing FWA as an independent authority to have clear mandates and responsibilities. It is potentially one of the lead agencies in terrestrial biodiversity conservation and management in the country.

The Ministry of Energy and Mines has development policies and strategies aim at: promote economically and environmentally sound energy sector development through the application of appropriate technology of energy production, conservation and use; implement appropriate energy pricing structures; diversify sources of energy; modernize and expand power generation and distribution system and create enabling situation for private participation in energy development and market.

The Ministry of Local Government (MoLG), as a decentralized administrative system, it oversees and implements the activities of all line ministries. MoLG is the highest institution at local levels to follow the implementation of all the planned activities including the mobilization of resources and people at all regional levels.

The Ministry of Information (MoI) has a wider role on public awareness issues and dissemination related to biodiversity conservation and sustainable use through radio, newspapers and TV. Other lessons and best practices from different sources could be also made available and reached easily through this institution. It provides essential information and backing of promotion and developmental activities.

The Ministry of Education (MoE) is mandated to incorporate environmental education in school curriculum, environmental awareness-raising programmes and activities in the schools and through adult radio programs on environmental conservations, promote

environmental clubs and school afforestation programmes, support the establishment of the Environment Youth Program in the context of implementing the NAP. Moreover, the MoE is responsible in supporting the Institute of Science and Technology to train students in environmental science and natural resources management.

Community Based organizations/Civil Society Organizations

The National Union of Eritrean Women (NUEW) would be responsible in mobilizing women for participation in development planning and implementation. NUEW is one of the major players in mobilizing local communities (especially women), identifying and implementing of programmes and projects including resources management, afforestation, adaptation, SLM/SFM techniques, water development and use, promotion and dissemination of alternative energy sources, income generating activities including the participation in policy planning and monitoring. It is of prime concern to the women of Eritrea, especially in the rural areas, where they play a significant role in environmental issues.

The National Union of Eritrean Youth and Students (NUEYS) is one of the biggest national CBOs in Eritrea. NUEYS has wide networks that enable it to implement various developmental programmes and projects. NUEYS has rich experience in implementing projects related to conservation and development of biodiversity resources. Every year thousand of youth and students from all over Eritrea participate in activities such as planting seedlings, digging wells, terracing hillsides, and well-being of the environment through NUEYS sponsorship in collaboration with the Ministry of Education.

The emerging associations and cooperatives' such as Dairy Development Associations, Horticultural Development Cooperatives, water users associations etc are potential entities in the biodiversity development and sustainable use.

4.1.2 Regional/Zonal Level Institutional Context

The regional administration assumes overall responsibility for implementation at all its levels. It ensures the coordination with respect to planning, financial management, and follow-up. At Zoba level it is the lead institution for biodiversity management through its powers of decentralized arrangement involving Sub-Zobas and local communities. At local levels, Zoba administrations are key implementing agencies in development programmes and projects. Other line agencies are to undertake the day-to-day implementation of programme and project activities in accordance to their respective mandates, i.e. the natural resources implementation and management responsibility rests on the zoba administration in coordination with the concerned line ministries.

At Zoba level the MoLG in collaboration with MoA and FWA are responsible for the supervision and management of the regional forestry and wildlife development and management, soil and water conservation, reservoir construction and the development of irrigation, conduct surveys, undertake Monitoring and Evaluation for natural and agricultural resources and related issues.

The Department of Agriculture and Land under the Regional Administration is responsible to the implementation, prevention, control of environmental pollution and ecological

damage, implementation of the environmental impact assessment of projects and programs, including the restoration improvement and development of the environmental resources. It is also responsible for the implementation and safeguarding the rational development and utilization of the water resources. The execution of land use planning at Zoba, Sub Zoba and village level; carry out parcel based land use studies based on demand of land for different purposes; prepare land use classification are also its responsibilities.

The Civil Societies like NGOs, NUEW, NUEYS and various associations sited at zoba level play significant role in supporting the development of natural resources activities.

4.1.3   Sub-Regional Level Institutional Context

The Sub-Regional Administration is the lead organization responsible to the overall mobilization of communities around the sub region in the implementation of programs and projects related to natural resources development and management such as nature resources conservation, soil and water conservation, tree planting, dam construction etc. Besides, it directly coordinates planning, financing, implementation and monitoring of all program and project activities planned by line ministries and partners in the sub-zoba offices.

The Sub-Regional Administration through its extension officers provides technical assistance, provision of advice and training. It is also responsible for the implementation, supervision and management of project development, soil and water conservation, construction and developing irrigation schemes, farmers' organization, monitoring and evaluation of agricultural resources, and intensive works in catchment rehabilitation activities.

The Sub-Region is also responsible to the implementation, prevention, control of environmental pollution and ecological damage, implementation of the environmental impact assessment of projects and programs, including the restoration improvement and development of the environmental resources. It is also responsible for the implementation and safeguarding the rational development and utilization of the resources.

Civil society at sub zobas level like NUEW and NUEYS are responsible with regard to gender mainstreaming, mobilizing workforce and campaign work activities like catchment rehabilitation and other conservation activities related to biodiversity management and other social aspects such as income generating activities.

4.1.4   Community level institutional Context:

The Kebabi administration: The Kebabi administration sets up a Planning and Implementation Committee (PIC) to formulate the Kebabi Development Plans. The PIC is headed by the Kebabi Administrator assisted by local Zoba assembly members. PIC receives technical support from the Sub-Zobas administration offices. Local projects are identified, planned and consolidated. They are custodians and beneficiaries of the natural resources including pasturelands, forests, fishing grounds. Local communities participate in planning and management, especially the identification, implementation, adaptation, SLM/SFM techniques, income generating activities and monitoring.

The Local Communities: Local communities bring unique indigenous knowledge on preservation of biodiversity resources. Communities identify and prioritize their own particular problems and define development actions to address them. They are custodians and end users of all developmental interventions. Local communities also participate in planning, management, identification, implementation, adaptation, SLM/SFM techniques, income generating activities and monitoring.

4.2   Policy and Legal Context

4.2.1   National level policy and legal context

Eritrea has acknowledged the need to establish ecosystem based management including protected areas system establishment as a way to preserve its rich biodiversity and conserve valuable natural resources. The importance of biodiversity integration into national policies frameworks, strategies and planning is becoming more recognized by policy makers and planners. In spite of the gains of high level commitment, this assessment has shown that there is inadequacy of overall environmental policies/legislation, which include protected area policies/legislation, land and sea-use policies/legislation and integrated strategies and planning regarding biodiversity conservation, management and financing.

At the national level there are policies, strategies and plans that are supportive and relevant to biodiversity conservation that require intensive consideration for sustainable and effective management of the nation's biodiversity.

In this NBSAP document, the Macro Policy, the National Environmental Management Plan (NEMP-E,1995); Land Use Planning(1999); National Environmental Assessment Procedures and Guidelines (Procedures and Guidelines for Environmental Clearance of Projects; and M&E of Projects, 1999); National Economic Policy Framework and Program (NEPFAP,1999); National Biodiversity Strategy and Action Plan (NBSAP, 2000); National Action Program to Combat Desertification and mitigate the effects of Drought (NAP, 2002); Forest and wildlife Conservation and Development Proclamation (2006); National Coastal Policy (2006); ICAM Proclamation and Authority (2007); Land Use Policy 2007; National Adaptation Program of Action for Climate Change (NAPA, 2007); Eritrea's First National Communication(2001) and Second National Communication(2012); Agricultural Development Program, MoA (2008-2010); Action Plan for Integrated Water Resource Management (IWRM) in Eritrea(2009-2016); The Tourism Development Policy and Strategy(1999); Water Policy(2010); Ministry of Land, Water and Environment, Department of Environment Eritrea's Five Year Action Plan(2011-2015) for The Great Green Wall Initiative; Fisheries Proclamation (1998/2003/2014) and others are reviewed and taken into consideration.

The key existing policy and legal instruments believed to make positive impacts in biodiversity conservation and development are highlighted below in ascending order (preparation years).

The National Constitution: The National Constitution of the State of Eritrea was ratified on 23 May 1997. Article 6 states that "unity in diversity" as a basic guiding principle for national development objectives. Article 8 mandates the State to work for sustainable

development and to "manage land, air, water and natural resources in a balanced and sustainable manner" and to "secure the participation of the people in safeguarding the environment". The Constitution thus provides the foundation for a national development policy based on sustainable principles and the maintenance of diversity.

The Macro policy (1994): The macro policy provides a background for the country's national economic growth strategy and states the guiding principles for human centred, efficient, sustainable and equitable development. This document clearly states the need for environmental impact assessments to determine the potential environmental consequences of major investment decisions. It recognizes the negative impacts of some traditional farming practices on crop productivity, as well as progressive environmental degradation attributed to increasing demands for fuel wood, and inadequate soil and water conservation measures. Furthermore, states the commitment required from the government to allocate financial resources to promote the rehabilitation, conservation, development and proper exploitation of natural resources.

The Land Proclamation No.58/1994: This Law provides that all land is owned by the State and citizens have use right only. Peasant farmers have the right to use land for a lifetime and if significant investment has been made on the land then priority is given for closer relatives to inherit the property and to continue using the land considering past experiences acquired with the *Diessa* (the right of land redistribution to all farming households) system of land ownership. This Proclamation provides tenure security and has been described as a framework for the evolution of grassroots action against land degradation.

Article 50 of this proclamation states that the Government can appropriate land for forestry and animal conservation projects, amongst others. Delays in enforcement of this proclamation had created disincentives for some longer term investments and land management programmes.

In elaborating the implementation of the Proclamation, the Government introduced Legal Notice No. 31/1997, which provided legal bases for methods of land allocation and land administration. This Legal Notice mandates the MoLWE, in collaboration with other ministries, to prepare land use and area development plan. According to such plans agricultural lands, particularly those to be reserved for irrigation, protected areas, and national parks, areas for afforestation programs, mining areas, etc. are to be identified. This important task has not been largely materialised so far.

The National Environmental Management Plan (NEMP-E) for Eritrea (DOE, 1995): The NEMP is a strategic instrument to take action in environmental issues related to the direct or indirect bearing on human health and well-being; natural resources and management issues and socio-economic, institutional, international affairs and conflict management. It has been a working document in the areas of environmental and developmental prospects for Eritrea; major environmental and development issues confronting Eritrea; major steps and responses involved in an integrated environmental and development planning process' requirements for implementation of the plan and its associated project activities; and institutional prerequisites, and financial/human resources.

The Proclamation to Promote the Development of Mineral Resources No. 68/1995: This Proclamation, in addition to the Regulations of Mining Operations (Legal Notice 19/1995), provides the framework for the development of both commercial and artisanal mining in Eritrea including the extraction of mineral waters, brine and geothermal energy.

The legislation lays out some general requirements for environmental management and protection which, if fully implemented and enforced, would ensure mining operations that do not have negative impacts on biodiversity. The legislation is being enforced with a minimum extent. In addition the legislation contains exemption clauses which effectively make all environmental protection subject to decisions of the Licensing Authority (Ministry of Energy and Mines).

The Regulations on Petroleum Operations Legal Notice No. 24/l995: These Regulations contain a framework for the development of the petroleum industry in Eritrea. Environmental protection is covered comprehensively in Article 11: Environment and, Pollution Control and Safety Measures. The legislation has the potential of providing strong protection of the environment.

The Proclamation for the Establishment of Local Governments No. 86/1996: This Proclamation is an important part of the Government's legislation with regard to regional decentralisation of administration in the control and implementation of developmental policy and planning that imparts major implications in biodiversity conservation and sustainable use. This Proclamation contains responsibilities of environmental protection at the regional level and highlights the need to ensure any policy of biodiversity conservation and sustainable use.

The Press Proclamation No 90/l996: The Press Proclamation provides a legal framework for freedom of information within Eritrea. There are a number of restraints however, due to lack and resources that the majority of information on biodiversity, and the environment in general, need to be generated and disseminated. The Ministry of Information has the potential to facilitate and disseminate biodiversity-related information in collaboration to the institutions concerned with biodiversity conservation and management.

The Renewable Energy Sub-Sector Policy (1997): The objective of national energy programs in the rural sector is to help increase the standard of living for the rural communities in Eritrea through the delivery of modern energy services while protecting the environment. Of the various intervention options being initiated by the Government for realizing this objective include: rural electrification through grid extension; improvement of biomass energy resources through various afforestation and reforestation programs; dissemination of improved stoves which is the aim of this project; and assessment of the potentials of renewable energy resources for eventual development. The objectives of the Renewable Energy Sub-Sector Policy (1997, MoME) include the promotion of sustainable biomass fuels and appropriate alternatives, and to exploit renewable energy potential. The household stove efficiency research has been performed as one part of an integrated national program of sustainable energy development

The Fisheries Proclamation No. 104/1998 and the Fishery Product Proclamation No. 105/1998: The marine and coastal sector is covered by two proclamations and thirteen Legal

Notices (Regulations), all promulgated in 1998 and 2003, and these are: The Foreign Fishing Vessel Regulation: Legal Notice No. 38/1998: (a) The National Fishing Vessel Regulation: Legal Notice No. 39/1998; (b) The Fishery Product Regulation: Legal Notice No. 40/1998; (c) The Fishery Product Hazard Analysis Critical Control Points Regulation: Legal Notice No. 41/1998; (d) The Potable Water Regulation: Legal Notice No. 42/1998; (e) The Aquaculture Products Regulation: Legal Notice No. 64/2003; (f) The Additives Regulations: Legal Notice No. 65/2003; (g) The Heavy Metals Regulations: Legal Notice No. 66/2003; (h) The Factory Vessel Regulations: Legal Notice No. 67/2003: (i) Potable Water Regulations in Fishery Product Activities: Legal Notice No.68/2003; (j) The Fishery Product Importation and Exportation Regulations: Legal Notice No 69/2003: (k) Regulations issued to amend the Foreign Fishing Vessels Regulations (Legal Notice No. 38/1998): Legal Notice No. 70/2003; (l) Regulations issued to amend the Fishery Product Regulations (Legal Notice No.40/1998): Legal Notice No. 71/2003.

These laws provide comprehensive coverage of the marine sector in Eritrea and contain a number of Articles relevant to biodiversity conservation and sustainable use. From a biodiversity perspective, the legislation covering the fisheries sector is quite comprehensive. The largest potential weaknesses lie in the lack of clarity with regard to integration of the responsibilities of the Ministry of Marine Resources with other government sectors in sustainable coastal management. This could lead to some problems of co-ordination and also restrict ability to respond to broader sectoral interests. This weakness could be reduced if the composition of the Fisheries Advisory Council were broadened, at least to include the Ministry of Land, Water and Environment. In addition, the mechanism for the creation of protected species and protected areas is not described fully – without a formal procedure, this part of the legislation may be difficult to put into practice.

The National Tourism Development Plan (2000-2020): The document addresses special sections for the coastal areas and the islands. This plan embedded in the context of national policies and perspectives also reflect the objectives of National Economic Framework and Program (NEPFP). At the national level the Ministry of Tourism planned various tourism developments such as construction of basic infrastructure and different and recreational centers. Besides, each zoba has been considered separately to facilitate the implementation of the activities and incorporate them into zoba administration and development policies. Among the many sites considered for example, in the Northern Red Sea Zoba include: (i) the proposed protected areas of Buri Peninsula and of the Danakil depression for some infrastructure; and (ii) the inland, the Akwar and Mai-Wooi hot springs are of interest for developing spa health resorts.

The Tourism Development Policy and Strategy (1999): This document specifies many aspects of biodiversity issues such as: (i) the need to develop tourism in a manner that encourages conservation and enhancement of the natural environment, especially protection of scenic areas, watersheds, ecosystems, biodiversity, and expansion of forests and wildlife populations; (ii) encourages the involvement of local communities in conservation programs that have linkage with the development and management of tourism; (iii) development of tourism in a sustainable manner through conserving the natural archaeological/historic, cultural resources of tourism, maintaining and improving the environmental quality of tourism areas and sharing of the benefits of tourism as widely as possible throughout the society; (iv) the need of suitably designed and environmentally appropriate good quality

tourist facilities, service and infrastructure that serve the needs of quality tourism and do not result in environmental problem; (v) the need to ensure the effective management of tourism based on cooperation between the public and private sector and coordination among central, regional, municipal and local governments; and (vi) Develop effective organizational structures legal and other institutional arrangements, controlling socio-economic and environmental impacts and monitoring all aspects of the progress of tourism.

The Eritrean National Environmental Assessment Procedures and Guidelines (NEAPG) 1999: The NEAPG demands that adequate level of environmental assessment take place for all development projects with potentially negative environmental consequences. The objectives of the National Environmental Assessment Procedures and Guidelines are: to assess the significance of potential impacts which the implementation of the project may have on the environment; to reduce delays in project approval procedures by providing a standardized and transparent system for environmental assessment; to improve project design and performance, thus improving overall economic efficiency, to promote sustainable economic development without unnecessary decline in environmental quality.

The Environmental Law Proclamation has not yet been promulgated. Though the application of NEAPG is limited several sectoral development projects mainly mining sites, construction areas, and industries are being implemented after acquiring environmental clearance. The Environmental Impact Assessment (EIA) guidelines, applied so far have proved to be an effective mechanism to ensuring an integrated approach for development.

The National Action Program (NAP, 2002) to Combat Desertification and Mitigate the Effects of Drought: the GoE in pursuant to Article 5 of the convention to the UNCCD, have prepared a National Action Program(NAP) that identifies factors contributing to desertification and practical measures necessary to combat it and mitigate the effect of drought. NAP has given particular attention to preventive measures. The actions under NAP have entailed both policy and institutional measures to facilitate the establishment of an enabling environment at the national level for sustainable resource use, as well as local level development activities to preserve and/or restore the resource base and improve livelihood security of the affected populations. In relation to biodiversity conservation and sustainable use NAP has identified key concerns and threats to flora and fauna; emphasized the need for creation of protected area system (in situ conservation) and identified four priority areas for conservation of biodiversity (The Semenawi Bahri, North of the river Setit, riverine habitat along the Gash and Barka Rivers and the Buri Peninsula); proposed actions that make effective enough the traditional practices and customary laws in conserving and sustainable use of the natural flora and fauna of Eritrea; recommended actions that strengthen the ex-situ conservation capacity of the nation on biodiversity resources; identified actions related to laws that promote the conservation and sustainable use of biodiversity; identified ways to establish international cooperation with international organizations with respect to technical assistance, scientific research and financial support; and identify actions required to improve, conserve and use sustainably the agricultural, livestock, rangeland and forest resources of the country.

The NAP Action Plan recognized five important steps or priority actions. These are: the improvement of the knowledge base on land degradation; empowering people to take action, initially coping with drought and desertification and eventually in taking measures to arrest

land degradation; take concerted action to address the concerns of vulnerable groups affected by land degradation, particularly women and pastoralists; the reduction of poverty through income generating activities; and activities related to arresting land degradation particularly degradation of productive agricultural land.

The Poverty Reduction Strategy Paper (PRSP 2004): In 2004 the Government of Eritrea prepared the Poverty Reduction Strategy Paper (PRSP), which represents an initial articulation of the Governments response to the urgent need to reduce the incidence of poverty in Eritrea. The Government gives high priority to proper conservation and use of the environment and as part of its poverty assessment the PPA project took on board environmental issues in order to establish causes of poverty. The main aim had been to help mainstream environmental issues in development planning. However in the sectoral polices and priorities not many of the line ministries had given emphasis to environmental issues

The Legal notice for banning of plastic bags (notice No. 99/2004): The notice states that polyethylene plastic bags that are not bio-degradable and their thickness with less than 100 micrometer are not allowed to be imported, produced, used and disposed. This legal notice had been enforced immediately after promulgate and actions taken. Thus, the act can be concluded as one of the successful policy instruments implemented at all levels.

The National Agricultural Development Strategy and Policy document (2005): This policy provides strategic and policy issues on how to develop and manage agriculture without adversely impacting the environment.It also recommends expansion of forest enclosures and provide villages forest tenure rights; undertake programs to educate villagers on the benefits of better forest management; establish corridors for livestock grazing and access for water in land concession agreements; allocate land on the basis of productivity equivalences. For villages with small endowments of land, it would be important to assist them to undertake activities that are not land-intensive; establish clear cut, permanent tenure rights of forest land, for villages to create incentive to manage it sustainably.As agricultural concession sizes sometimes have been quite large ranging up to 1,000 hectares, it is recommended that designing concessions of more moderate size; revise existing guidelines for land clearing to include adoption of windbreak technologies, riverine and drainage pathway protection and contour structures to slow down surface water flows.

The National Coastal Policy (Draft 2006): The National Coastal Policy is formulated as a framework designed to direct the elaboration of: the preparation of a Proclamation detailing the National Coastal Area Management and Development Directives including the Institutional Structure necessary for its implementation; Eritrea's National Integrated Coastal Area Management Plan; and the requisite Regulatory framework necessary for the implementation of the Plan: the Coastal Management Proclamation. The objective is to provide for the sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, commercial and other activities in appropriate designated areas.

The Forestry and Wildlife Conservation and Development Proclamation No 155/2006: This Proclamation, in addition to the regulations for the issuance forestry permits (Legal Notice 111/2006) and regulations for the issuance of wildlife permits (Legal Notice 112/2006) provides the framework for the conservation and development of forests and wildlife resources of the country.

The proclamation contains particular relevance to conservation and sustainable use of biological diversity resources. Some of the main ones include: (i) Mandates the MoA to properly implement the Proclamation (Article-4) and to establish and manage protected areas for the conservation of biodiversity, sites of special scientific interest or preservation of landscapes (Article-16 & 17); (ii) Secures tree tenure to a person who plants trees on any land which that person has a legal right to use (Article-23); (iii) Provide legal rights to individuals or communities to use a specified land area, for the creation or management of woodlots' (Article 24): (iv) prohibits unauthorized exploitation, transporting and processing of wood and none wood forest products for commercial purposes, cutting live trees for domestic use and clearing land for agriculture and other purposes (Article-21); (v) Prohibits the importation of exotic trees and wildlife and their products without getting permits. It requires verifying that the exotic species is not invasive and does not affect the conservation and sustainable management of the indigenous species and ecosystem.

The National Action Plan for the Conservation of Marine Turtles and their Habitats in Eritrea (Draft 2006): Eritrea's commitment rises from the membership as a signatory of the *Memorandum of Understanding on the Conservation and Management of Marine Turtles of the Indian Ocean and South-East Asia (MOU IOSEA)* under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) which recognizes the need for regional cooperation in turtle management and conservation. The National Action Plan for Marine Turtles in Eritrea will consider all critical habitats. Those critical habitats that will be outside future protected areas can be stated as sanctuaries and regulated as such. Marine turtles also feature prominently in plans to set aside marine protected areas which will safeguard these resources and leave behind a longstanding legacy for future generations.

The Proclamation for Pesticide Handling (Draft 2006): This regulation is developed by the MoA for importation, use storage and handling of pesticides. It attempts to reduce the negative environmental and human health effects of pests by putting measures such as pesticide registration system and regulations for packaging, levelling, advertising, transport, use and disposal.

The Proclamation to Establish an Integrated Coastal Area Management (ICAM) (Draft 2007): ICAM was drafted as a mechanism that avoids and mitigates environmental damage through coordinated planning and implementation of activities and minimizes unknown risks using the precautionary principle. It can also be understood as a tool that enables conservation of ecosystems by managing development activities. In addition to ecosystem conservation benefits ICAM enhance the value of the coastal assets. ICAM will enable us to define location of facilities and development activities in line with national needs and sustainability opposed to investor preferences only in the coastal area; and to resolve and mitigates conflict of interest over the assets.

The Proclamation to Establish the Eritrean Coastal Authority (Draft 2007): This Proclamation to establish the Eritrean Coastal Authority was also drafted which shall have juridical personality, with full financial and legal autonomy. The proclamation states that an inter- sectoral Coastal Area Management Board shall be established to conserve and mange

the resources. The Board shall be composed of representatives of the 13 stakeholder members appointed by their line Ministries or administrative agencies.

The National Adaptation Program of Action (NAPA/2007): Eritrea's NAPA has identified highest priority actions/ projects (102 adaptation projects) that are urgently needed to Adapt to climate change. It address that each priority project will need strong donor support coupled with effective local project implementation, monitoring and evaluation programs.

Eritrea has compiled with the reporting commitment to the Convention one being the Second National Communication (SNC) Under the United Nations Framework Convention on Climate Change (UNFCCC). The SNC contains information required by the UNFCCC from Non-Annex I Parties and specifically it provides comprehensive description of the climate and climate change.

The Land Use Policy, (2007): Objective of the draft Land Use Policy, (2007) is to promote improved land stewardship by rural and urban land users by better defining and strengthening land and resource tenure rights. It also aims to provide a coordinated, national approach to sustainable land use and planning and to prepare national and local land-use plans to help guide land-use decisions in an environmentally sound, economically sustainable and socially acceptable way.

The National Bio-safety Framework (NBF), 2007: Eritrea has been acceded the Cartagena protocol on Bio-safety under the CBD in March 2005. Under this protocol, a National framework was prepared in 2007. The NBF includes four sets of guidelines for: 1) Handling requests/ permits for authorization; 2) Risk assessment of genetically modified organisms (GMOs); 3) Public awareness and participation in biotechnology/bio-safety; and 4) Protection of confidential business information (CBI). The Bio-safety Clearing House Mechanism also initiated and two trainings were conducted in 2008 and 2009 to relevant stakeholders. The second National Report also submitted in 2012. In the same year the Strategy and Action Plan for the Implementation of the NBF document has been developed.

The National Capacity Needs Self Assessment (NCSA, 2007): The Ministry of Land, Water and Environment has prepared a National Capacity Needs Self Assessment (NCSA) through a country driven consultative process in 2007. In this process gaps and priority needs, opportunities for synergistic cross cutting issues and strategy and action plan for capacity building in the country at various levels have been identified to support the implementation of the global environmental conventions that stressed mainly on the three conventions such as UNCBD, UNCCD and UNFCCC. Accordingly, eight synergetic capacity building intervention areas were identified.

The Regulation for the issuance of permit for the importation or exportation of ODS and ODS based equipment or products (legal notice No. 117/2010): The objectives of the legal notice are to (i) track the total quantity of ODS imported to or exported from Eritrea (ii) Control and limit the ODS, imported to or exported from Eritrea (iii) Ensure that ODS are imported or exported through formal import permits (iv) Promote the use of ozone friendly substances, products, equipment and technology, and (v) phase out the use or consumption of ODS and products. Articles in this notice include scope of application,

restrictions, permits, powers of the MoLWE, obligation of importers and exporters and list of controlled ODS and their mixtures.

The Action Plan for Integrated Water Resources Management (IWRM) in Eritrea (2009-2016): The IWRM Action Plan was developed at end of 2009. The document covers a range of management actions that are important to establish knowledge on effective control of the country's water resources management and development. About 95 IWRM barrier removal action/project portfolios focused on enabling environment, institutional framework and management instruments have been developed and categorized into a short term, medium term and a longer term planning horizon (2009-2016). The action plan was approved by the MoLWE, published and broadly disseminated to pertinent stakeholders. The action plan elaborate the approaches and set out specific objectives, strategies, actions and activities that would be taken to support IWRM for the sustainable economic development of Eritrea. The development and implementation of these actions portfolios complement the government's present actions and policies, strategies and action plans to reduce poverty, food security and sustainable economic development. The action plans proposed focused on seven thematic areas. The thematic areas are: water resources assessment, development and protection; water resources allocation and water use; disaster management; enabling environment; implementation and financing mechanism; research and information exchange; and basin Management Plan.

The Eritrean Water Law, Proclamation, No. 162/2010: This proclamation addresses the rational management and use of the water resources; the provision of clean, safe and sufficient supply of water; and development of water resources without harming the environment.

The stated objectives of the Water Proclamation are: conservation and protection from pollution and related risk factors of the country's water resources; systemization of studies and documentation of data on water resources; Promotion of integrated water resources management and development as well as judicious prioritization of allocation and use of the same; establishment of pertinent legal framework and institutions with clear mandate in consonance with the principles of integrated water resources management; Promotion of public awareness and participation in water conservation, protection and management and proper utilization; and ensuring equity in the use, management and development of the resources.

The National Situational Analysis and Needs Assessment (SANA, 2011): The Department of Environment of the Ministry of land, Water and Environment with the Ministry of Health and other stakeholders has prepared a country report that aimed at the information sharing and developing inter-linkage between environment and health. The report provides baseline situation of the country in terms of risk factors, strategic frameworks, alliance between health and environment, partners currently existing and major needs identified to mitigate the impact resulting from ecosystem disintegration through consolidated alliance of health inter-linkage.

The Eritrea's Five Year Action Plan For The Great Green Wall Initiative (2011-2015) (Draft): The five year action plan developed by the MoLWE in 2011 describes the initiative on The Great Green Wall that focuses to combat desertification for countries bordering

along the Sahara Desert (Senegal, Niger, Nigeria, Burkina Faso, Mali, Mauritania, Chad, Sudan, Eritrea, Ethiopia and Djibouti) aimed to fight for the advancement of the Sahara desertification and its consequences.

Eritrea's five year action plan focuses on activities that help in mitigating land degradation, reducing desertification, adapting climate change, increasing agricultural products so as to improve the livelihood of the people. This action plan includes implementation of sustainable natural resources management (land, water, forest and wildlife) in the six zones (Maekel, Debub, Anseba, Gash-Barka, NRS & SRS) through afforestation, soil and water conservation, establishment and management of enclosures as well as promotion and establishment of nursery sites.

The action plan also included the establishment of protected areas such as; Semenawi and Debubawi Bahri (129,000 ha), Buri-Irrori-Hawakil Islands (867,000 ha), Bara'soli (13,600 ha), including Riverine habitat along Gash and Barka Rivers (195,024 ha), and Nakfa Reserves (16,390 ha).

The Piloting Integrated Processes and Approaches to Facilitate National Reporting (FNR) to Rio-Conventions (2012): The Department of Environment has developed a manual on Integrated Reporting at a national level in response to request of the Global FNR_Rio Project to develop analysis at a national level and recommend for piloting integrated processes. The document was based on the current reporting formats of CBD, UNCCD and UNFCCC and its preparation has passed through the following steps. Firstly, those elements that have relevance to the three Conventions have been identified. Secondly, the theme of sustainable land management was identified as a cross-cutting issue reflecting relevance to all three Conventions. Thirdly, an integrated reporting section was constructed that assembles the overlapping elements of the three existing reporting formats addressing sustainable land management.

The Eritrean Environmental law Proclamation (Draft 2012): Eritrean Environment Proclamation is drafted with these objectives, but not specific, to:

  a) establish the foundation of environmental policy and laws; and provide the basic instruments for implementing and enforcing it;
  b) establish the basis for guidelines and procedures necessary for managing and integrating national efforts of environmental protection, conservation and enhancement;
  c) establish the basis for Eritrea's effective contribution to international cooperation in the global environmental protection efforts.

The draft proclamation includes fifty-seven articles classified in ten chapters. Some among the articles are meant to Community rights precedent over individual interests, establishing National Council of the Environment, Integrated Environmental Management, Disaster early warning and contingency planning, Public awareness, Research on maintenance of ecosystem integrity, Economic Incentives, Establishment of national environment fund, Environmental Impact Assessment, Management of waste, Integrated Coastal Area (Zone) Management, Conservation and sustainable use of biological diversity, and Bio-safety and

Protected Areas. Climate Change issues (adaptation and mitigation) are also at the core of the environmental law.

4.2.2 Zonal/Sub zonal strategies, planning and local legal situation Zonal MoA five years agricultural strategic plan (2013-2017): The Ministry of Agriculture has been exerting all possible efforts to restore the environment by developing the capacity of farmers and extension agents. In order to tackle this crucial problem the MoA has conducted a Rapid Agricultural Production Situation Assessment (RAPSA) which focuses on collecting basic data at Sub-Zoba levels and developed a 5 years sectoral strategic plan particularly useful at local levels.

The Zonal and Sub-zonal Local traditional Laws: Zonal addministration Semienawi Keih Bahri, together with other stakeholders has set temporary regulations to manage and preserve the protected area especially for Semienawi and Debubawi Bahri PAs. The interim regulations focus on enclosures management; temporary land use classification, grazing and cultivable areas and measures against any offences. These points have been discussed and outlined together with local communities.

The Customary laws and regulatory at community level: In the Debubawi Bahri area, the Sub Zoba administration in collaboration with MoA, and MoLWE and key stakeholders have set local regulations on how to temporarily manage the protected area which had been practically materialized. Kebabi administration and local area communities have taken the responsibility of managing their own protected areas. Communities managed to recruit forest guards from their own sources.

Besides, the local communities in the Buri, Irrori and Hawkil PAs have their traditional and rich customary laws and regulations on how to manage and protect the natural resources particularly on the forestry and wildlife resources. According to this tradition and local knowledge, along the coastline, it is not acceptable to harm or hunt wildlife animals. Wildlife often lives close to human settlements and graze in harmony together with livestock. With regards to forest conservation, the tradition does not allow to cut live trees either. Firewood collection (dry wood) can only allowed through the permission of the elderly and local government as per the bylaws set. Violation of this tradition leads to local and administrative punishment.

4.3 Current analysis of institutional, policy and legal framework

National institutional and legal framework: the GoE has implemented several civil service reform programs to clarify the roles, mandates, and functions of the various government institutions. The Proclamation No. 86/1996 for the Establishment of Regional Administrations state that the core responsibility of line ministries are policy, regulations, human resource development, research, and technical support, while all operational and implementation functions fall under the mandates of regional administrations. Hence, formulation policies, regulatory framework, training, research and mobilization of resources/funding is the responsibility of the line ministries. All other consultation and coordination matters with bilateral and multilateral agencies are through the MoND. Project implementation, monitoring and regulating the projects is done at the zone level. The bulk

of the project implementation is carried out at sub-zonal level and the communities at large through community based organizations/committees.

There is inadequate enabling environment supported by specific policy and institutional frameworks. There exist incomplete policies, action plans and strategies that are supportive and relevant to biodiversity conservation which requires consideration for sustainable and effective management of the national biodiversity resources to be translated into action through enforcement, monitoring and evaluation.

There is significant gap that need to address biodiversity issues at local levels. Some of these obstacles include absence of gazetted environmental law, weak enforcement of existing laws; lack of integration and coordination among institutions, very much limited representation, absence of competent legal body, poor application of monitoring, evaluation and supervision and inadequate response to environmental degradation and lack of capacity to avert or mitigate effects of natural and man-made disasters.

Institutions responsible for biodiversity conservation at zonal and sub zonal levels include MoLWE, MoA, MoMR, MoLG, MoT, and FWA. In general terms, there is insufficient biodiversity conservation framework at zonal and sub zonal levels. There is also lack of any management plan or regulation carried out pertinent to site level management. However the government had been exercising various efforts and making interventions regarding ecosystem conservation.

Cognizing Protected areas' management as the fundamental building blocks of the national conservation strategies (Terrestrial, Marine and Agriculture), the GoE is undertaking initiatives to realize sustainable mechanisms in place. This is supposed to constitute the core efforts to protect the threatened species-increasingly recognized as essential providers of ecosystem services and biological resources. This is a key component in climate change mitigation strategies.

According to Fisheries Proclamations, a number of articles relevant to the protection and conservation of marine resources, including the establishment of marine protected areas have been initiated by the MoMR. The Ministry has already plans to establish a National Protected Areas Network aiming at maintaining the diversity and viability of the various components of Eritrea's natural heritage, and to ensure the sustainable utilization of the natural resources within them in which two islands are already proposed for MPA.

Presently, there is serious understaffing and shortage of capable human resources in the management of biodiversity. With the existing capacity it cannot perform the required global and national tasks adequately. If this current situation is not solved timely, it would not be possible to provide proper planning, regulatory framework, technical and monitoring support to GSE including its various institutions. Different categories of staff, expertise and attitudes will be required for taking up policy and planning functions in biodiversity management and development. It is evident that the key and immediate challenges to biodiversity conservation and management are to staffing, training, planning and supervision. The challenge was on how to attract the best candidates available in the labor market which need to be solved. Limitation on job training and lack of incentives particularly at zonal and sub zonal levels is evident considered as a big challenge.

CHAPTER 5: STRATEGIC GOALS AND ACTION PLAN FOR BIODIVERSITY

This revised NBSAP- 2014 contains the Terrestrial, Coastal, Marine and Islands and Agro-biodiversity components of biodiversity aligned with the existing national policies and legislation as well as the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets. The principal components of the National Biodiversity Strategy and Action Plan include the Vision, Mission, Overall Objectives, General and Ecosystem-specific Targets and Actions of the Plan. These statements form an internally consistent, closely linked hierarchy that creates a logical pathway from high-level principles to activities on the ground.

5.1 Vision

"By 2040, biodiversity is valued, conserved, restored and wisely used through the active participation of all stakeholders to sustaining a healthy environment and equity sharing of benefits to meet the development needs and well-being of the people."

5.2 Mission

Realizing the current status, threats and trends of biodiversity in Eritrea, the mission has been defined as follows:

"Establish all necessary measures and undertake effective actions designed to reduce the loss of biodiversity by 2020 and ensure that by 2040 the state of the natural environment in Eritrea is stable and capable of ensuring people's future well-being". This statement will provide guidance towards the establishment of workable national strategies for both short and long-term efforts by all stakeholders towards the achievement of common goals of national socio-economic development and environmental conservation.

As a matter of dynamic process, a continuous collaboration and integration among stakeholders and key partners is required in order to achieve the required goals and objectives based on the following general principles:

5.3 General Principles

• *The country's biodiversity resources are basic resources of livelihood that need to be sustainably conserved and utilized.*
• *All stakeholders have the responsibility to contribute to the conservation of biodiversity and its sustainable use. Integration of biodiversity issues required with all concerned stakeholders at all levels.*
• *Political commitment is always in place at all phases of programmes and projects.*
• *Awareness raising and capacity building programmes are basic elements of areas of intervention of biodiversity.*

> *• According to the existing state of biodiversity development, an integrated ecosystem management is to be considered towards the achievement of biodiversity conservation and sustainable use.*
> *• Conservation of ecosystems and BD, prioritizing mangroves, coral reefs, dunes, lagoons and coastal areas that provide environmental services essential to reduce vulnerability.*
> *• Ensure that climate change mitigation and adaptation are taken into consideration and that NBSAP objectives are climate resilient.*
> *• Reduce vulnerability of the population and ecosystems to the effects of climate change through appropriate adaptation approaches for biodiversity conservation and sustainable use.*
> *• Mainstreaming biodiversity into national and sector planning processes is vital to ensure sustainability and follow economic, social and environmental impacts of biodiversity.*
> *• Traditional knowledge and sustainable use practices are respected norms.*
> *• International cooperation (technical and financial), is enhanced to tackle the causes of biodiversity losses and achieve the intended biodiversity targets.*

Based on the above mentioned principles the following general measures are proposed to attain the vision/mission statements:

- Decision makers are aware of biodiversity values and make inputs towards minimizing the pressure of biodiversity losses.
- Integration among key stakeholders is improved through active participation and comprehensive planning at all levels particularly in realizing resources protection and use to allow environmental sustainability.
- Biodiversity is mainstreamed at key institutions and partners so that policies, strategies, programs and plans are well coordinated and integrated.
- Land uses are effectively planned, degraded land reclaimed and natural resources sustainably utilized.
- Make maximum effort in the promotion of renewable alternative energy sources to reduce biodiversity losses and ensure sustainable livelihood.
- A continuous awareness programmes related to the conservation and sustainable use of biodiversity should be realized and supported by technical and financial resources with respected international and local knowledge.
- A well harmonized natural resources access and protection is in place through proper implementation of the existing and future legal and institutional frameworks.
- Biodiversity is treated according international and available applied information and environmental sustainability.

5.4   Overall Objectives

The overall objectives of each ecosystem as described in NBSAB 2000 are also maintained in this new version. The overall objectives are drawn to lead to the strategic goals in respect to the three main ecosystems in line with the strategic plan for biodiversity 2011-2020 and its Aichi biodiversity targets as listed below:

5.4.1 Terrestrial Biodiversity

> In terrestrial biodiversity, the objective is *"the Rehabilitation of degraded terrestrial ecosystems and their components through a combination of natural succession; protected area establishment and management; and sustainable use of terrestrial biodiversity resources"*.

5.4.2 Coastal, Marine and Island Biodiversity

> In the Coastal, marine and Island Biodiversity the objective is *" the coastal, marine and island biodiversity of Eritrea is conserved and human activity managed to promote the sustainable development and optimal use of these resources"*.

5.4.3 Agricultural Biodiversity

> In the Agro-biodiversity the objective is *"the conservation and sustainable use of the agro-biodiversity resources for food security, income generation and agriculture, whilst ensuring the socially-fair distribution of benefits arising from the use of national agro-biodiversity resources"*.

The above three objectives provide the first layer of elaboration of the overall biodiversity goals, for each ecosystem as a basis to develop the general and ecosystem specific targets in line with the strategic plan for biodiversity and its Aichi biodiversity targets.

5.5 Strategic Goals and Biodiversity Targets

In line with the Strategic Plan for Biodiversity 2011-2020, its Aichi Biodiversity Targets , national biodiversity priorities, fundamental principles, 5 strategic goals, 20 general and 18 ecosystem targets (areas for intervention) have been addressed to reduce and eventually halt biodiversity losses and improve the current state of ecosystems and ensure sustainable use.

Table 6: shows the Strategic Plan for Biodiversity 2011-2020, its Aichi Biodiversity Targets , national biodiversity priorities, fundamental principles,and 5 strategic goals.

Strategic Goals	Target
Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society	**Target 1:** By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
	Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as

	appropriate, and reporting systems.
	Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.
	Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use	**Target 5:** By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
	Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.
	Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
	Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
	Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority

	species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
	Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.
Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity	**Target 11:** By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.
	Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained
	Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.	**Target 14:** By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.
	Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

	Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.
Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building	**Target 17:** By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.
	Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.
	Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.
	Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011- 2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels; This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.

For ease of understanding, the Biodiversity Strategic Goals and Targets have been converted into general actions for interventions with specific national and ecosystem priorities. Points including the level of development, status of livelihood, local knowledge and practices, integrated management, existing potentials, institutional and legal contexts, partnerships' and networking are some of the guides and criteria considered .to meeting the targets. The action plan contains strategic goals, targets, actions, time frame, performance indicators, implementing institutions and source of information.

The strategic goals show five major areas of intervention aimed at: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across national and sector development plans **(Strategic Goal A)** Reduce the direct pressures on biodiversity and promote sustainable use **(Strategic Goal B)** Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity **(Strategic Goal C)** Enhance the benefits to all from biodiversity and ecosystem services (**Strategic Goal D**) and Enhance implementation through participatory planning, knowledge management and capacity building **(Strategic Goal E)**.

In meeting the identified five goals 20 targets had been derived that should be met by 2020. Targets are set and listed so as to meet their corresponding goals. Which all of them are aligned to possibly achieve to the contribution for the conservation and sustainable use of the natural resources. All the targets should be met in close collaboration of all partners in a participatory manner. The NBSAP maintained an ecosystem approach subject to changes as required by concerned institutions in future..

Priority actions have been selected for all corresponding targets. In due course actions can be added as necessary due to the fact that the current situation may not be exhaustive. The actions are distributed and prioritized according the predetermined targets with a range of 1-6 years. The time frame had been determined to comply with the national obligations and the 2011-2020 Strategic Plans for the Convention and the Aichi targets for biodiversity.The time frame had been determined to comply with the national obligations and the 2011-2020 Strategic Plans for the Convention and the Aichi targets for biodiversity.

M&E is to be established to determine the extent of progress in the implementation of this plan whereby the identified indicators for each action to determine progress in performance towards the realization of each target and the strategic goal need to be recorded and take corrective measures.

Implementing or responsible institutions are identified to take care of the NBSAP actions so as effective conservation and sustainable use of biodiversity is maintained. These bodies are the forefronts that participated in the preparation of this updated NBSAP and are also expected to do contribute better for its implementation.

5.5.1 General Targets

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across national and sector development plans.

Under this strategic goal, four targets have been identified for the realisation of this defined strategic goal as follows:

Target 1: By 2020, at least 50% of the population have a basic knowledge of biodiversity and are aware of its significance and their own opportunities to contribute to its conservation and sustainable use. Redressing the low level of information and knowledge, sensitization and public awareness is promoted as a critical approach to improve knowledge on the value, the causes and consequences of biodiversity loss. Campaigns to promote attitude change

would be targeted to a wide range of actors such as in educational curriculums, media, arts, literature, national and sector level decision makers, civil societies and local communities.

Target 2: By 2020 biodiversity values have been integrated into national and sector development plans. The goal of conserving biodiversity has also been integrated into decision-making on plans, programmes and projects. Responding to the identified target, mainstreaming the NBSAP into the national development framework and sector development plans is required. The existing Draft Eritrean Environmental law is also need to be completed, proclaimed and enforced.

Target 3: By 2020, incentives and subsidies harmful to biodiversity have been identified and reformed, and economic controls related to biodiversity have been enhanced, taking into account the traditional use of forest products and socio-economic conditions. To address these issues a positive incentive and subsides harmful mechanism such community based natural resources management and sustainable use will be established at local level. These will include cut and carry system of grasses in enclosure areas, harvest of poles as part of revenues to the local communities, distribution of improved energy saving stoves subsidized by government and partners, and up-scaling marine and terrestrial afforestation development efforts in partnership with community based management.

Target 4: By 2020 an ecologically sustainable system of production and consumption is established based on sustainable practices with appropriate investments. As a priority response to the current unsustainable mode of consumption and production exacerbated by huge resources demands, there is need to promote a sustainable use of the ecosystem and species of importance in a manner that will reduce the pressure on biodiversity and maintain the increase of activities within safe ecological limits.

Focus will be given to promoting the sustainable use of forest products and use of alternative energy sources and efficient energy saving technologies such as *Adhanet Mogogo stoves* as an efforts to considerably reduced deforestation and keep the impacts of natural resource use within safe ecological limits

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Under this strategic goal,six targets have been prioritized to address the consequences of habitat degradation and species loss as follows:

Target 5: By 2020,the loss of natural habitats, degradation and fragmentation of ecosystems has been significantly reduced. Critical habitats under serious threats of degradation that require protection such as highland forests, riverine forests, mangroves, etc have been prioritized. In reducing the rate of degradation calls for a proper development and management plans for those critical habitats proposed under Protected Area System (Semenawi and Debubawi Bahri, Buri-Irrori- Hawakil Islands, as well as Bara'sole bay) for Conservation of Biodiversity and Mitigation of Land Degradation. Inventories and assessments to set baseline studies will be carried out to determine the state of biodiversity and highlight trends. Threats of degradation in non-protected areas equally need to be addressed. This includes areas of rich biodiversity such as Gash-setit Elephant sanctuary, open grasslands, Islands, etc.

Target 6: By 2020, major marine biotic and coastal resources are managed and utilized in a sustainable manner, and the concept of Maximum Sustainable Yield (MSY) is applied in fisheries. Fish stock management plans will be prepared for all threatened fish populations and where necessary for commercially fished populations. Fisheries shall not have significant adverse impacts on threatened species or vulnerable ecosystems. Fish migration routes and spawning areas are safeguarded in waters of importance to migratory fish and commercially fished species. Depleted fish stocks are strengthened and native fish populations restored with the help of re-introductions.

Target 7: By 2020 areas under agriculture and forestry are managed and utilised sustainably using agricultural land use master plan to ensuring conservation of biodiversity. To ensure the conservation of agriculture and forest biodiversity, an agricultural and forestry land use master plan shall be developed for sustainable resource use. Afforestation and sustainable land management (SLM) programmers will widely implement through the participation of community mobilization.

Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.Preventing and mitigating the impacts of pollution and its potential threats the environment will be addressed with a great concern. In view of the current development prospects with an increase in land and marine based activities for agro-industries, mining, port, infrastructure, fishing, livestock, tourism and other sector activities, there is a need for urgent action to prevent and mitigate the impact of the polluting substances, solid and liquid waste that will increasingly be generated across all ecosystems.

A major preventive approach is to effectively implement EIAs procedure for all development programmes and projects with consideration of all biodiversity indicators. Periodic Strategic Environmental Impact Assessment (SEIA), policies and regulations would be enforced. Developing waste water management and pollution control strategy that prevent the contamination of both surface and underground freshwater resources as well as integrated water resources action plan are prioritized to assist in reducing the potential/current levels of pollution. Sea water quality and pollution tested in accredited laboratory for any heavy metal contamination will also be established.

Target 9: By 2020 invasive alien species and their pathways have been critically studied and prioritized, with the most harmful species brought under control through sustainable utilization and management programmes. Responding to the identified challenge, pathways are studied and monitored to prevent the introduction and sustainable utilization of invasive alien species in the country. Given its adverse impacts, invasive alien species will be studied, prioritized and sustainably utilized.

Target 10:By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change are minimized, so as to maintain their integrity and functioning. Climate change and multiple anthropogenic pressures are negatively impacting on ecosystems and consequently on the wellbeing communities that depend on ecosystem resources for their livelihoods. Therefore actions need to be put in place that reduce the negative impacts of climate change and multiple anthropogenic

pressures through the application of Integrated Coastal Area Management (ICAM) Strategies and setback development.

Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Under this strategic goal, three targets have been identified as priorities to attain this strategic goal as follows:

Target 11: By 2020, at least 10% of the national territory, set-aside for Protected Area System for Conservation of Biodiversity and Mitigation of Land Degradation. Eritrea shall operationalze an integrated Semenawi and Debubawi Bahri, Buri-Irrori- Hawakil as well as Bara'sole Protected Area System with a total land area of 1,009,860 ha (649,266 ha for terrestrial and 360,594 ha for marine protected area) for Conservation of Biodiversity and Mitigation of Land Degradation. Biodiversity also continues to be managed and conserved in other potential woodland, grasslands and forest areas.

Target 12: By 2020, the extinction of threatened species has been prevented and the conservation statuses of those most threatened have been improved, with declining trends significantly reduced.

The extinction of threatened species (such as the African wild ass, Nubian Ibex, African Elephant and Sea Turtle has been prevented and the conservation status of those most threatened has been improved, with declining trends significantly reduced. This target will ensure through proper management and action plan for the in-situ conservation of these critically threatened species. In addition this revised NBSAP addresses the conservation measures for threatened and endangered trees and shrubs such as: *Juniperus procera,Olea europea subsp Africana,Hyphaene thebaica,Boscia angustifolia, Colutea abyssinica, Dalbergia melanoxylon, Diospyros mespiliformis, Flueggia virosa, Mimusops kummel, Sclerocary abirrea, Senna alexandriana, Syzygium guineense, Tamarindus indica, Vangueria madagascariensis, Ximenia Americana and* Aloe (*A. neosteudneri* and *A. schoelleri.*)

Target 13: By 2020, the genetic diversity of cultivated plants and domesticated animals as well as culturally valuable species is maintained and strategies have been developed and implemented, for minimizing genetic erosion and safeguarding their genetic diversity. To minimize the genetic erosion both in plants and animal resources, promoting *Ex-situ* conservation of cultivated crops and forest genetic resources through human capacity building and infrastructure development implemented and safeguarded.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.

Under this strategic goal, three targets have been identified as priorities to attain this strategic goal as follows:

Target 14: By 2020, ecosystems that provide essential services that contribute to livelihoods and well-being of people are restored and safeguarded. Responding to this function, ecosystems that provide essential services, including water, land and health issues

are restored and safeguarded through Integrated Watershed Approaches and as well as Coastal, Marine and Islands Biodiversity Managements.

Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and combating desertification. Readdressing these challenges, ecosystem resilience and the contribution of biodiversity to carbon stocks have been enhanced through conservation and restoration with effective implementation of the National Adaptation Program of Action (NAPA/UNFCCC) and National Action Programmes (NAP) to combat desertification and mitigate the effects of drought in Eritrea. Eritrea participates in global efforts to restore at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation. The objective of this target is to ensure that compensation schemes are defined for the utilization of all biological and genetic resources in a manner relevant for the effective recognition of traditional knowledge and their application effectively contribute to improving the livelihoods of local communities.

Responding to the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their utilization has been enforced and integrated into national legislation and administrative practices through proper documentation of all relevant information pertaining policies, legislations for genetic resource use.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

Under this strategic goal, four targets have been identified as priorities to attain this strategic goal as follows:

Target 17: By 2015 Eritrea has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan

The revised and updated National Strategy and Action Plan for Biodiversity (NBSAP Version II) are implemented and have been monitored for the purposes of an interim report produced in 2015. The strategy will be implemented and evaluated cost-effectively in collaboration with various sectors and stakeholders. The new orientation in carrying out the defined mission for biodiversity recognises the critical importance of multi sector involvement and the role of decentralised and international institutions in the implementation of the NBSAP.

Target 18: By 2020, the traditional knowledge and practices relevant for the conservation and sustainable use of biodiversity, and sustainable use of biological resources are respected, subject to national legislation and relevant international obligations.

To this effect, traditional knowledge associated with conservation of genetic resources and germ-plasm relevant for the conservation and sustainable use of biodiversity are respected, restored and conserved by developing legislation and administrative procedures related to the protection of this traditional knowledge. Eritrea is considering the traditional knowledge and practices and promotes biodiversity management and sustainable use.

Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Readdressing this challenge, the science based knowledge and technologies related to biodiversity, its values, functioning, status and trends have been improved, and are widely utilised, applied and transferred to the public through national environmental and/or biodiversity days or gathering.

Target 20: By 2020, the mobilization of financial resources, for the effective implementation of the Strategic Plan (2014-2020) from all sources should increase in accordance with the consolidated Strategy for Resource Mobilization.

A strong national partnership with develop`ent partners and other stakeholders is central for the implementation of priority programs and projects identified. Innovative approaches to mobilise support and investment from sector ministries will constitute a critical part of the priority interventions.

Eritrea assesses opportunities to increase the availability of financial, human and technical resources to facilitate the effective implementation of the Strategic Plan for Biodiversity 2011-2020 as drawn up at CBD COP 10 and in line with decisions made at COP 11.

5.5.2 Ecosystem-specific Targets:

This NBSAP 2014 maintains the ecosystem management approach of the already identified three core ecosystems i.e. Terrestrial, Coastal, Marine and Islands, and Agricultural Ecosystems to ensure the effective recognition of the strategic goals for the conservation and sustainable use of biodiversity.

Terrestrial Ecosystem Targets:

Deforestation, land degradation, over grazing/over browsing, invasive alien species and habitat transformation are identified as a major threat for loss of terrestrial biodiversity, particularly from conversion to agriculture due to anthropogenic pressures are direct drivers of biodiversity decline in Eritrea. In providing a response to this threat, the target is focused on strengthening the coordination of land use planning and promoting integrated approaches to avoid over-exploitation of natural resources. Establishing and ensuring effective implementation of sustainable use of forest resources and integrated control mechanism in the Forestry and Wildlife Authority and agricultural sector is expected to response to reduce the excessive collection of firewood and construction wood.

E-Target 1: Develop an integrated action framework to control all activities of excessive collection of firewood and construction woods that impact on forest biodiversity resources in a manner that enhances sustainable use of nature resources.

To meeting this target reduction of pressure on plants in natural habitat through strengthening of forestry and Wildlife inspectors, promotion of alternative fuels (afforestation), and sustainable utilization of forest products is fundamental.

E-Target 2: By 2020 the use of alternative energy should have increased and pressure on forests significantly reduced.

This target is meant to seek a response to the increase in human population with corresponding demands for fuel wood as more than 90% of national energy consumption constitutes biomass energy.

Intervention actions should focus on promoting the use of alternative energy sources (biogas, wind and solar) and efficient improved cooking stoves *(Adhanet Mogogo)* as an efforts to considerably reduced deforestation.

E-Target 3: By 2020, at least 25% of grazer populations have developed the capacity to reduce overgrazing/over browsing.

This target is aimed at addressing the lack of knowledge of the undesirable impacts of overgrazing/over browsing. As a priority, capacity building programmes for herders in local communities and training on cut and carry of forage production and sustainable utilization of enclosures will contribute very significantly to reduce biodiversity loss from over-grazing/over browsing.

The realisation of this target will also be considered a priority in the Semi-arid and Grassland Ecosystems.

E-Target 4: By 2020 the extinction of threatened species has been prevented and the conservation status of those most threatened and endangered of flora and fauna have been improved, with declining trends significantly reduced.

This target is provided to contribute to the conservation of threatened and endangered species of flora and fauna taxonomy based on the IUCN Red List and National priorities. One of the actions is the establishment of a protected area system and enclosures appropriate to Eritrean conditions.

This target ensures proper management and action plan for the *in-situ* conservation of these critically threatened species.

E-Target 5: By 2020 at least 25% of catchment sites and degraded lands of high biodiversity hotspots are rehabilitated within the terrestrial ecosystem.

To tackle the threats from watershed degradation and climate change and variation with a focus on forest and woodland ecosystem, an implementation of National Land use Master

Plan with the principles of Sustainable Land Management (SLM), and Integrated Strategy on Degraded Catchments Treatments Programme is proposed. Priority intervention here is to assess the impacts of rehabilitated degraded watersheds with high biodiversity hotspots and make an intervention through soil and water conservation, afforestation as well as enclosures establishment.

E-Target 6: Develop an integrated action plan of implementation to reduce the expansion of alien species through control mechanisms and sustainable utilization.

This target will be ensured through integrated management approaches for the control of alien invasive species of *Prosopis chilensis* and *Prosopis juliflora* and other alien invasive species to negative effects and sustainably exploit the potential in-order to reduce pressure to the forest ecosystem.

Proper management mechanisms and awareness raising programmes on the sustainable utilization and control of *Prosopis chilensis* and *Prosopis juliflora* and other alien invasive species have to be conducted at all level by the relevant sectors.

Coastal, Marine and Islands Ecosystem Targets:

The following six targets specific to Coastal, Marine and Islands ecosystem seek to provide responses to the major drivers of ecosystem destruction and fragmentation including mangrove destruction and fragmentation, pollution, coastal erosion, alien invasive species, and, rare, endangered and threatened species of marine biodiversity.

E-Target 7: By 2020, mangrove forest and associated coastal forest degradation and loss should have been significantly reduced.

Current responses to address the specific threats to the massive degradation and fragmentation of mangrove habitats and over browsing are insufficient. But development programme by the MoMR are aimed to plant 30 ha of mangrove both on the intertidal areas of the main coast and the islands of Dahlak. Locations have been identified on both Northern and Southern Eritrean Red Sea Regions. Existing degraded mangroves in near coastal villages will rehabilitated

This target requires to strengthen the on-going approaches and programs. Hence, intervention priorities call for the intensification of on-going programs for mangrove restoration and its sustainable use, and the protection of progeny rounds.

Furthermore, the target calls for collaboration with on-going programs and initiatives in the marine and coastal zone managements.

E-Target 8: By 2020, all sources of coastal, marine and island pollution should be effectively controlled to reduce pollution and mitigate its impact on the ecosystem.

This target recognizes the existence on-going programs to reduce the growing risk of coastal, marine and islands pollution and environment degradation from rapidly expanding

maritime activities and urban waste flows and the inadequacy to provide the expected response.

The target thus seeks to strengthen control of pollution arising from urban waste flows and rapidly expanding maritime activities as growing risk to the coastal, marine and island ecosystem and to mitigate the impact of pollution on the ecosystem. Priorities will include the establishment of a collaborative mechanism to strengthen control of coastal, marine and island pollution, strengthening of control and inspections of coastal, marine and island sector and maritime activities with polluting effects, Intensify existing programmes for control of coastal, marine and island pollution.

E-Target 9: By 2020, Coastal Erosion should be greatly reduced and eroded coastal beaches rehabilitated.

In taking actions to the threats from coastal erosion due to the impacts of climate change, unsustainable clearing of coastal vegetation converted for urban and industrial development, etc., with devastating impacts on the coastal, marine and islands ecosystem, requires the strengthening of current programs.

This calls for the carrying of studies to identify and understand the underlying causes and further promoting the rehabilitation of eroded coastal beaches by supporting the use of cost effective local technologies.

E-Target 10: By 2020, all coral reefs in the Eritrean Red Sea are identified to a species level and status of natural and human induced degradations regularly monitored.

In this respect the target seeks to develop and implement program to identify the coral and prepare reference sample of corals to a species level and establish a resources database.

Programme activities include surveys regarding status of coral reefs, coral reef conservation and damage minimization, development of legal frameworks to establish Marine Protected Area, Strengthening of management, monitoring programmes and the promotion of awareness raising programmes.

E-Target 11: By 2020, alien invasive species in the Coastal, Marine and Islands (CMI) are controlled and monitored.

The growing concern of alien invasive species is to be tackled through the establishment and institutionalization of an effective organ so as to control, implement and monitor the introduction and status of alien and invasive species.

This target thus intend to thoroughly survey the of introduced alien invasive species so far, preparation of implementation plans, regulatory frameworks and as well as strategic maritime and aquaculture master plan for the control of possible introduction of alien invasive species.

E-Target 12: By 2020, rare, endangered and threatened species of both marine flora and fauna species are protected and rehabilitated.

The target focuses on the establishment, conservation and monitoring programme concerning the status of rare, endangered and threatened species such as sea turtles and dugongs.

In meeting the target a detailed status survey of rare, endangered and threatened species will be prepared including its implementation and monitoring, preparation of a *migratory species conservation network* and activities for endangered, endemic, migratory and/or indicator species that are not in the conservation management areas, in particular: marine turtles, marine mammals, migratory birds and sharks. Development of legal frameworks to protect indigenous flora and fauna, implementation of marine protected areas, building institutional capacities of MPAs and provision of required awareness programmes on conservation of rare, endangered and threatened species are also considered issues.

Agricultural Ecosystem Targets:

The six targets specific to the agro-ecosystem seek to provide responses to the major issues of genetic resources, land degradation, deforestation, soil loss and the expansion of desertification, especially in the critical areas where agricultural outputs is vital.

E-Target 13: Public awareness on the importance and sustainable use of agricultural biodiversity increased by 10%.

In this target actions of engagement in advocacy targeting policy makers to address the importance of genetic resources in alleviating food insecurity, poverty reduction and healthy problems and backing up through institutional and legal instruments are considered as fundamental steps.

This target seeks to strengthen dissemination of agro-biodiversity information through the national media, publishing flyers and training, and inclusion of more information on Eritrean agricultural systems and their associated biodiversity-diversity into the school curriculum.

E-Target 14: By 2017, plans for sustainable agricultural biodiversity use implemented.

This target aims at setting national strategy for the management of farm animals' genetic resources and strengthening research on alternative energy such as biogas and briquettes. Priorities will include promoting development of crop varieties resistant to drought, disease and insects to adapt climate change

E-Target 15: By 2020, pollution to agricultural biodiversity from agro-chemical has been brought to levels that are not detrimental to ecosystem function and biodiversity.

This target calls effective implementation the environmental assessment of industrial products and construction and develop an effective system for the regulation of agro-chemical import and supply to ensure proper pesticide use and promote the framework of Integrated Pest Management (IPM). One of the priority interventions is to consider the preparation of formal registered list of agro-chemicals.

E-Target 16: By 2020 threatened species prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

To alleviate the extinction of wild tree fruits conservation and domestication of species shall be considered. Regarding landraces of crop varieties the *ex-situ* conservation shall be complimented through the establishment of community seed bank conservation and informal seed distribution. Characterization of Barka cattle breed at phenotypic and molecular level for estimating the genetic diversity within the breed and for setting conservation and sustainable utilization strategy as part of the national livestock improvement program .

E-Target 17: by 2020 Conservation and management of genetic resources and diversities strengthened.

Responding to this target priority activities will include enhance *Ex-situ* conservation of cultivated crops and forest genetic resources through human and infrastructure capacity building, exploration and collection of PGR as gap filling, establishment of the on-farm conservation and community seed distribution systems of cultivated crops and establishing *in-situ* conservation of wild pasture species, arboretum and botanical garden, install cryopreservation facility for conservation of semen of cattle, strengthen on-farm conservation of breeds of goat, sheep and cattle, and documenting genetic resources information and studying genetic treaties including strengthening of gene bank.

All legal issues on Genetic resources in which Eritrea have signed will be domesticated through different legal forms, ratifying Protocol and develop national regulations or adopt best practices. To ensure this target the livestock export market should be regulated for attaining sustainable use and emplacing national Material Transfer Agreement are programme activities for implementation.

E-Target 18: By 2020, the traditional knowledge, innovations and practices of local communities relevant for the conservation and sustainable use of agricultural biodiversity properly documented and integrated in agricultural biodiversity.

The target require the collection, documentation of indigenous knowledge and traditional farming practices so as incorporating relevant local knowledge into teaching materials is a priority activities. Their customary use of PGR respected and fully integrated and reflected in the implementation of agricultural biodiversity conservation and management.

Table 6: PROJECT RESULTS FRAMEWORK (MATRIX OF ACTIONS)

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across national and sector development plans

TARGET 1					
TARGET 1: By 2020, at least 25% of the population have a basic knowledge of biodiversity and are aware of its significance and their own opportunities to contribute to its conservation and sustainable use.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost (USD)**
1.1. Promote stakeholder participation in biodiversity conservation and management	2016	1.1.1 stakeholder identification 1.1.2 needs assessment	MoLWE, FWA, MoA, MoMR,MoLG, MoI, NUEW,Academia,and Local communities	-Sector reports, -Project reports, -Written summaries, -Television and radio broadcasting	200,000
1.2. Develop and implement communication mechanism strategy for BD	2018	1.2.1 BD strategy documents 1.2.2 Attitude changes			250,000
1.3. Mainstream communication strategy at key sectors and institutions	2019	1.3.1 No. of institutions and associate BD related programmes 1.3.2 No. of campaigns and actions of media			100,000
1.4. Develop programs of awareness on biodiversity values, trends and threats	2020	1.4.1 establish networking 1.4.2 No of initiatives\ 1,4.3 No of events conducted			50,000
1.5. A national dialogue on the importance of BD conservation and development conducted involving all relevant stakeholders.	2020	1.5.1 Existence of public awareness campaign 1.5.2 No of workshops			100,000
1.6. Conduct awareness biotechnology and bio-safety. 1.7. Introduce of biosafety principles into educational carriculum.	2016	1.6.1.number of participants 1.6.2.awarness materials 1.7.1.educational curriculum			150,000
Sub Total (USD)					**850,000**

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TARGET 2					
TARGET 2: By 2020, biodiversity values have been mainstreamed into national and sector development plans. The goal of conserving biodiversity has also been integrated into decision-making on plans, programmes and projects					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
2.1 Political commitments and stakeholders involvement in the process established	2016	2.1.1 Involvement of decision makers 2.1.2 Dissemination of NBSAP 2.1.3 NBSAP utilization and implementation	MoLWE, FWA,MoA, MoMR,MoND, MoLG, and MoF	-Project reports -Regulations (promulgated) -Plan and strategy documents -NBSAP Mainstreamed document	50,000
2.2 Process for legislation enactment, including gazetting of environmental law, and BD, institutionalized	2017	2.2.1 Approval of regulations (Environmental and BD) 2.2.2 regulations have been formally issued and enforced			100,000
2.3 Background reviews and draft legislation, policies and policy guidelines completed	2016	2.3.1 review completed 2.3.2 policy and legislation			40,000
2.4 BD strategy and/or plan developed and owned by government with intensive participation of key stakeholders	2016	2.4.1 distribution of NBSAP 2.4.2 Knowledge of NBSAP by stakeholders			60,000
2.5 Mainstreaming the NBSAP into the national and sector development plans	2017	2.5.1 NBSAP mainstreamed in the national and sector development plan			150,000
Sub Total (USD)					**400,000**

TARGET 3					
TARGET 3: By 2020, incentives and subsidies harmful to biodiversity have been identified and reformed, and economic controls related to biodiversity have been enhanced, taking into account the traditional use of forest products and socio-economic conditions.					
Priority Actions	**Time frame**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**

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Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
		(baseline:2014)			
3.1 identification of incentives and subsidies concerning natural resources conservation and its sustainable uses	2015	3.1.1 Types of incentives and subsidies established 3.1.2 Acceptance by stakeholders	MoLWE, FWA, MoA, MoMR, MoND, MoJ, MoLG,MoEM,and Local communities	-Legal documents -Annual reports -Income and expenditure statements	50,000
3.2 Assessment and prioritization of harmful aspects of biodiversity management	2016	3.1.3 Involvement of decision makers and beneficiaries			100,000
3.3 development mechanisms for sustainable use of natural resources	2018	3.3.1 agreed methods and mechanisms			200,000
3.4 implementation of community based natural resources development, management and use including identification and promotion of best practices	2020	3.4.1 Use of forest products 3.4.2 Economic status of end users 3.4.3 Best practices collected and promoted			150,000
Sub Total (USD)					**500,000**

TARGET 4					
TARGET 4: By 2020 an ecologically sustainable system of production and consumption is established based on sustainable practices with appropriate investments.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
4.1 needs assessment studies	2016	4.1.1 resources supply and demand assessed 4.1.2 needs assessment and studies			200,000
4.2 formulation of programs and projects in participatory manner pertaining to sustainable ecology	2017	4.2.1 No. of ecological projects 4.2.2 stakeholders participation 4.2.3 resources use	MoLWE, FWA, MoA,		300,000

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
development and use			MoMR, MoND,MoF, MoLG, MoEM and Local communities	-Project reports -Ministry reports	
4.3 promotion of ecology management awareness programmes	2018	4.3.1 No and type of people trained 4.3.2. response to current ecological pressures			100,000
4.4 implementation to a systematic forest production and use	2015	4.4.1 regeneration rates 4.4.2 use of forest products			500,000
4.5 Promotion of alternative energy sources	2015	4.5.1 No and type of alternative energy sources developed 4.5.2 Accessibility and affordability of energy sources 4.5.3 trends in ecological pressures			700,000
Sub Total (USD)					**1,800,000**

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

TARGET 5					
TARGET 5: By 2020, at least 10% of the losses of natural habitats, degradation and fragmentation of ecosystems have been reduced.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
5.1 identification and prioritization of critically threatened habitats	2016	5.1.1 Critically identified areas 5.2.2 rate of concern	MoLWE, FWA, MoA, MoMR, MoND, MoLG and Local communities	-Annual reports, -Assessments and reviews	600,000
5.2 Development of management plans	2017	5.2.1 management plan 5.2.2 responsibilities taken		-Management plan -Baseline report	50,000
5.3 Development and mitigation of BD and land degradation Baseline studies	2017	5.3.1 state of biodiversity 5.3.2 trends of BD loss 5.3.3 baseline undertaken		-Project reports and reviews -Reports and	200,000
5.4 Biodiversity loss and human-induced degradation	2020	5.4.1 Quantitative data comparison with the baseline		supervision missions -State of the	400,000

Priority Actions	Time frame	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
reduced and effectively managed in protected areas				environment -Investments	
5.5 Implementation of SDB, Buri, Irrori and Hawakil islands PA system	2016	5.5.1 operationalization of the PA 5.5.2 annual and mid-term evaluations and reports			1,000,000
5.6 Inclusion of the protection of non-protected areas	2017	5.6.1 State of elephants, wild ass and other endangered animals 5.6.2 state of the coast and islands 5.6.3. status of highland forests, riverine forests, mangroves, etc			500,000
5.7 Capacity building for effective participation of the national biosafety authority in biosafety clearing house of the Cartagena Protocol	2017	5.7.1.skill developed			
Sub Total (USD)					**2,750,000**

TARGET 6
TARGET 6: By 2020, major marine biotic and coastal resources are managed and utilized in a sustainable manner, and the concept of maximum sustainable yield (MSY) and Ecosystem-based concept is applied in fisheries.

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
6.1 Update CMI database	2016	6.1.1 CMI study report	MoLWE, FWA, MoA, MoMR, MoND, MoLG and Local communities	-MoMR reports -Annual reports -Assessment and study	70,000

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6.2 preparation of fish stock management plans and application of MSY	2017	6.2.1 Fishery management plan 6.2.2 Status of MSY 6.2.3 stock taking assessment		reports -M&E reports -National statistics reports	210,000
6.3 safeguarded migration routes of fish and restored native fish populations	2018	6.3.1 status of migration routes 6.3.2 trends of native fish			100,000
6.4 promotion to consumption of CMI fish resources use	2020	6.4.1 consumption rates 6.4.2 knowledge of resource base 6.4.3 promotion rates			60,000
Sub Total (USD)					**440,000**

TARGET 7					
TARGET 7: By 2020 areas under agriculture and forestry are managed and utilized sustainably using agricultural land use master plan to ensuring conservation of biodiversity.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
7.1 Land use management plan introduced (DoL)	2016	7.1.1 Agriculture and forestry land use master plan 7.1.2 No of participants in the plan			200,000
7.2 introduction to sustainable agricultural biodiversity uses	2017	7.2.1 Users satisfaction 7.2.2 trends in Agro biodiversity	MoLWE, FWA, MoA,MoMR, MoND, MoLG and Local communities	-Approved land use master plan -M&E reports -Annual reports	150,000
7.3 Redistribution of agricultural land and improvement in land tenure systems	2018	7.3.1 equity 7.3.2 improvement in land reclamation 7.3.3 size and no. of plots			250,000
7.4 sustainable utilization of forestry and rangeland areas	2019	7.4.1 Type and size of forestry and rangelands managed 7.4.2 production and use of			300,000

		agricultural products 7.4.3 trends of agricultural biodiversity 7.4.4 income and expenditure of HH			
7.5 implementation of SLM practices (DoL)		7.5.1 newly introduced SLM practices 7.5.2 impacts of SLM practices			150,000
Sub Total (USD)					**1,050,000**

TARGET 8
Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
8.1 Assessment of pollution sources	2016	8.1.1 identified pollutants 8.1.2 prioritized pollution sources	MoLWE, FWA,MoA,MoMR, MoLG,academic and research institutions (EIT, HAC and CoMSAT)	-Laboratory results -Assessment reports -State of pollution report -Policy and regulatory documents	500,000
8.2 Prepare the state of pollution	2017	8.2.1 national state of pollution			200,000
8.3 Periodic implementation of Strategic Environmental Impact Assessment (SEIA)	2017	8.3.1 impact assessments 8.3.2 laboratory tests and results			100,000
8.4 Development of pollution regulatory frameworks	2018	8.4.1 Integrated regulatory frameworks 8.4.2 No of participants			150,000

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
8.5 Promote pollution knowledge and dissemination of information		8.5.1 No of institutions using available information 8.5.2 benefits gained out of the informed decision			50,000
Sub Total (USD)					**550,000**

TARGET 9					
TARGET 9: By 2020 invasive alien species and their pathways have been critically studied and prioritized, with the most harmful species brought under control through sustainable utilization and management programmes.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
9.1situational analysis on invasive alien species	2016	9.1.1 invasive species utilization 9.1.2 improvement regulatory services	MoLWE, FWA,MoA, MoMR, MoEM,MoLG and Local communities	-Surveys -Impact assessment -Effective guidelines -Peer reviewed papers published in scientific journals	100,000
9.2 identify and prioritize invasive species	2017	9.2.1 list of invasive alien species produced 9.2.2 envisaged work plans			50,000
9.3 emplace guideline to eradicate harmful species from agricultural lands	2018	9.3.1 approved guidelines 9.3.2 distribution of guidelines 9.3.3 knowledge of invasive alien species			150,000
9.4 promotion to sustainable control and utilization of harmful species	2020	9.4.1 No of awareness programmes 9.5.2 Area under utilization and control 9.4.3 Earning and benefits by users			400,000
Sub Total (USD)					**700,000**

		TARGET 10			
TARGET 10: By 2020, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change are minimized, so as to maintain their integrity and functioning					
Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost (USD)
10.1 Conduct full assessment of impacts of climate change on CMI biodiversity and ecosystems.	2016	10.1.1 identified climate change impacts and an early warning systems instituted in all sectors 10.1.2 improved knowledge of Climate Change 10.1.3 improved knowledge of major impacts by industrial fishing activities	MoLWE, FWA, MoMR, MoLG and Local communities	-CMI biodiversity framework -CMI reports -M&E reports	100,000
10.2 Develop a comprehensive, integrated and participatory management framework for CMI biodiversity including addressing climate change.	2017	10.2.1 CMI integrated management framework 10.2.2 informed decision making 10.2.3 No of participants in the process of development 10.2.4 An integrated national programme of adaptation to the impacts of climate.			200,000
10.3 Implement and strengthen CMI Biodiversity related to the mitigation of pressures on coral reefs and other vulnerable ecosystems due to climate change	2018	10.3.1 implementation committee in place 10.3.2implementation arrangements and mechanism 10.3.3 status of coral reefs and vulnerable ecosystems			300,000
Sub Total (USD)					600,000

Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

	TARGET 11
TARGET 11: By 2020, at least 10% of the national territory, set-aside for Protected Area System for Conservation of Biodiversity and Mitigation of Land	

Degradation					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
11.1 Operationalizing of Integrated Semenawi and Debubawi Bahri, Buri-Irrori-Hawakil Protected Area System for Conservation of Biodiversity and Mitigation of Land Degradation	2016	11.1.1 649,255 ha Delineated for terrestrial PA 11.1.2 360,594 ha delineated for marine PA 11.1.3 represented ecosystem system , including community conservation 11.1.4 % change achieved in the flora and fauna 11.1.5 A recognized body operates on the whole territory 11.1.6 The natural reproduction of flora and fauna species increased 11.1.7 habitats and landscapes are preserved 11.1.8 Deforestation rate and Biosphere Reserve 11.1.9 Socio-economic implications	MoLWE, FWA,MoA, MoMR, MoND,MoJ, MoLG, MoE and Local communities	-Project and PA reports -Supervision mission assessments -Plan and study documents	4,000,000

11.2 capabilities and competences of national partners are enhanced	2017	11.2.1 Protected Area System Plan adapted and implemented 11.2.2 PAs and core infrastructures delineated 11.2.3 Management and business plan adopted and implemented 11.2.4 Number of experienced staff 11.2.5 PA management			1,000,000
Sub Total (USD)					**5,000,000**

TARGET 12					
TARGET 12: By 2020, the extinction of threatened species has been prevented and the conservation statuses of those most threatened have been improved, with declining trends significantly reduced					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost (USD)**
12.1.Conservation for Somali wild Ass (*Equus africanus somaliensis*)					
12.1.1.Conduct surveys on Somali wild Ass to update population status ,basic biology,seasonal movements and interactionwith lives stock in sub zoba Gelalo	Phase I. 2016	12.1.1.1.Number of Somali wild Ass range,movement and numbers for future planning and zonation	MoA,FWA,MoLWE, Semienawi Kieh Bahri local government staffs ,MoMR, HAC, EIT,COMSAT and Local communities	-Management plans - Implementation arrangements -Status reports	20,000
12.1.2 Conduct socio-economic assessment of stakeholder communities	Phase.I.2016	12.1.2.1.socioeconomic report	MoA,FWA,MoLWE, Semienawi Kieh Bahri local government staffs and Local communities	- Implementation arrangements	30,000
12.1.3.Land use planning for Somali wild ass site prepared	Phase.I.2016	12.1.3.1.Land use planning report	MoA,FWA,MoLWE, Semienawi Kieh Bahri local government staffs and Local communities	-Management plans - Implementation arrangements -Status reports	50,000
12.1.3. Delineation, demarcation and legal gazettment of Somali wild ass protection area.	Phase.II.2017	12.1.3.Survey reports	MoA,FWA,MoLWE,Semienawi kieh Bahri local government staffs and Local communities	-Management plans -Implemen tation arrangements -Status reports	10,000
12.1.4. Management plans & capacity building	Phase.III. 2018-2019	12.1.4.1. Management plan reports and skill developed			2,000,000

12.1.5.Improve the protection and management of existing population	Phase.III. 2018-2019	12.1.5.1.Protected Area establishment	MoA,FWA,MoLWE,and Local communities	-Management plans -Implemen tation arrangements -Status reports	
12.1.6.Encourage Captive breeding of Somali Wild Ass	Phase IV.2020	Number of Somali Wild Ass captivated	MoA,FWA,and MoLWE		
Sub total (USD)					**2,110,000**
12.2.Conservation of elephant (*Loxondonta Africana*)				-Management plans - Implementation arrangements -Status reports	**Cost (USD)**
12.2.1. Biodiversity research,data collection and monitoring on	Phase I. 2016	12.2.1.1.Report prepared	MoA,GashBarka local government,FWA,and MoLWE		15,000
12.2.2.conduct socio-economic assessment of stakeholder communities	Phase I. 2016	12.2.2.1.Report prepared	MoA,GashBarka local government,FWA,and MoLWE		30,000
12.2.3.Assess the Human/Elephant conflicts		12.2.3.1..Report prepared	MoA,GashBarka local government, FWA, and MoLWE		60,000
12.2.4.Mapping	Phase.II. 2017-2018	12.2.4.1.Maps developed	MoA,GashBarka local government, FWA, and MoLWE		20,000
12.2.5.Sectoral Assessment	Phase.II. 2017-2018	12.2.5.1.Assessment reports	MoA,GashBarka local government,FWA, and MoLWE,		50,000
12.2.6.Gazetment of protected areas for elephants and develop manegment plan	Phase.II. 2017-2018	12.2.6.1.Area protected	MoA,GashBarka local government, FWA, MoLWE,and MoJ		
Sub Total (USD)					**175,000**
12.3.Conservation of Nubian Ibex (*Capra ibex nubiana*)					**Cost (USD)**

12.3.1.conduct preliminary surveys to determine the status and distribution of the Nubian Ibex	Phase.I.2016	12.3.1.1.Number of Nubian Ibex observed and area coverd during surveys	MoA, Anseba local government, FWA, MoLWE,and Local communities		50,000
12.3.2.Prepare questionnaire to investigate the attitude of the community in wild life conservation	Phase.I.2016	12.3.2.1.Report prepared	MoA,Anseba local government, FWA, and MoLWE		40,000
12.3.4.Sectoral Assessment	Phase.II. 2017-2018	12.3.4.1.Assessment reports	MoA,Anseba local government, FWA,and MoLWE		25,000
12.3.5.Mapping	Phase.II. 2017-2018	12.3.5.1.Maps developed	MoA,Anseba local government, FWA,and MoLWE		10,000
12.3.6.Gazetment of protected areas for elephants and develop manegment plan	2018	12.3.6.1.Gazetment of protected areas for Nubian Ibex and develop manegment plan	MoA,Anseba local government, FWA,and MoLWE		25,000
Sub Total (USD)					**150,000**
12.4.Conservation of two endemic species ; Aloe (*A. neosteudneri* and *A. schoelleri)*					**Cost(USD)**
12.4.1. Preliminary survey to assess distribution and altitudinal limits of the two species in Kohaito, Mt Seber (Gheleb) and neighboring slopes and valleys.	2016	12.4.1.1.Report on the distribution of the species	DoE, EIT ,National Musuem and Local communities		20,000
12.4.1. Discuss with village communities and administrators to see possibilities to participate in conservation planes.	2016	12.4.2.1.Prepare proposal for investigation	DoE, EIT, MoLG and National Musuem		20,000

12.4.2. Detail Ecological studies to provide more accurate description of the habitat, investigate abundance and population structure of *A. schoeleri* and *A. neosteudeneri.* Assess conservation status and recommend measures for conservation action.	2017	12.4.3.1.Delimit vegetation enclosure with the approval	DoE, EIT,MoA,FWA , MoLG, and National Musuem		25,000
12.4.3.Investigation using Questionnaire to study the role of village communities in establishing vegetation enclosures	2017	12.4.5.1.Participation of village communities	DoE, EIT, MoLG , and National Musuem		25,000
12.4.4.Upgrade awareness of the community in conserving soil, water and vegetation	2018	12.4.6.1.Participation of village communities	DoE, MoA ,FWA, MoT, MoLG, and National Musuem		20,000
12.4.5. Establish a conservation program and implement monitoring plans.	2018	12.4.7.1.Report on conservation status of the species	DoE, MoA ,FWA, MoT, MoLG,and National Musuem		20,000
Sub Total (USD)					**130,000**
12.5.Conservation of Juniperus procera (coniferous)					**Cost (USD)**
12.5.1.Conduct surveys to determine the status and distribution of Junipers procera Spp	Phase i-2016	12.5.1.1. Status and distribution of plant spp. and area covered.	FWA, MoA, MoLWE ,EMIC and Local communities	-Management plans -Implementation arrangements -Status reports	40,000
12.5.2.Prepare questionna-iers related to the attitude of thecommunity in conserving the endangered spp.	Phase i-2016	12.5.2.1.Report prepared	FWA,MoA, and MoLWE		
12.5.3.Mapping	Phase ii-20-2018	12.5.3.1.Report prepared	FWA,MOA,MOLWE, and EMIC		10,000

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12.5.4.Reforestation and soil and water conservation	Phase ii-20-2018	12.5.4.1.Degraded forest land rehabilitated, developed and regenerated	FWA,MoA, MoLWE , Local Governments of Semienawi Keih Bahri, Maekel, Debub, Anseba and Local Comunities		100,000
12.5.5.Assessment	Phase ii-20-2018	12.5.5.1.Assessment reports	FWA,MoA, MoLWE and , Local Governments of Semienawi Keih Bahri, Maekel, Debub, Anseba and Local Comunities		30,000
Sub total (USD)					**180,000**
12.6.Conservation of Olea europea sub-spp africana					**Cost (USD)**
12.6.1.Conduct surveys to determine the status and distribution of *Olea europea* subsp *africana* Spp	Phase i-2016	12.6.1.1. Status and distribution of plant spp. and area covered.	FWA,MOA, MoLWE and EMIC		100,000
12.6.2.Prepare questioners related to the attitude of the community in conserving the endangered spp.	Phase i-2016	12.6.2.1.Report prepared	FWA,MoA, and MoLWE	-Management plans - Implementation arrangements -Status reports	
12.6.3.Mapping	Phase ii-2016-2018	12.6.3.1.Report prepared	FWA,MoA, MoLWE and EMIC		150,000
12.6.4.Reforestation and soil and water conservation	Phase ii-2016-2018	12.6.4.1.Degraded forest land rehabilated, developed and regenerated	FWA,MoA, MoLWE , Local Governments of Semienawi Kieh Bahri,Maekel,Debub, Anseba and Local Comunities		200,000
Sub Total (USD)					**450,000**
12.7.Conservation of *Hyphaene thebaica*					**Cost (USD)**
12.7.1. Conduct surveys to determine the status and distribution of **Hyphaene**	Phase i-2016	**12.7.1.**Status and distribution of plant spp. and area covered.	FWA,MOA, MOLWE and EMIC	-Assessment reports	50,000

thebaica					
12.7.2. Prepare questioners related to the attitude of the community in conserving the endangered spp.	Phase i-2016	**12.7.2.**Report prepared	FWA,MOA, MOLWE		
12.7.3. Mapping	Phase i-2016	**12.7.3.**Report prepared	FWA,MOA, MOLWE and EMIC		100,000
12.7.4. Reforestation and soil and water conservation	Phase ii-2016-2018	**12.7.4.**Degraded forest land rehabilated, developed and regenerated	FWA,MOA, MOLWE and EMIC		200,000
Sub Total (USD)					**350,000**
12.8.Conservation of *Boscia angustifolia, Colutea abyssinica, Dalbergia melanoxylon, Diospyros mespiliformis, Flueggia virosa, Mimusops kummel, Sclerocary abirrea, Senna alexandriana, Syzygium guineense, Tamarindus indica, Vangueria madagascariensis, Ximenia americana*					**Cost(USD)**
12.8.1.Monitoring and evaluation 14 endangered or critically endangered indigenous trees and shrubs important for agriculture, food, feed, shelter and medicine	2016	12.8.1.1.number of indicators with data, Number of monitoring program ,sites visited ,status of endangered species reported	FWA,MoA, MoLWE and Local communities	Monitoring and Evaluation report	70,000
12.8.2.Field visit to potential growing areas of the targeted species		12.8.2.1.Skill developed, Developed database platform,Published flyers and posters		Assessment reports	
12.8.3.conducting status of targeted species in proposed sites		12.8.3.1.reports		Assessment reports	
12.8.4.Stakeholders workshop		12.8.4.1.No of participants			
12.8.5.Creating data collection means and knowledge sharing among	2016	12.8.5.1.Skill developed ,Developed database			80,000

relevant stakeholders to promote conservation of threatened species and producing national red lists of species that reflect trend of threat		platform		Assessment reports	
12.8.6.Ad hoc technical working group meetings	2016 2017	12.8.6.1. Skill developed			
12.8.7.Developing database platform		12.8.7.1.data base developed			
12.8.8.Publishing flyers and posters		12.8.8.1.Published flyers and posters			
12.8.9.Organizing awareness and synthesizing meetings		12.8.9.1. no of participants			
12.8.10.Avoiding new extinction of species through developing habitat for *In situ* conservation of several endangered or critically endangered indigenous trees and shrubs important for agriculture in a site within *Semenawi Keih Bahri* protected area	2017 - 2020	12.8.10.1.no of species protected			110,000
12.8.11.Quantify targeted species growing in the proposed site		12.8.11.1.quantified species			
12.8.12.Delineating the area in Semenawi Keih Bahri protected area to be used as In situ conservation site andRegenerating trees/shrubs seeds and raising seedling for planting in the site		12.8.12.1.delinated area			
12.8.13.Stakeholders workshop		12.8.13.1.no of participants		Assessment reports	
12.8.14.Guarding/protecting site		12.8.14.1.protected sited			
12.8.15.Short and long term		12.8.15.1. Skill			

		developed			
trainings					
Sub Total (USD)					**260,000**

TARGET 13					
TARGET 13: By 2020, the genetic diversity of cultivated plants and domesticated animals as well as culturally valuable species is maintained, and safeguarding their genetic diversity					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
13.1 Develop strategies for minimizing genetic erosion and diversity	2015	13.1.1 Stakeholders involvement 13.1.2 NARI's focus 13.1.3 Diversity status 13.1.4 Institutional arrangements	MoLWE, FWA, MoA(NARI, Extension regulatory),MoMR, MoND, MoLG, NUEW, MoE, HAC,EIT,Local administration and local communities	-Strategy document -NARI reports -Genetic diversity report -Annual plans and reports -Studies and agreements	150,000
13.2 Enhance Ex-situ conservation of cultivated crops and forest genetic resources through Capacity building and awareness programmes	2016	13.2.1 Status of genetic resources within NARI 13.2.2 No of trained personnel 13.2.3 Infrastructures established and equipment acquired			350,000
13.3 Strengthen genetic resources conservation and management for inclusion of all none included genetic diversities	2017	13.3.1 list of newly included genetic resources 13.3.2 improved conservation and management			400,000
13.4 Establishment of the on-farm conservation and community seed distribution systems of cultivated crops	2017	13.4.1 No of conservation sites 13.4.2 quantity and quality of seed distributed 13.4.3 available management systems			500,000
13.5 Establishing in situ	2017	13.5.1 established in-situ			1,000,000

conservation of wild pasture species, arboretum and botanical garden		conservation 13.5.2 institutional set up			
13.6 Install cryopreservation facility for conservation of semen of cattle	2018	13.6.1 infrastructure and facility in place 13.6.2 qualified personnel			300,000
13.7 Strengthening on-farm conservation of breeds of goat, sheep and cattle	2018	13.7.1 enhanced conservation system 13.7.2 trends of conserved breeds			400,000
13.8 Documenting genetic resources information and studying genetic treaties	2018	13.8.1 established documentation system 13.8.2 No of publications 13.8.3 No of beneficiaries 13.8.4 No of agreements			200,000
13.9.Utilization of modern biotechnology for developing tissue culture and other techniques to conserve threatened and endangered species as well as genetically eroded diversity	2020	13.9.1.No of conserved species	MoLWE, FWA, MoA (NARI, Extension and regulatory); HAC, and EIT		250,000
Sub Total (USD)					**3,550,000**
13.9. Conservation of " Emmer" wheat (*Triticum dicoccun*)					**Cost (USD)**
13.9.1.Set duplicate safety backup	2016 – 2018	13.9.1.1.safety backup developed	MoA, DoE, MoLG, EIT, HAC,Local communities		195,000

13.9.2.Germplasm collection		13.9.2.1.number of Germplasm collected		
13.9.3.Establish on farm conservation		13.9.3.1. on farm conservation established		
13.9.4.Train farmers		13.9.4.1 skill developed		
13.9.5.Project management meetings		13.9.4.1 action plan developed		
Sub Total (USD				**195,000**
13.10. Conservation of Genotyping barka cattle breed (Boss indicus,Ungulates)				
13.10.1.molecular characterization of breeds	2017	13.10.1.1 data collected	MoA , DoE, EIT , HAC and Local communities	300,000
13.10.2.Stakeholders workshop		13.10.1.2 number of participants		
13.10.3.backstopping support		13.10.3.1. data generated		
13.10.4.establishment conservation facility		13.10.3.2. facility stablished		
SubTotal (USD)				**300,000**

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.

TARGET 14					
TARGET 14: By 2020, ecosystems that provide essential services, that contribute to livelihoods and well-being of people, are restored and safeguarded					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
14.1 Introduction and promotion of SLM techniques(approaches and practices)	2016	14.1.1 Areas covered under SLM 14.1.2 No of beneficiaries 14.1.3 SLM gained benefits	MoLWE, FWA, MoA, MoMR, and MoLG	-MoA and SLM reports -FWA reports -PA reports	200,000
14.2 Rehabilitation of degraded land with community based afforestation programmes and integrated CMI management	2016	14.2.1 Techniques of land reclamation applied 14.2.2 Rehabilitated area 14.2.3 involved communities 14.2.4 No of campaigns 14.2.5 No of integrated projects 14.2.6 No of vulnerable and Women headed households			300,000
14.3 Promotion of Integrated PA and design networks to allow long-term species and ecosystem responses to climate change.	2017	14.3.1 Established PA network. 14.3.2 Rehabilitate areas 14.3.3 Restoration of ecosystems			400,000

| 14.4 Promotion and encouragement of production and utilization alternative mechanisms to balance livelihood wellbeing and ecosystem restoration through ecosystem based approaches. | 2018 | 14.4.1 application of zero grazing
14.4.2 income generated
14.4.3 multiple ecosystem benefits | | | 450,000 |
| Sub Total (USD) | | | | | 1,350,000 |

TARGET 15					
Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and combating desertification					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
15.1 Promote studies on carbon stocks	2017	15.1.1 quantity of Carbon stock 15.1.2 carbon stock revenues	MoLWE, FWA, MoA, MoMR, MoLG Research Institutions, Academia, GEF, UNFCC,and Local Communities	-Project reports -Surveys and assessments	300,000
15.2 effective implementation of the National Adaptation Program of Action (NAPA/UNFCC), National Action Programmes (NAP) and outcomes of Second and third national communications,	2018	15.2.1 ensured in-situ and ex-situ conservation 15.2.2 valued traditional practices 15.2.3 areas enclosed 15.2.4 restored ecosystems 15.2.5 Adopted drought resilience mechanisms			10,000,000
15.3 Implement and	2020	15.3.1 updated and aligned			400,000

create an integrated mechanism for vulnerable ecosystem conservation and sustainable livelihood.		strategic documents 15.3.2 implemented integrated actions 15.3.3 vulnerable ecosystem conserved	MoLWE, FWA, MoA, MoMR, MoLG Research Institutions, Academia, GEF, and Local Communities		
15.4 Promote initiatives to reduce vulnerability of the population and of ecosystems to the effects of climate change and strengthening national capacities to respond to climate change and desertification.		15.4.1 investments due 15.4.2 Income generated 15.4.3 Rate of vulnerability 15.4.4 Developed capacity			250,000
Sub Total (USD)					**10,950,000**

TARGET 16					
TARGET 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is ratified and forced consistent with national legislation.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
16.1 Ensure awareness programmes on access and benefit sharing framework for genetic resources	2016	16.1.1 No. of awareness programmes 16.1.2 Number and type of persons trained 16.1.3 Number of agreements signed	MoLWE, FWA, MoA, MoMR, MoLG, MoND, MoJ, MoI, Research institutions, academia and UNCBD	-Number of agreements -Annual reports -Legal, institutional and regulatory frameworks -Studies and assessments	50,000
16.2 Production of a legal framework	2017	16.2.1 adopted legal framework			100,000

		16.2.2 Adopted regulatory instruments 16.2.3 integration with national policies 16.2.4 enforcement measures			
concerning access and benefit sharing framework for genetic resources					
16.3 Make studies on the Protection and application of traditional knowledge associated with biological and genetic resources,	2018	16.3.1 Study on the traditional knowledge; 16.4.2 No of cases			200,000
16.5 Establish programmes/projects that enhance Access and Benefit Sharing to ensure that stakeholders adequately gain from biodiversity conservation action	2019	16.5.1 Number of projects; 16.5.2 Number and type of genetic resources 16.5.3 benefit generated; 16.5.4 No and type of beneficiaries 16.5.5 institutional arrangements 16.5.6 effective implementation			250,000
16.6 Genetic resources domestication (Domestication of international legal instruments on genetic resources and emplace national PGR policy)	2020	16.6.1 regulated livestock export 16.6.2 Adopted standard material Transfer Agreement of the ITPGRFA 16.6.3 national Material Transfer Agreement 16.6.4 National PGR policy			300,000
16.7 Nagoya protocol fully ratified and implemented		16.7.1 accession to the protocol 16.7.2 adherence to Nagoya provisions and articles			50,000
16.8.Strengthen capacity for enforcing National Biosafety	2019	16.8.1.skill developed	MoLWE, FWA, MoA, MoMR, MoLG, MoND, MoJ, MoI, Research	-Studies and assessments	200,000

Frameworks			institutions, academia UNCBD		
Sub Total(USD)					**925,000**

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

TARGET 17					
TARGET 17: By 2015, Eritrea has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	
17.1 Production of an updated NBSAP	2014	17.1.1 updated NBSAP document 17.1.2 stakeholders involvement	MoLWE, FWA, MoA, MoMR, MoND,MoE ,MoJ, MoLG,and NGOs (NUEW)	-Updated and approved NBSAP -Annual reports -Communication reports -Impact assessment reports	
17.2 Adoption of NBSAP by key stakeholders at all levels	2015	17.2.1 Adopted NBSAP 17.2.2 Key stakeholders involved			
17.3 Carry out wider awareness programmes	2016	17.3.1 No of meetings and workshops 17.3.2 No and type of participants 17.3.3 levels of awareness programs			
17.4 Implementation of an effective NBSAP	2017	17.4.1 effectiveness and efficiency 17.4.2 impacts of NBSAP 17.4.3 stakeholders involvement 17.4.4 institutional arrangements 17.4.5 M&E mechanisms			

TARGET 18					
TARGET 18: By 2020, the traditional knowledge and practices relevant for the conservation and sustainable use of biodiversity, and sustainable use of biological resources are respected, subject to national legislation and relevant international obligations					
Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
18.1 Document systematically the traditional knowledge and practices of genetic resources for the conservation and sustainable use of biodiversity	2016	18.1.1 Assessment and study document on traditional knowledge and practices 18.1.2 Resources conserved traditionally	MoLWE, FWA, MoA, MoMR, MoND, MoE, MoJ, MoLG and Local communities	-Annual reports -Policy and legal documents -Workshop reports	150,000
18.2 Align the documented knowledge and practices with the existing national legislation and international obligations and teaching materials	2018	18.2.1 Aligned TK document with the current national policies and legislations, hopefully integrated into the national educational system			100,000
18.3 Promote the sustainability of local knowledge through the involvement of wider community participation and administrative procedures	2020	18.3.1 level of community participation 18.3.2 Application of the TK by local government institutions 18.3.3 established institutions			200,000
Sub Total(USD)					450,000

TARGET 19					
TARGET 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied					
Priority Actions	Time frame	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)

	(baseline:2014)				
19.1 Establish technical team for BD knowledge sharing	2015	19.1.1 Operational platform 19.1.2 No of BD and ecosystem projects 19.1.3 Facilities 19.1.4 No of beneficiaries	MoLWE, FWA, MoA, MoMR, MoND, MoE, MoJ, MoLG, HAC,EIT, Academia, and Researchers	-State of the environment -Scientific and project reports -Annual reports and reviews -PA report -Amended legislations -Workshop reports	100,000
19.2 Improved knowledge by all stakeholders of challenges, roles, and constraints and priority actions and solutions identified.	2017	19.2.1 teaching and reference materials 19.2.2 No of beneficiaries			90,000
19.3 comprehensive PA Plan developed through knowledge based participatory process, taking climate change risks into considerations and implementation plan agreed	2018	19.3.1 The creation of PA management 19.3.2 partnerships, for community based management structures 19.3.3 The PA Plan 19.3.4 legislation, policies and guidelines amended and validated through stakeholder inputs:			200,000
19.4 Capacity building of Staff in existing institutions as well as other stakeholders better prepared to implement follow up actions	2018	19.4.1 No and type of training programs 19.4.2 No of trained personnel			250,000
19.5 Publish reference material	2018	19.5.1 published material (fauna and flora) 19.5.2 No of users			50,000
19.6 Establish	2018	19,6.1 operational and accessible			300,000

| | | centre
19.6.2 quality and quantity of information provided | | | |
|---|---|---|---|---|---|
| 19.7 Set national environmental and/or biodiversity days | 2018 | 19.7.1 BD days
19.7.2 organizational set up
19.7.3 Contents covered in the days | | | 100,000 |
| **Sub Total (USD)** | | | | | **1,090,000** |

TARGET 20

TARGET 20: By 2020, the mobilization of financial resources for effectively implementing the Strategic Plan 2011- 2020 from all sources should increase in accordance with the consolidated Strategy for Resource Mobilization				
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**
20.1 Establish national country partnership	2016	20.1.1 No of partners
20.1.2 Diversity of partners
20.1.3 No of meetings, workshops and conferences
20.1.4 Partners support	MoLWE, FWA, MoA,MoMR,MoF,MoND, MoE,MoJ,and MoLG	-National partnership report
-Technical and financial reports
-Partners report
20.2 Develop country partners plan and strategy	2017	20.2.1 No of initiatives
20.2.2 Amount of financial support
20.2.3 Approved plan and strategy		
20.3 Mobilize financial resources	2018	20.3.1 No of proposals
20.3.2 Funding sources
20.3.3 Secured sustainable financing		

Table 7: ECOSYSTEM SPECIFIC TARGETS

1. **TERRESTERIAL ECOSYSTEM TARGETS**

E- Target 1					
E- Target 1. Developed integrated action frameworks on the control of excessive firewood collection and construction wood that impact biodiversity resources, in a manner that enhances sustainable use of nature resources.					
Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
E-1.1 Integrated awareness programs on sustainable conservation and utilization of forest and shrub products 1.1.1 Biomass need assessment 1.1.2 Identification of key Stakeholders and beneficiaries 1.1.3 Develop training materials 1.1.4 Training of trainers 1.1.5 Establish information system for conservation and sustainable utilization of forest products 1.1.6 Integration of environmental education on sustainable conservation and utilization of forest products 1.1.7 Conduct awareness campaigns and training.	2016	E.1.1.1 Assessment study E.1.1.2 No and type of training programs E.1.1.3 Status of integration E.1.1.4 No of stakeholder participation E.1.1.5 Use of forest Products E 1.1.6 tool kits (published manuals and brochures)	MoA,FWA, MoLWE, HAC, MoE, MoI, NUEW, MoE, MoJ, MoLG	-Workshop reports -Training reports -Assessment reports -Forest use reports	200,000
E.1.2 Promote the implementation of forest and shrub products sustainable utilization 1.2.1 Ensure enforcement of the forestry and wildlife proclamation No. 155/2006, plant quarantine 155/2006, forestry permits notice 111/2006, wild life permits 112/2006 1.2.2 Identification, categorization, prioritization and Mapping of forest	2019	E.1.2.1 Size of closure areas E.1.2.2 Management effectiveness including enclosures. E.1.2.3 Use of forest products E.1.2.4 Number of established			300,000

		forest/plantation areas and protection mechanisms
areas		
1.2.3 Forest biomass assessment		E.1.2.5 afforested area
1.2.4 Afforestation programmes		E.1.2.6 forest use trend
1.2.5 Setting maximum fuel harvest/threshold/yr		

Sub Total(USD)	**500,000**

E- Target 2					
E-Target 2. By 2020 the use of alternative energy should be increased and pressure on forests significantly reduced					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost (USD)**
E.2.1 Increase energy efficiency demand and supply	2016				
2.1.1 ditribute improved electric stove		E.2.1.1 Number of electric stove distributed	Lead: MoEM Key stakeholders: MoLWE,FWA,MoA, MoF,MoND, MoLG,MoE,NUEW, NUEYS		2,000,000
2.1.2 ditribute improved biomass stoves for cooking		E.2.1.2 Number of biomass stoves ditributed			1,500,000
2.1.3 ditribute efficient lamp		E.2.1.3 Number of efficient lamp			3,000,000

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E.2.2 promote capacity building of alternative energy 2.2.1 research and development on alternative energy 2.2.2 feasibility study for potential resources and development	2017	E.2.2.1 skill developed E.2.2.2 Number of project developed			3,500,000
2.2.3 training and awarness raising	2017	E.2.2.3 Number of training programs , Demands for alternative sources And No of beneficiaries			300,000
2.2.4 M and E		E.2.2.4 Reports			500,000
E.2.3. increase alternative energy sources in the total energy supply mix as well as increase use of renewable energy	2018			-MoEM reports -FWA reports -Advertisements -Annual publishing	
2.3.1Installing 30 MW solar system		E.2.3.1 Number of solar energy implemented			35,000,000
2.3.2 Installing 5MW wind turbine		E.2.3.2 Number of wind energy implemented			45,000,000
2.3.3 Introduction of pilot Bio-gas plants for cooking		E.2.3.3 Number of pilot biogass plants implemented			1,000,000
Sub Total(USD)					**104,100,000**

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E- Target 3					
E-Target 3. By 2020, at least 25% of grazer populations have developed the capacity to reduce overgrazing/over browsing					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E3,1 Promote capacity building programmes for herders on forage production and utilization Classification of range land/closures 3.1.3 Conduct training on grass/ forage production and utilization 3.1.4 Production of processed animal feed 3.1.5 Introduction of zero grazing 3.1.6 Education, awareness an Training	2020	E.3.1.1 No of capacity building programmes for communities E.3.1.2 No of beneficiaries E.3.1.3 Eco-system richness	Lead: MoA Key stakeholders: FWA,MoLWE,HAC,MoL G,andLocal Communities	-MoA/FWA and other reports	150,000
E.3.2 Promote and support forage production by local herders 3.2.1 Classification of rangeland/closures 3.2.2 Multiplication and distribution of forage seeds 3.2.3 Reseeding of selected forage areas	2017	E.3.2.1 Forage area developed E.3.2.2 Increment in quality of cattle and reduction in No of traditional herders E.3.2.3 Decrease Migration rate			200,000
Sub Total(USD)					**350,000**

E- Target 4					
E-Target 4. By 2020 the extinction of threatened species has been prevented and the conservation status of those most threatened and endangered of flora and fauna have been improved, with declining trends significantly reduced.					
Priority Actions	**Time frame (baseline: 2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.4.1 Establishment of Protected Area System 4.1.1 Delineate and demarcate PA 4.1.2 Preparation of management and business plan 4.1.3 Recruitment of PA staff 4.1.4 Capacity building and training	2017	E.4.1.1 Three new PAs, covering 649,100 ha, formally established E.4.1.2 Physical delineation of the PAs E.4.1.3 Management and business plans E.4.1.4 PA staff skill E.4.1.5 Established institutional framework	Lead: MoLWE Key stakeholders: MoA,MoLWE,MoMR,FWA,HAC,EIT, MoLG, NUEYS,and Local Communities	-PA Management and Business Plan -Annual reports -Supervision missions -Project reports -Feedback from local administration	4,000,000
E.4.2 Assessment and prioritization of threatened species (fauna and flora taxonomy) 4.2.1 Conduct ecological assessment of threatened species 4.2.2 Identify and Prioritize threatened species according to global and national importance 4.2.3 Development project to conserve threatened species	2016	E.4.2.1 No of threatened genetic species E.4.2.2 No of studies and projects			250,000

E.4.3 Develop and implement management plans for threatened genetic diversity 4.3.1 Conduct assessment on the status of threatened genetic diversity 4.3.2 Develop management plan for threatened genetic diversity E.g establish Ex-situ) 4.3.3 Implement the management plan to enhance the status of threatened genetic diversity 4.3.4 M & E	2017	E.4.3.1 N0 of Management Plans implemented; E.4.3.2 No of threatened genetic species maintained			**150,000**
E.4.4 Protection/conservation of threatened genetic species. 4.4.1 Monitoring the enforcement Forestry & wildlife proclamation 155/2006 4.4.2 Establish area closures for threatened genetic species 4.4.3 Seeding and reseeding	2018	E.4.4.1No of genetic species protected (inventory, forest management and silvicultural intervention) E.4.4.2 No of threatened promoted and replicated E. 4.4.3 Area seeded and reseeded			100,000
Sub Total (USD)					**4,500,000**

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E- Target 5					
E-Target 5. By 2020 at least 25% of catchment sites and degraded lands of high biodiversity hotspots are rehabilitated within the terrestrial ecosystem					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost (USD)**
E.5.1 Promote an Integrated Strategy on Degraded Catchments Treatments 5.1.1 Identification of degraded lands of high biodiversity hotspots 5.1.2 Rehabilitation of degraded lands of high biodiversity hotspots 5.1.3 Strengthen and approve the integrated Strategy for degraded catchment treatments 5.1.4 Integrate existing watershed treatment projects	2016	E.5.1.1 Impact assessment E.5.1.2 approved integrated strategy document E.5.1.3 Planned integrated actions E.5.1.4 implementation mechanism established	Lead: FWA Key stakeholders: MoA,MoLWE,MoE,MoLG,Local Communities,NUEW,andNUEYS	-Anual reports -Stocktaking assessments on microorganisms, invertebrates, vertebrates (reptiles, amphibians etc. and reviews -Strategy document on degraded catchments -Integrated Action plans	400,000
E.5.2 Implementation of National Land use Master Plan with the principles of Sustainable Land Management (SLM) 5.2.1 Awareness of National Land use Master Plan to all stakeholders 5.2.2 Align the National Land use Master Plan with SLM 5.2.3 Select pilot areas to practice the projects 5.2.4 Promote widely SLM technologies and practice 5.2.5 Strengthen enforcement of SLM implementation	2018	E.5.2.1 No of people aware of the Land Use Master Plan and SLM principles E.5.2.2 No of people used SLM practices E.5.2.3 Area coverage by SLM practices		-National reports -Land use plan report -SLM report -Assessment reports -FWA reports -State of Environment (up dated)	600,000

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
E.5.3 Rehabilitate degraded watersheds of high biodiversity hotspots with indigenous species 5.3.1 Assessment degraded area according their degraded status 5.3.2 Promote indigenous species in national nurseries 5.3.3 Rehabilitate degraded catchments according to their priorities 5.3.4 Intensify national tree planting campaigns 5.3.5 Encourage agro-forestry system 5.3.6 M & E	2020	E.5.3.1 1Strengthening the National Nurseries and establishments of new nurseries E.5.3.2 Type and No of species distributed E.5.3.3 Area treated/rehabilitated E.5.3.4 No of Communities participated			500,000
Sub Total(USD)					**1,500,000**

E- Target 6					
E-Target 6. Develop an integrated action plan of implementation to reduce the expansion of alien species through control mechanisms and sustainable utilization.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.6.1 Establish integrated mechanism for the control and sustainable use of alien invasive species 6.1.1 Collection of information on control methods of potential invasive species 6.1.2 Institutionalize networking for integrate control 6.1.3 Conduct awareness raising programmes on integrated control and sustainable use mechanisms	2017	E.6.1.1 Established coordination mechanism and strategy E.6.1.2 Integrated actions prepared E.6.1.3 No of awareness programs	Lead: FWA Key stakeholders: MoA,MoLWE,MoMR,HAC,EIT, MoLG,and Local Communities	-Proposals and reports on *Prosopis chilensis* and *Prosopis juliflora*	200,000

E.6.2 Promote the sustainable utilization and control of *Prosopis chilensis* and *Prosopis juliflora* and other alien invasive species at all levels 6.2.1 Conduct detailed assessment on the invasion and use of *Prosopis chilensis* and *Prosopis juliflora and* other alien invasive species 6.2.2 Promote the sustainable use of *Prosopis chilensis* and *Prosopis juliflora* and other alien invasive species as a mean of control	2018	E.6.2.1 Specific studies of the invasive species E.6.2.2 Surface area invaded E.6.2.3 Surface area restored E.6.2.4 Rate in the control of the invasive species E.6.2.5 invasive species per specific ecosystem			300,000
E.6.3 Develop and implement management project 6.3.1 Prepare bankable project for control and use of *Prosopis chilensis* and *Prosopis juliflora* and other alien species 6.3.2 *Implement approved projects related to Prosopis chilensis* and *Prosopis juliflora* and other alien invasive species 6.3.3 Strengthen quarantine mechanism for alien invasive species	2018	E.6.3.1 No of active projects E.6.3.2 Trend of all invasive species			150,000
Sub Total(USD)					**650,000**

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2. COASTAL, MARINE AND ISLANDS ECOSYSTEM TARGETS

E- Target 7					
E-Target 7. By 2020, mangrove forest and associated coastal forest degradation and loss would have been significantly reduced					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost (USD)**
E.7.1 Promote active programs and initiatives in the marine, coastal and Island mangrove managements. 7.1.1 Survey and establish an updated baseline of CMI mangrove areas 7.1.2 Conduct public awareness by the available media 7.1.3 Prepare a framework for M &E	2016	E.7.1.1 Prepared plans and initiatives E.7.1.2 Established frameworks including M&E E.7.1.3 Public awareness conducted	Lead: MoMR Key Stakeholders: FWA,MoA,MoLWE,MoI, MoLG, Northern & Southern Red Sea Zones, /MoTC,Port Authority (Department of Maritime transport),MoE,andCOMSAT	-MoMR plans and reports	55,000
E.7.2 strengthen on-going approaches to reduce massive degradation and fragmentation of mangrove habitats 7.2.1 Assess the extent of mangrove degradation 7.2.2 Capacity building for the improvement of performance of institutions 7.2.3 Preparation of	2017	E.7.2.1 Established implementation plan E.7.2.2 No of training programs (campaigns) and No of trainees E.7.2.3 No of seedlings prepared and			2,016,000

management plans 7.2.4 Public awareness by every available medium 7.2.5 Conduct training on sustainable use of mangrove resources 7.2.6 Rehabilitation and conservation of mangrove areas		distributed E.7.2.4 Size of area replanted or regenerated E.7.2.5 Size of area of mangrove conserved and rehabilitated.			
E.7.3 Development of programmes for mangrove, both on the intertidal areas of the main coast and the islands of Dahlak 7.3.1 Identify clear rehabilitation plan 7.3.2 Rehabilitate the existing degraded mangroves in near coastal villages.		E.7.3.1 Size of area planted by mangroves E.7.3.2 No of villages rehabilitated E.7.3.3 Plans and budgets for the main coast and the islands of Dahlak			250,000
Sub Total(USD)					**2,321,000**

E- Target 8

E-Target 8. By 2020, all sources of coastal, marine and island pollution should be effectively controlled to reduce pollution and mitigate its impact on the ecosystem

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
E.8.1 Establishment of an integrated mechanism to strengthen control of	2016	E.8.1.1 Pollution assessment report	Lead: MoMR Key Stakeholders: FWA,MoA,MoLWE,MoI,MoLG,	MoMR reports MoLWE	260,000

coastal, marine and island pollution 8.1.1 Assessment of pollution status 8.1.2 Update and ensure the implementation of existing CMI legal instruments 8.1.3 Establish an integrated mechanism for CMI pollution control 8.1.4 Monitoring of critical pollutants in CMI environment based on established indicators		E.8.1.2. Pollution rate E.8.1.3. Establish integrated platform of pollution control E.8.1.4. Population trends of species in CMI ecosystem	Northern & Southern Red Sea Zones, MoTC,Port Authority (Department of Maritime transport),MoE,and COMSAT	reports	
E.8.2 Strengthening of control and inspections of coastal, marine and island sector and maritime activities with polluting effects 8.2.1 Train DoE and MoMR staff in EIA procedures including evaluation, enforcement and monitoring, through In-situ short courses and follow-up support 8.2.2 Conduct awareness raising on EIA procedures to developers/ investors	2016	E.8.2.1 No of Trainings provided and no of trainees E.8.2.2 Quality and quantity of control facilities introduced E.8.2.3 CMI Establishment and Zoning provided E.8.2.4 No. of active control posts E.8.2.5 No. of inspections			2,450,000

including EIA clearance and certificates 8.2.3 Formulate an ecologically-sound, integrated, CMI Development and Zoning 8.2.4 Establish effective quality control standard. 8.2.5 Conduct periodic pollution inspection in CMI areas		conducted E.8.2.6 No. and level of damages occurred			
E.8.3 Promotion to strengthen pollution control through community based approaches 8.3.1 Preparation of community based pollution control guideline 8.3.2 Conduct pollution control awareness programmes 8.3.3 Establish community based pollution implementation framework		E.8.3.1 Preparation of Guideline to control Pollution E.8.3.2 No. awareness raising programs conducted E.8.3.3 Established implementation frame E.8.3.3 No people and stakeholders			50,000

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		involved			

Sub Total (USD)					**2,760,000**

E- Target 9					
E-Target 9. By 2020, Coastal Erosion should be greatly reduced and eroded coastal beaches rehabilitated.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.9.1 Develop and implement program to identify the underlying causes of Coastal Erosion that need to be reduced 9.1.1 In-depth studies of coastal erosion 9.1.2 Develop implementation of coastal erosion and rehabilitation projects 9.1.3 Establish CMI area management plans and monitoring programmes 9.1.4 Conduct awareness programmes on coastal erosion rehabilitation indicatives	2016	E.9.1.1 in-depth studies conducted on coastal erosion E.9.1.2 No. of initiatives and projects undertaken 9.1.3 CMI areas rehabilitated or reclaimed. 9.1.4 No. of projects implemented and prepared management plan. 9.1.5 Availability of funding	Lead: MoMR Key Stakeholders: FWA,MoA,MoLWE,MoI ,MoLG, Northern & Southern Red Sea Zones, MoTC,Port Authority (Department of Maritime transport),MoE,and COMSAT	-MOMR report -Implementation program -Project report	48,000

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
E.9.2 Rehabilitate eroded coastal area and beaches through the use of cost effective local technologies 9.2.1 Assessment coastal eroded areas according their status 9.2.2 Rehabilitate coastal eroded area according to their priorities with local community participation 9.2.3 Select adaptive flora species (like helophytes) for the rehabilitation eroded coastal areas and beaches 9.2.4 M & E	2017	E.9.2.1 Area rehabilitated E.9.2.2 Use of local technology E.9.2.3 trend of coastal and beach erosion E.9.2.4 Community participation in identification of local technology/ practice or traditional knowledge			190,500
Sub Total(USD)					**238,500**

E- Target 10					
E-Target 10. By 2020, all coral reefs in the Eritrean Red Sea are identified to a species level and status of natural and human induced degradations regularly monitored.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.10. Develop and implement program to identify the coral species	2016	E.10.1.1 No of identified and	Lead: MoMR Key Stakeholders:	-MoMR report Implementation	

10.1 Identification of corals to a species level and establish a resources database	2016	collected coral samples E.10.1.2 Establishment of a resource database	FWA,MoA,MoLWE,MoI, MoLG, Northern & Southern Red Sea Zones, MoTC,Port Authority (Department of Maritime transport),MoE,and COMSAT	program -Project and survey report -Management plans -PA report	950,00
10.1 Detailed surveys of coral reefs status	2017	E.10.1.3 In-depth status Surveys on coral reefs			
10.2 Develop implementation of coral reef conservation projects and minimize damages	2018	E.10.1.4 No. of conservation initiatives and projects undertaken			
10.3 Establish Marine Protected Area legal framework, management plans and an ongoing monitoring programmes	2020	10.1.5 Marine Protected Areas (MPA) with diversified or endangered reef established			220,000
10.4 Conduct awareness and training programmes on coral reef conservation	2018	10.1.6 Coral reef conservation Commitment of decision makers and fisher folks 10.1.7 No. of awareness programs			62,000
Sub Total(USD)					**2,142,000.00**

E- Target 11					
E-Target 11. By 2020, Alien Invasive Species in the Coastal, Marine and Islands (CMI) are controlled and monitored					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost (USD)**
E.11. Establish an office for the control and implement monitoring programme for an alien and invasive species introduction	2016	E.11.1 In-depth Surveys and reports on alien invasive species	Lead: MoMR Key Stakeholders: FWA,MoA,MoLWE,MoTC,COMSAT, Port Authority (Department of Maritime transport),and Northern & Southern Red Sea Zones	-MoMR and DoMT -Implementation program -Project report	35,000
11.1 Detailed status surveys of previously introduced alien invasive species					
11.2 Preparation of activities regulatory framework on a local, national and regional scale which address issues of exotic species, both from ship-sources and land-sources, with particular attention to island ecosystem		E.11.2 Establishment of an office for the control and monitoring of alien invasive species introduction			50,000

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Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost (USD)
11.3 Develop implementation programme for control and monitoring of alien invasive species through ship ports and introduction of species through aquaculture		E.11.3 Strategic Master plan produced by all relevant stakeholders			33,000
11.4.Develop a strategic maritime and aquaculture master plan for the control of possible introduction of alien invasive species		E.11.4.1.Strategic Master plan produced by all relevant stakeholders			22,000
11.5. Conduct awareness programmes on alien invasive species		E.11.5.1.Number of participants E.11.5.2.awarnes-s materials			15,000
11.6. Strengthen capacity building for quarantine office in ports		E.11.6.1.skill developed			35,000
Sub Total (USD)					**190,000.00**

E- Target 12

E-Target 12. By 2020, Rare, Endangered and Threatened species of both marine flora and fauna species are protected, conserved and rehabilitated

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost (USD)

				-MoMR report -Implementation program -PA report -Project report	
E.12. Promote a conservation and development programme based on the status of rare, endangered and threatened species such as sea turtles and dugongs	2016				
12.1 Detailed status survey of rare, endangered and threatened species and checklist produced		E.12.1.1 In-depth Surveys and reports on endangered and threatened species	Lead: MoMR Key Stakeholders: FWA, MoA, MoLWE, MoI, MoLG, Northern & Southern Red Sea Zones, MoTC, Port Authority (Department of Maritimetransport),MoE,and COMSAT		1,260,000
12.2 Develop adequate legislation to protect indigenous flora and fauna		E.12.1.2 Checklist of rare, endangered and threatened species			32,000
12.3 Develop a strategic plan and projects for the conservation and rehabilitation		E.12.1.3 Plan and projectes developed			56,000

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12.4 Preparation of a migratory species conservation network and activities for rare & endangered & threatened species that are not in the conservation management areas, in particular: marine turtles, marine mammals, migratory birds and sharks		E.12.1.4 Net work developed			43,000
12.5 Establish marine protected area management plans and strengthen institutional capacity for monitoring programmes		E.12.1.5 skill developed			75,000
12.6 Conduct awareness programmes on conservation of rare, endangered and threatened species		E.12.1.6 No of participants and produced materials			248,000
12.7. Develop and implementation of an ongoing monitoring programme		E.12.1.7 Produced Strategic plan and conservation projects			160,000

12.8.M & E		12.1.8 Establishme nt of self-sustained MPAs				120,000

Sub Total(USD)	**1,994,000**

12.9.conservation of the marine turtles(green turtle ,hawksbill,leather back,Olive rideley and loggerhead)						**Cost (USD)**
12.9.1.Field surveys to gather baseline information of the marine turtles(green turtle ,hawksbill,leather back,Olive rideley and loggerhead) and their habitat	2016	12.9.1.Repor t of the current status of the s species and its habitat	MoMR and COMSAT		-MoMR report -Implementation program -PA report -Project report	50,000
12.9.2.Conduct meeting with the administrator and local community to ingage them inthe project	2016	12.9.2.Propo sals developed for turtle population at Borasele	MoMR and COMSAT			12,000
12.9.3.Detailed survey to assess the current abundance ,threats of the marine turtles and their habitat,nesting area	2017	12.9.3.Identi fying the type of the marine protected area				320,000

12.9.4.Conduct awareness for the local community about the status of the species and its conservation programme	2017	12.9.4.No of participants and no of awareness materials	MoMR,COMSAT,DoE,local administrator		15,000
12.9.5.Monitoring of the ongoing conservation efforts	2018	Report of the going activities	MoMR,COMSAT,DoE,local administrator		20,000
12.9.6.Strengthen and expand the public awareness to the coastal people as a whole ,particularly to the local community,NUEYS of the Southern Red Sea Branch and Navy members living around	2018	12.9.6.No of participants and no of awareness materials	MoMR,COMSAT,DoE,local administrator		15,000
12.9.7.Provide the framework for conservation and management plan	2019	12.9.7.Final Report of the conservation of the species	MoMR,COMSAT,DoE,local administrator		12,000
12.9.8.Action plan to be decided and drafted incorporate with concerned stake holders and decision makers		12.9.8.action plan decided	MoMR,COMSAT,DoE,local administrator		8,000

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Sub Total(USD)					**452,000**

12.10. Conservation of Socotra Cormorant (*Phalacrocorax nigrogularis*)					
12.10.1.Field surveys to gather baseline information of the species and their habitat 12.10.2.Meeting with Tio administrator and community to aware about the current situation, conservation concerns of the species as well as to engage in the conservation programs	2016	12.10.1.Report current situation of the species and their habitat. 12.10.2.Proposal writing for Socotra cormorant *Phalacrocorax nigrogularis* at islands near Tio	-Lead MoMR Key; stakeholders COMSAT and Local administrators	-MoMR report -Implementa-tion program -PA report -Project report	20,000
12.10.3.Detailed survey to assess: 12.10.4.Current abundance and distribution of the species 12.10.5.Current Threats of the species and their habitat 12.10.6.Nesting season and nesting area of the species 12.10.7.Current egg collection and habitat destruction 12.10.8.Sea cucumber fishier men activities which are main threats of the species	2017	12.10.3.Detailed current information of the species and their habitat will be recorded 12.10.4/5/6/7/8.Current threats of the species, their egg and	- Lead MoMR -Key; stakeholders COMSAT, NUEYSSR and Local administrators		58,000

12.10.9. Conductawareness for the people of Tio and Edi about the status of the species and its conservation programs.	2018	habitats will be well identified 12.10.9.The costal people at Tio, Edi and near by areas will aware bout the current situation of the bird			
12.10.10. Monitoring for conservation activities. 12.10.11. Strengthen and expand the public awareness to the coastal people as a whole, particularly to the Tio community, NUEYS of Southern Red Sea Branch and Navy members living around. 12.10.12.Discussion incorporate with concerned stakeholders and decision makers the action plan to be decided and declared	2018	12.10.10. Reports 12.10.11.No of participants 12.10.12.Desision taken	-Lead MoMR - Key; stakeholders COMSAT, Local Administrator, NUEYSSR and DOE		30,000

	2019	12.10.13.Final report of the conservation activities done 12.10.14. area delinated 12.10.15.Timely Proper and effective monitoring and evaluation process will be done	-Lead MoMR - Key; stakeholders COMSAT, Local Administrator , NUEYSSR and DOE		18,000
12.10.13. Provide the framework for conservation and management plans. 12.10.14.Delinate Sea bird protected area 12.10.15.Monitoring & evaluation					
Sub Total(USD)					**126000**

12.11.Conservation of Dugong dugon at Buri-peninsula					
12.11.1. Field surveys to gather baseline information of the species and their habitat. 12.11.2. Meeting with the local administrators and community to participate in the conservation program.	2016	12.11.1. Report the current situation of the species and its habitat 12.11.2. Proposal developed for Socotra cormarant	MOMR and CMSAT	MoMR report -Implementation program -PA report -Project report	**1,750,000**

12.11.3. Detailed survey to assess the current abundance, threats of the species and their habitat, distribution and feeding grounds. 12.11.4.Give awareness for the people found at Buri- peninsula about the status of dugong and its conservation programs.	2017	12.11.3.Ident ify the type of the MPA 12.11.4.No of participants	MOMR, CMSAT		
12.11.5. Monitoring for the ongoing conservation efforts. 12.11.6. Strengthen and expand the public awareness to the coastal people as a whole, particularly for those who actively practice in fishing activities, NUEYS of Southern Rea Sea Branch and Navy members living around.	2018	12.11.5. Reports of monitoring activities 12.11.6.skill developed	MOMR, CMSAT, Local Administrator and DOE		
12.11.7. Provide the framework for conservation and management plans. 12.11.8. Discuss incorporate with concerned stakeholders and decision makers for the action plan to be decided and drafted.	2019	12.11.7. Final report of the conservation activities done 12.11.8.deci sions taken	MOMR, CMSAT, Local Administrator and DOE		
Sub Total(USD)					**1,750,000**

3. AGRICULTURAL ECOSYSTEM TARGETS:

E-Target 13. Public awareness on the Importance and sustainable use of agricultural biodiversity increased by 10%.

Priority Actions	Time frame (baseline:2014)	Performance Indicators	Implementing Institutions	Source of information	Cost(USD)
E.13.1 strengthen agro-biodiversity awareness programs on sustainable use of agricultural biodiversity 13.1.1 Prepare an awareness and communication strategy document 13.1.2 Identification of stakeholders 13.1.3 Preparation and dissemination of information through various ways such as national media and bulletins 13.1.4 Incorporate of agro-biodiversity into teaching materials.	2016	E.13.1.1 No of awareness and trained people E.13.1.2 No. and type of training materials E.13.1.3 Usage of mass media E.13.1.4 Inclusion of BD information into the school curriculum	Lead: MoA Key Stakeholders: MoLWE,MoLG,MoI,MoE,HAC,and EIT	-Annual reports -Text books -Awareness strategy document -Program/ project plans	15,000
E.13.2 Promote wider participation of community based sustainable ecosystem management through awareness programs	2017	E.13.2.1 No of community based programs and projects			45,000

13.2.1 Identify and prioritize communities for sustainable ecosystem management		established E.13.2.2 No. of communities participation and contribution to sustainable management E.13.2.3 Awareness and communication strategy document E.13.2.4 Effective institutional arrangements			
13.2.2 Establish community pilot demonstration areas					
13.2.3 Establish M & E system					
Sub Total					**60,000**

E- Target 14					
E-Target 14. By 2020, plans for sustainable management of agricultural genetic resources is implemented					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.14.1 Develop a national strategy for the conservation and management of genetic resources	2020	E.14.1.1 A national genetic resources management strategy	Lead: MoA Key Stakeholders: MoLWE,FWA,MoLG,HAC,and EIT	-Strategy document -NARI report -MoA report -AED	45,000
14.1.1 Asses the status of landraces varieties, wild crop relatives and farm animals diversity,		E.14.1.2 Management plans for genetic			
14.1.2 Review and update check lists of plant, forest and					

farm animals genetic resources 14.1.3 Prepare the national genetic resources management strategy plans 14.1.4 Enforcement of the national Bio safety Framework (NBF) and implementation of the Strategic Action Plan for NBF		resources management E.14.1.3 Products of management strategic plan on genetic resources E.14.1.4 No. of beneficiaries			
E.14.2 promote development of crop varieties resistant to drought, disease and insects to adapt climate change 14.2.1 Assessment and research studies of crops resistant to climate change 14.2.2 Develop resistant crop varieties to drought and pests select end users 14.2.3 Documentation best agronomic practices	2020	E.14.2.1 Research plans on resistant crops E.14.2.2 Type of resistant crops released E.14.2.3 Type and area coverage of crops and used by farmers E.14.2.4 production of crop increased			105,000
E.14.3 Domestication and consumption of new crop varieties 14.3.1 Evaluate the new	2018	E.14.3.1 No. of newly introduced crop			

		varieties			
varieties and release to farmers		E.14.3.2 No of species adopted			
14.3.2 Conduct an impact assessment		E.14.3.3 Size of new species consumed E.14.3.4 Impact assessment report			
E.14.4 Encourage the sustainable management of agro biodiversity in prioritized areas 14.4.1 Conduct situational analysis on the sustainable management of agro biodiversity 14.4.2 List of prioritized areas 14.4.3 Implement sustainable agro-biodiversity management 14.4.4 M & E	2017	E.14.4.1 prioritized areas and designs E.11.4.2 Area under sustained management E.14.4.3 No of people use sustainable management practices			
Sub Total (USD)					**150,000**

E- Target 15					
E-Target 15. By 2020, pollution to agricultural biodiversity from agro-chemicals has been brought to levels that are not detrimental to ecosystem function and biodiversity.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.15.1 implementation the environmental assessment on agricultural practices	2016	E.15.1.1 Pollution	Lead: MoA Key Stakeholders:	-DoE report -Pollution	45,000

REVISED NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN FOR ERITREA (2014 - 2020)

15.1.1 Prepare an agricultural pollution management plan 15.1.2 Setup institutional framework		control and management plan E.15.1.2 Functional institution established	MoLWE,MoLG,MoTE,HAC,and EIT	management plan -Statistical reports -MoA, -NARI reports -M&E reports	
E.15.2 develop an effective system for the regulation of agro-chemical import and supply 15.2.1 Preparation of formally registered list of agro-chemicals 15.2.2 Produce an agricultural pollution regulation and enforcement of legal notice no. 114/2006 on importation, handling, use, storage and disposal of pesticides 15.2.3 Preparation of agro pollutants control projects 15.2.4 Implement projects according priorities set 15.2.5 Capacity building and awareness programmes	2018	E.15.2.1 Approved regulation E.15.2.2 amount of pesticide use E.15.2.3 list of registered agro-chemicals			75,000
E.15.3 Update the framework of Integrated Pest Management (IPM) 15.3.1 Update IPM framework 15.3.2 Institutionalize IPM at farm levels	2018	E.15.3.1 Established IPM framework E.15.3.2 No of training programs			35,000

15.3.3 Conduct IPM assessment		E.15.3.3 Coverage of IPM E.15.3.4 Impacts of IPM		
E.15.4 EIA on development projects 15.4.1 Conduct EIA situation analysis on agro-biodiversity 15.4.2 Strengthen EIA at all agricultural development programmes	2016	E.15.4.1 No EIAs conducted		10,000
E.15.5 M&E on the use and management of chemical pollutants 15.5.1 Introduce effective agricultural pollution control 15.5.2 Promote an efficient M&E mechanism	2018	E.15.5.1 No of controls and Offense E.15.5.2 Facilities and equipment supplied		20,000
E.15.6 Develop the implementation of waste management plans 15.6.1 Prepare waste management guideline 15.6.2 Integration of the implementation of agricultural waste management 15.6.3 Production of waste management plans 15.6.4 Periodic monitoring of	2018	E.15.6.1 No approved Waste Management plans E.15.6.2 Progress of implementation		35,000

agricultural wastes					
Sub total (USD)					**220,000**

<table>
<tr><td colspan="6" align="center">E- Target 16</td></tr>
<tr><td colspan="6">E-Target 16. By 2020 threatened species prevented and their conservation status, particularly of those most in decline, has been improved and sustained.</td></tr>
<tr>
<td>Priority Actions</td>
<td>Time frame (baseline:2014)</td>
<td>Performance Indicators</td>
<td>Implementing Institutions</td>
<td>Source of information</td>
<td>Cost(USD)</td>
</tr>
<tr>
<td>E.16.1 Strengthen the management of threatened and endangered species
16.1.1 Organize implementation framework
16.1.2 Develop work programmes and projects for wild fruits and Barka cattle
16.1.3 Monitor implementation plan</td>
<td>2017</td>
<td>E.16.1.1 No approved programmes/projects
E.16.1.2 Trends in threatened and endangered species specially in wild tree fruits and Barka cattle</td>
<td>Lead: MoA
Key Stakeholders: MoLWE,MoLG,MoI,MoE,HAC,and EIT</td>
<td>-Plans for endangered and threatened species
-MoA and project reports</td>
<td>200,000</td>
</tr>
<tr>
<td>E.16.2 Promote integrated approaches in the management of threatened and endangered species.
16.2.1 Develop integrated management plan for threatened and endangered species
16.2.2 Promote involvement of</td>
<td>2020</td>
<td>E.16.2.1 No. of participatory management programs for threatened and endangered species</td>
<td></td>
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<td>150,000</td>
</tr>
</table>

REVISED NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN FOR ERITREA (2014 - 2020)

		E.16.2.2 No of people involved E.16.2.3 Endangered species recovered			
key partners 16.2.3 Initiate and strengthen revitalization of endangered species					
Sub total(USD)					**350,000**

E- Target 17					
E-Target 17. By 2020 Conservation and management of genetic resources and diversities strengthened.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.17.1 Implement species conservation and management programmes at in situ and ex-situ levels 17.1.1 Assessment/survey on genetic resources 17.1.2 Strengthen agro-biodiversity gene bank 17.1.3 Establish funding mechanism for conservation and management of genetic resources diversities 17.1.4 Multiplication of genetic resources in the Gene-Bank 17.1.5 Conduct needs	2016	E.17.1.1 No of active arboreta/zoos botanical garden developed E.17.1.2 status of gene bank E.17.1.3 No of species established/reco vered E.17.1.4 Area conserved by cultivated crops and forest genetic	Lead: MoA Key Stakeholders: MoLWE,FWA,MoLG,MoI,MoE, HAC,and EIT	-MoA and NARI plans and reports -Genetic resources information -PA report	1,000,000

assessment of genetic resources 17.1.6 Carry out capacity building programmes of genetic resources conservation and management 17.1.7 Support communities with basic facilities that promote genetic resources conservation and management 17.1.8 Document lessons learned on genetic resources conservation, management and diversities		resources E.17.1.5 No of capacity building programs E.17.1.6 Seed distributed to community E.17.1.7 Facility for conservation (semen, on-farm conservation of breeds of goat, sheep and cattle) E.17.1.8 Documented genetic resources information			
E.17.2 PAs conservation of genetic resources 17.2.1 Conduct systematic genetic resources assessment 17.2.2 Produce management plan to strengthen genetic resources management 17.2.3 Conservation and management of genetic resources diversities on	2018	E.17.2.1 strengthened genetic resources established E.17.2.2 Area conserved			500,000

selected areas					
Sub total (USD)					**1,500,000**

E- Target 1					
E-Target 18. By 2020, the traditional knowledge, innovations and practices of local communities relevant for the conservation and sustainable use of agricultural biodiversity properly documented and integrated in agricultural biodiversity.					
Priority Actions	**Time frame (baseline:2014)**	**Performance Indicators**	**Implementing Institutions**	**Source of information**	**Cost(USD)**
E.18.1 Assess documentation of indigenous knowledge and traditional farming practices 18.1.1 Set stakeholders mapping 18.1.2 Document traditional knowledge on conservation and sustainable agricultural BD	2017	E.18.1.1 Documented local knowledge E.18.1.2 local knowledge document E.18.1.3 Type and size of informants	Lead: MoA Key Stakeholders: MoLWE,MoLG,MoI,MoE,HAC,and EIT	-Local knowledge document -Guideline on local knowledge -Local knowledge biodiversity report	200,000
E.18.2 Promotion of community-based biodiversity conservation 18.2.1 Selection of best local BD sustainable conservation practices 18.2.2 Integrate selected practices with existing agricultural BD for sustainable management 18.2.3 Implement integrated knowledge plans with national BD plans 18.2.4 M&E	2018	E.18.2.1 No of Community based BD conservation created E.18.2.2 Area recovered and maintained by communities knowledge and practices E.18.2.3			300,000

		Integrated plans to incorporate of local knowledge into national BD conservation			
E.18.3 Promote the establishment of community based ecosystem management 18.3.1 Organize independent ecosystem management plans 18.3.2 Prepare fundable community based management projects 18.3.3 Integration of ecosystem plans with community based management and approaches 18.3.4 Set institutional arrangement for every ecosystem management 18.3.5 M&E	2019	E.18.3.1 No of community based projects E.18.3.2 Ecosystems managed through community participation E.18.3.3 Trends in BD conservation managed by local knowledge			400,000
Sub Total(USD)					900,000

CHAPTER 6: IMPLEMENATION ARRANGEMENTS

This NBSAP 2014 includes the M&E framework for the timely implementation of the action plan that needs attention from the very beginning of validation date. The actions and tasks of the NBSAP are expected to be met by collaborative effort of all concerned institutions based from past experiences and lessons learned as described under 6.3 below:

6.1 Implementation Mechanism

The MoLWE/DoE as the focal institution of environmental conventions is the lead and responsible body for the coordination and implementation of this revised NBSAP. In collaboration with other main institutions particularly the MoA, MoMR, FWA, MoEM and MoLG, the MoLWE/DoE will ensure the effective conservation and utilization of biodiversity in Eritrea and follow-up all necessary impacted measures. To meet these obligations the MoLWE has the authority to establish ad hoc group arranged for a particular purpose and/or assignment, and make necessary delegations from the onset of this NBSAP preparation. Other line ministries are also responsible to implement and monitor their specific concerned actions.

The MoND has the overall responsibility to lead the process of development planning, and to coordinate locally and internationally financed programmes and projects related to Biodiversity conservation and development including the allocation of budgetary resources. The Ministry is also responsible to mobilise resources with key development partners in support of NBSAP implementation and its efficiency. The ministry maintains close linkages with all development partners and ensures coordination related support programmes.

The FWA has overall responsibility to development and rational utilization of forestry resources, Protected Areas (PAs) management such as coordination, technical backup, resources mobilization, monitoring and evaluation of forestry and wildlife resources, and potentially one of the lead agencies of terrestrial biodiversity conservation and management programmes.

The MoA as mandated for policy formulation, planning and regulatory Functions in the agricultural sector has the overall responsibilities of sustainable management of agricultural genetic resources and use as well as the development of agro-biodiversity resources of the country.

The MoMR has the mandated for promoting the development and the proper management and sustainable utilization of marine resources, enforcement of regulations and laws. Oversee all marine biodiversity areas and related community programs, and develop and manage the sustainable exploitation of the country's marine living resources, protect and preserve the coastal, marine and island habitat.

The MoLG through its regional administrations and all their powers are obliged to know the contents of the document and duly make maximum efforts for the wider dissemination of biodiversity knowledge and as well its practical implementation on ground up to grass-root levels giving more attention to local communities. Various tools such as awareness

strategies, technical and financial mobilization techniques, ecosystem plans and strategies need to be organized, promoted and implemented.

6.2 Monitoring and Evaluation

NBSAP need to be validated by all concerned stakeholders. Immediately after validation, awareness programmes regarding NBSAP 2014 and its enforcements should be discussed at national and regional (zonal) levels with a decision of high commitments. Roles and responsibilities need to be assigned during this time which is important in building ownership and results.

During early implementation of NBSAP, M&E mechanisms need to be given priority at all levels as an integral part of their concerned programmes and actions. MoLWE, MoMR, MoA, FWA and MoLG are the prime institutions need to carry out and make their functions through the inclusion of appropriate M&E mechanisms including awareness and training programmes and associated financial resources. In the process of M&E some of the main tasks need to be included are changes of trends, data and information, Provision of outcomes to concerned bodies timely, impacts, etc. Integration and coordination of all stakeholders on M&E activities will assist in taking the best road to effective implementation.

Following the understanding the values and responsibilities collaborative work plan need to be agreed for the whole process. The agreed task and time frame will serve as benchmarks to measure progress of the intended targets and actions. Bi-annual and annual reports are submitted from all institutions by the coordination of the MoLWE. This will assist to monitor progress.

Evaluation need to take place every two year bases focusing to NBSAP results and actions. The final evaluation will look at impact and sustainability of results, including the contribution to Aichi 2011-2020 targets. It also needs to provide recommendations for further follow-up and sustainability. The collection of these reports will assist to generate the 6th CBD report in 2018 and further for 2022.

Hence the MoLWE in collaboration with CBD partners need to oversee and fulfil bi-annual and annual reports, evaluations, other similar reports, reviews, proposals and findings for betterment of CBD outlooks.

6.3 Lessons learned

MoLWE has identified a number of lessons from a variety of assessments and evaluations including internal and external reviews. These lessons, contribute to understand the strengths and weaknesses of interventions. Overall, the lessons can provide better guidance for implementing the mission and strategic direction of NBSAP to ensure towards the identified NBSAP actions.Throughout implementation of the convention and the experience from national and local CBD interventions valuable lessons were learnt for consideration in formulating new initiatives like this NBSAP. Some of the lessons include the following:

- A key lesson learned is that the goals of the previous and even the current NBSAP are broad indicatives and need to be revisited every time in order to specifically meet CBD

convention and targets as stipulated in the strategic plan of biodiversity 2011-2020 that includes a reference set of indicators, data on baseline and targets.

- Effective implementation of the convention needs commitment and cooperation among ministries, and between central and local institutions. In addition, the cooperation still need to be more strengthened and a formal platform should be established and replicated in the implementation of NBSAP 2014.
- Mapping of all stakeholders including their roles and responsibilities at all levels must be clearly identified in order to ensure sound working relationships and better division of functions and commitments.
- A single institution only can't follow up the implementation of the Biodiversity Conservation and sustainable use. There is no enough monitoring and reporting mechanism in place to measure the progress made in achieving targets of the planned priority activities in the NBSAP.
- Mainstreaming the biological diversity issues to the national development frameworks and sector policies and program through a continuous consultation and provision of sensitization and awareness activities is critical for effective implementation of the convention in the country.
- Inadequate communication and platform between and among key ministries and stakeholders on biodiversity-related information resulted delayed on timely reporting. Inadequate reliable data and information limits the understanding on status and trends of biodiversity of the country.
- The knowledge and skill transfer mechanisms on CBD implementation are currently weak. Hence seek to put one of the basic priorities to look at in future programme of intervention. Specifically, subject matter specialists for broadening the knowledge transfer and as well as to follow implementation need to be assigned.
- Incentives and disincentive mechanisms and necessary social services on community based initiatives should be packaged alongside NBSAP interventions if the intended actions to be implemented effectively. If biodiversity wishes to sustain all required technical and financial incentives need to be provided at an agreed pace.
- The report should reflect national status of biodiversity thus enough time and resources need to be allocated on time.
- The NBSAP has to be revised and updated by addressing the barriers encountered during its implementation and incorporating the lesson learnt.
- Overlap of mandates make institutional functions complex and create duplication of actions and waste of resources including human resources allocations and use in an acceptable competence.

Promotion of alternative livelihood activities including alternative source of energy can greatly enhance protection of biodiversity and ecosystem processes by reducing harvesting on natural forest which had been clearly addressed in the NBSAP should be described these issuesappropriately.

NBSAP INSTITUTIONAL FRAMEWORK

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┌─────────────────────────────┐        ┌─────────────────────────────┐
│      MoLWE/DoE              │        │  National Steering Committee │
│  UNCBD focal institution    │────────│  (MoLWE, MoA, FWA, MoMR,     │
│                             │        │   MoND, MoLG)                │
└─────────────────────────────┘        └─────────────────────────────┘
              │
      ┌───────┴────────┐
      │  CBD National Coordinator  │
      └────────────────┘
              ┊
┌──────────────────────┐        ┌──────────────────────────┐
│ Scientific and       │        │   National Stakeholders  │
│ Research Team        │        │  (CBD Technical Committee)│
└──────────────────────┘        └──────────────────────────┘
              ┊
      ┌──────────────────┐
      │ Zonal Administration │
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│ Sub Zonal│ │ Sub Zonal│ │ Sub Zonal│
│ Admin.   │ │ Admin.   │ │ Admin.   │
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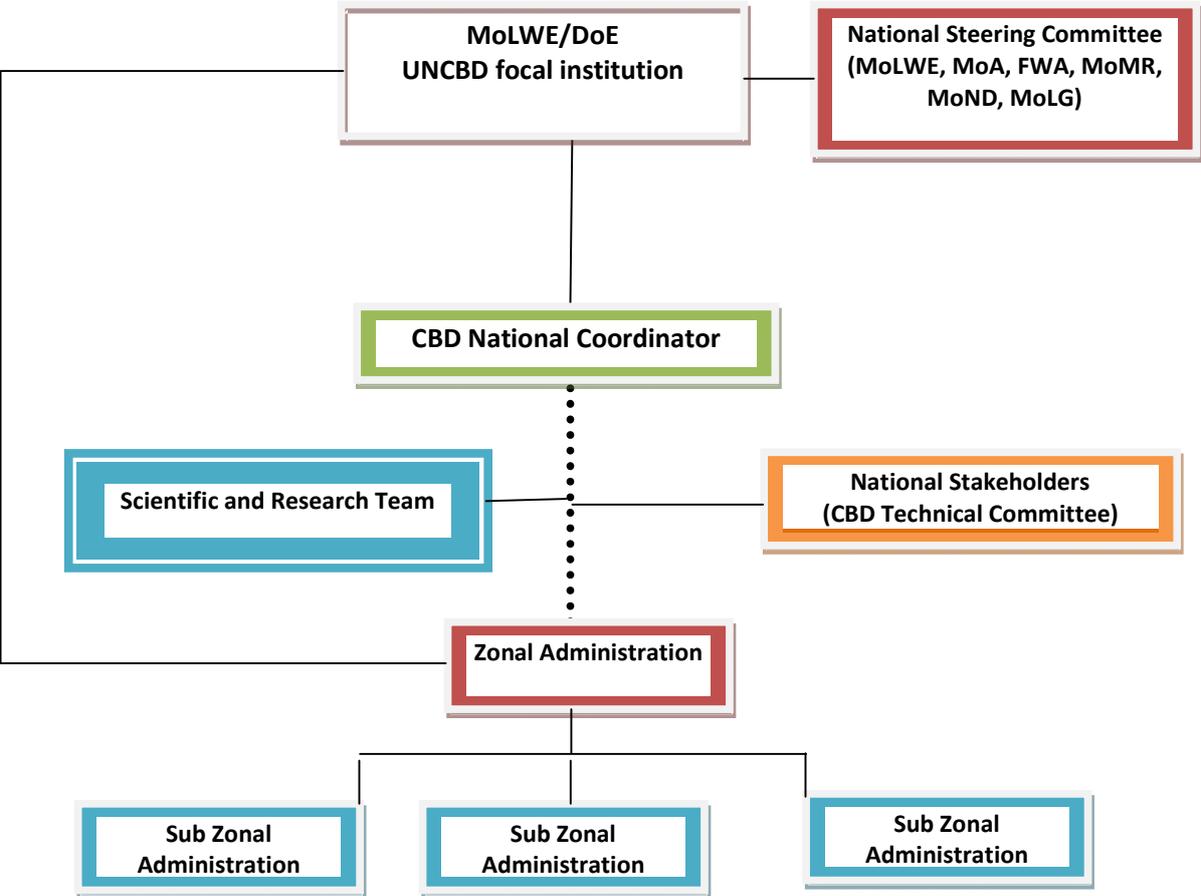
6.4. PROCESS OF PREPARATION OF NATIONAL REPORT

Designate an Agency:- The preparation of the revised NBSAP (2014-2020) was coordinated by the Department of Environment of the Ministry of Land, Water and Environment (National Focal Institution) in consultation with key stakeholders identified as lead agencies in the revising of the NBSAP and those involved in the conservation and sustainable use of biological diversity.

Establishing the Core Team - The Director General of the DoE has identified core experts to lead the revising of the NBSAP preparation process from the relevant institutions that have prior knowledge on the convention and the 1st NBSAP. The core team was assisted by experts form the respective sector and agencies who are directly involved in the monitoring and evaluation of biological diversity related works.

Identification of Key Stakeholders – Considering the importance to ensure national report reflects comprehensively national situation the established core team at the initial stage has identified all key stakeholders which would be involved and/or consulted through out the process of this national report writing. The identified and/or consulted sectors or institutions are:
- Ministry of Agriculture (Department of Agrcultural Extention, Department of Regulator Services and National Agricultural Research Institute)
- Ministry of Land,water and Environmnet(Department of Land,Department of Environment and Department of Water Resources,
- Ministry of Land,water and Environmnet(Zone Branch Offices)
- Ministry of Marine Resources,
- Ministry of National Development,
- Ministry of Energy and Mines,
- Forestry and Wildlife Authority
- COMSAT
- Ministry of Trade and industry
- Ministry of Education,
- Hamelmalo Agricultural College,
- Eritrean Institute of Technology,
- Community ,
- The Six Zone Administrations.

Review of relevant documents:- Prior to developing of the work plan, methodology and starting the consultation process, the core team has reviewed all relevant documents, previous national reports, available sectoral annual reports, research papers, web sites, project reports to collect information relevant to revese the 1st NBSAP.

Develop a work plan: the core team in consultation with the DoE has prepared a workplan that elaborate the whole NBSAP process starting form document reviewe up to final report submission.

Conduct Consultation: the core team has conducted a number of consutations with key stakeholders at headquartes, zoba levels particulrily on regions where biodiversity hot spot

areas exist and with communities. Particpatory methodology using tables, checklist and leading questions were used to facilitate the gathering of data and

List of contributors/ participants in NBSAP updating process

S.No.	Name	Institution/Position
1.	Abraha Gebreamlak	MLWE/Gash-Barka zoba branch
2.	Abreham Amenay	COMSAT
3.	Adle Osman	MLWE/Department of Environment
4.	Alem Dawit	Secretary, DoE
5.	Aman Saleh	MLWE/Department of Environment
6.	Amanuel Bokretsion	MLWE/Department of Land
7.	Amanuel Gebrelul	Ministry of Marine Resources
8.	Amanuel Mahdre	Ministry of Agriculture/ NARI
9.	Amanuel Negusse	Ministry of Agriculture
10.	Astier Redaezgi	D.EM.MLWE/Department of Environment
11.	Bereket Nugusse	MLWE/Department of Water Resources
12.	Dawit Tewelde	MLWE/Department of Environment
13.	Dr. G/hiwet Medhane	Eritrean Institute of Science/EIT
14.	Dr.Woldeslassie	Hamelmalo Agricultural College
15.	Efrem Kiflemariam	MLWE/Department of Environment
16.	Eyob Gebremeskel	Ministry of Agriculture
17.	Fanus Aregay	Finance, MoLWE
18.	Fikreyesus Ghilay	Forestry and Wildlife Authority
19.	Filimon Yosief	MLWE/Department of Environment
20.	Gebremeskel Tewelde	Anseba Zone
21.	Haile Halemichael	Ministry of Marine Resources
22.	Hailu Hadera	ENCC
23.	Haleab Berhane	MLWE/Department of Environment
24.	Issac Giorghis	MLWE/Department of Environment
25.	Kibrom Asmerom	MLWE/Department of Environment
26.	Kidane Tsegay	Ministry of National Development
27.	Mahari Fishatsion	Ministry of Marine Resources
28.	Mahta Goiteom	Ministry of Marine Resources
29.	Mebrahtu Tekle	IT ,MoLWE
30.	Michael Haile	Ministry of Trade and industry
31.	Mihretaab Michael	MLWE/Department of Environment
32.	Milashu Kiflom	Cassier, MoLWE
33.	Mogos Woldeyohanes	D.G. MLWE/Department of Environment
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36.	Ogbamichael Wahd	Head Unit, MoT
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39.	Sabela Habtom	Secretary,DoE
40.	Semere Yohannes	MLWE/NRS zoba branch
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46.	Teklit Andom	MLWE/Department of Environment
47.	Tomas Kifle	MLWE/Department of Environment
48.	Yacob Yohannes	Ministry of Agriculture/RSD
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50.	Yonas Hadgu	MLWE/Department of Water
51.	Yonas Tekleab	Forestry and Wildlife Authority
52.	Yosief Gebremicheal	Finance, MoLWE
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ANNEX 1: Marine birds recorded and their status along the Red Sea. ECMIB Bird Team Unpublished Report, 2008

S/no.	Common name	Scientific Name	Account	Movement status
1.	Red-billed Tropicbird	*Phaethon athereus*	Frequent	Resident
2.	Lesser frigate bird	*Fregata ariel*	Vagrant	Migrant
3.	Brown Booby	*Sula leucogaster*	Common	Resident
4.	Masked booby	*Sula dactylatra*	Rare	Resident
5.	Pink Backed Pelican	*Pelecanus rufescens*	Common	Resident
6.	Greater White Pelican	*Pelecanus onocrotalus*	Rare	Resident
7.	White-breasted Cormorant	*Phalacrocorax lucidus*	Vagrant	Migrant
8.	Socotra cormorant	*Phalacrocorax nigrogularis*	Frequent	Migrant
9.	Lesser Black-backed gull	*Larus fuscus*	Common	Migrant
10.	Sooty gull	*Larus hemprichii*	Abundant	Resident
11.	White-eyed gull	*Larus leucophthalmus*	Common	Resident
12.	Black-headed gull	*Larus ridibndus*	Frequent	Migrant
13.	Slender-billed gull	*Larus genei*	Frequent	Migrant
14.	Richardson's Skua	*Stercorarius parasiticus*	Vagrant	Migrant
15.	Lesser-Crested Tern	*Sterna bengalensis*	Abundant	Resident
16.	Greater Crested Tern	*Sterna bergii*	Common	Resident
17.	Caspian Tern	*Sterna caspia*	Frequent	Resident
18.	Gull-billed Tern	*Sterna nilotica*	Frequent	Resident
19.	Common Tern	*Sterna hirundu*	Abundant	Migrant
20.	White-Cheeked Tern	*Sterna repressa*	Abundant	Resident
21.	Bridled Tern	*Sterna anaethetus*	Abundant	Resident
22.	Little Tern	*Sterna albifrons*	Frequent	Resident
23.	Saunders` Tern	*Sterna saundersi*	common	Resident
24.	White-winged Tern	*Chlidonias leucopterus*	Frequent	Resident
25.	Brown Noddy	*Anous stolidus*	Frequent	Resident
26.	African Skimmer	*Rynchops flavirostris*	Rare	Migrant
27.	Osprey	*Pandion haliaetus*	Common	Resident
28.	Sooty Falcon	*Falco concolor*	Common	Resident
29.	Eurasian spoonbill	*Platalea leucorodi*	Common	Resident
30.	African spoonbill	*platalea alba*	Rare	Resident
31.	Sacred Ibis	*Threskiornis aethiopicus*	Common	Resident
32.	Western-reef Heron	*Egretta gularis*	Common	Resident
33.	Little Egret	*Egretta garze*tta	Frequent	Resident
34.	Goliath Heron	*Ardea goliath*	Frequent	Resident
35.	Purple Heron	*Ardea purpurea*	Frequent	Resident

36.	Grey Heron	*Ardea cinerea*	Frequent	Resident
37.	Black-headed Heron	*Ardea melanocep*hala	Uncommon	Resident
38.	Squaco Heron	*Ardoela ralloides*	Frequent	Resident
39.	Red Sea Green-backed Heron	*Butorides striatus*	Common	Resident
40.	Abdim`s Stork	*Ciconia abdimii*	Frequent	Migrant
41.	Greater Flamingos	*Phoenicopterus ruber roseus*	Common	Migrant
42.	Lesser Flamingos	*Phoenicopterus minor*	Uncommon	Migrant
43.	Egyptian Goose	*Alopochen aegyptiaca*	Uncommon	Migrant
44.	Northern Shoveller	*Anas clypeata*	Frequent	Migrant
45.	Blue-winged Teal	*Anas discors*	Rare, perhaps first record	Migrant
46.	Crab-plover	*Dromas ardeola*	Abundant	Resident
47.	Eurasian oystercatcher	*Haematopus ostralegus*	Frequent	Migrant
48.	Pied Avocet	*Recurvirostra avosetta*	Frequent	Migrant
49.	Black-winged Stilt	*Himantopus himantopus*	Frequent	Migrant
50.	Kittlitz`s Plover	*Charadrius pecuarius*	Frequent	Migrant
51.	White-fronted Plover	*Charadrius marginatus*	Frequent	Migrant
52.	Common Ringed Plover	*Charadrius hiaticula*	Common	Migrant
53.	Little Ringed Plover	*Charadrius dubius*	Frequent	Migrant
54.	Kentish Plover	*Charadrius alexandrinus*	Common	Resident
55.	Mongolian Sandplover	*Charadrius mongolus*	Frequent	Migrant
56.	Greater Sandplover	*Charadrius leschenaultii*	Common	Migrant
57.	Caspian Plover	*Charadrius asiaticus*	Frequent	Migrant
58.	Grey Plover	*Pluvialis squatarola*	Common	Migrant
59.	Common Sandpiper	*Actis hypoleucos*	Common	Migrant
60.	Terek Sandpiper	*Xenus cinereus*	Frequent	Migrant
61.	Common Greenshank	*Tringa nebularia*	Common	Migrant
62.	Marsh Sandpiper	*Tringa stagnatilis*	Frequent	Migrant
63.	Spotted Redshank	*Tringa erythropus*	Uncommon	Migrant
64.	Common Redshank	*Tringa tetanus*	Common	Migrant
65.	Broad-billed Sandpiper	*Limicola falcinellus*	Frequent	Migrant
66.	Little Stint	*Calidris minuta*	Frequent	Migrant
67.	Sandreling	*Calidris alba*	Frequent	Migrant
68.	Curlew Sandpiper	*Calidris ferrugniea*	Common	Migrant
69.	Dunlin	*Calidris alpina*	Abundant	Migrant
70.	Ruddy Turnstone	*Arenaria interpres*	Abundant	Migrant
71.	Black-tailed Godwit	*Limosa limosa*	Frequent	Migrant

72.	Bar-tailed Godwit	*Limosa napponica*	Common	Migrant
73.	Whimbrel	*Numenius phaeopus*	Frequent	Migrant
74.	Eurasian Curlew	*Numenius arquata*	Common	Migrant
75.	Greater Black-headed Gull	*Larus ichthyaetus*	Uncommon	Migrant
76.	Heuglin`s Gull	*Larus heuglini*	Frequent	Migrant
77.	Yellow-legged Gull	*Larus cachinnans*	Uncommon	Migrant
78.	Sandwich Tern	*Sterna sandvicensis*	Frequent	Migrant
79.	Cattle Egret	*Bubulcus ibis*	Uncommon	Resident
80.	Gargany	*Anas querquedula*	Frequent	Migrant
81.	White-collard Kingfisher	*Sauopatis chloris*	Frequent	Resident
82.	Black-winged Pratincole	*Glareola nordmanni*	Uncommon	Migrant
83.	Three-banded Plover	*Charadrius tricollaris*	Frequent	Migrant
84.	Pacific Golden Plover	*Pluvialis fulva*	Frequent	Migrant
85.	Green Sandpiper	*Tringa ochropus*	Uncommon	Migrant
86.	Temmick`s Stint	*Calidris temminckii*	Uncommon	Migrant

ANNEX 2: Common and local (Afar) names and IUCN Category of Sea Turtles in Eritrea. ECMIB Sea Turtle Unpublished Report, 2008

S/No	Common name	Scientific	Local (Afar) name	IUCN Category
1	**Green**	*Chelonia mydas*	Bisa'e/ Tuhu	Endangered
2	**Hawksbill**	*Eretmochelys imbricata*	Lida'e	Critically endangered
3	**Olive Ridley**	*Lepidochelys olivacea*	Zahlefa	Endangered
4	**Loggerhead**	*Caretta caretta*	Girfa / Sugur	Endangered
5	**Leatherback**	*Dermochelys coriacea*	Nea'ma	Critically endangered

ANNEXE 3: Genera of Corals (44) found n the Eritrean Red Sea. ECMIB Coral Unpublished Report and Charlie Veron, 2008

SCLERACTINIA	Abundance
Family Pocilloporidae Gray, 1842	
Genus *Pocillopora* Lamarck, 1816	
Pocillopora damicornis (Linnaeus, 1758)	Uncommon
Pocillopora verrucosa (Ellis and Solander, 1786)	Uncommon
Genus *Seriatopora* Lamarck, 1816	
Seriatopora caliendrum Ehrenberg, 1834	Common
Seriatopora hystrix Dana, 1846	Uncommon
Genus *Stylophora* Schweigger, 1819	
Stylophora danae Milne Edwards and Haime, 1850	Common
Stylophora kuehlmanni Scheer and Pillai, 1983	Uncommon
Stylophora pistillata Esper, 1797	Common
Stylophora subseriata (Ehrenberg, 1834)	Common
Family Acroporidae Verrill, 1902	
Genus *Montipora* Blainville, 1830	
Montipora aequituberculata Bernard, 1897	Sometimes common
Montipora aspergillus Veron, DeVantier and Turak, 2000	Rare
Montipora calcarea Bernard, 1897	Common
Montipora caliculata (Dana, 1846)	Uncommon
Montipora circumvallata (Ehrenberg, 1834)	Unusually uncommon
Montipora crassituberculata Bernard, 1897	Uncommon
Montipora cryptus Veron, 2000	Rare
Montipora danae (Milne Edwards and Haime, 1851)	Unusually uncommon
Montipora digitata (Dana, 1846)	Sometimes common
Montipora echinata Veron, DeVantier and Turak, 2000	Rare
Montipora foliosa (Pallas, 1766)	Sometimes common
Montipora grisea Bernard, 1897	Rare
Montipora hispida (Dana, 1846)	Sometimes common
Montipora informis Bernard, 1897	Rare
Montipora meandrina (Ehrenberg, 1834)	Uncommon
Montipora monasteriata (Forskäl, 1775)	Uncommon
Montipora nodosa (Dana, 1846)	Rare
Montipora pachytuberculata Veron, DeVantier and Turak, 2000	Rare
Montipora saudii Turak, DeVantier and Veron, 2000	Uncommon
Montipora stellata Bernard, 1897	Sometimes common
Montipora tuberculosa (Lamarck, 1816)	Uncommon
Montipora undata Bernard, 1897	Uncommon
Montipora verrucosa (Lamarck, 1816)	Rare

Genus *Anacropora* Ridley, 1884	
Anacropora spumosa Veron, Turak and DeVantier, 2000	Sometimes common
Genus *Acropora* Oken, 1815	Unusually uncommon in many sites
Acropora acuminata (Verrill, 1864)	Rare
Acropora anthocercis (Brook, 1893)	Rare
Acropora appressa (Ehrenberg, 1834)	Sometimes common
Acropora arabensis Hodgson and Carpenter, 1995	Common
Acropora austera (Dana, 1846)	Rare
Acropora cerealis (Dana, 1846)	Rare
Acropora clathrata (Brook, 1891)	Usually common
Acropora cytherea (Dana, 1846)	Rare
Acropora digitifera (Dana, 1846)	Rare
Acropora divaricata (Dana, 1846)	Usually common
Acropora downingi Wallace, 1999	Common
Acropora elseyi (Brook, 1892)	Rare
Acropora florida (Dana, 1846)	Rare
Acropora formosa (Dana, 1846)	Usually common
Acropora forskali (Ehrenberg, 1834)	Common
Acropora gemmifera (Brook, 1892)	Rare
Acropora haimei (Milne Edwards and Haime, 1860)	Common
Acropora hemprichii (Ehrenberg, 1834)	Common
Acropora horrida (Dana, 1846)	Sometimes common
Acropora hyacinthus (Dana, 1846)	Usually common
Acropora inermis (Brook, 1891)	Rare
Acropora latistella (Brook, 1891)	Usually common
Acropora listeri (Brook, 1893)	Rare
Acropora loripes (Brook, 1892)	Usually common
Acropora massawensis Marenzeller, 1906	Uncommon
Acropora microphthalma (Verrill, 1859)	Uncommon
Acropora nasuta (Dana, 1846)	Uncommon
Acropora nobilis (Dana, 1846)	Rare
Acropora parapharaonis Veron, 2000	Rare
Acropora pharaonis (Milne Edwards and Haime, 1860)	Usually common
Acropora plantaginea (Lamarck, 1816)	Common
Acropora polystoma (Brook, 1891)	Uncommon
Acropora robusta (Dana, 1846)	Rare
*Acropora samoensis (*Brook, 1891)	Common
Acropora secale (Studer, 1878)	Uncommon
Acropora selago (Studer, 1878)	Uncommon
Acropora squarrosa (Ehrenberg, 1834)	Uncommon

Acropora tenuis (Dana, 1846)	Uncommon
Acropora valenciennesi (Milne Edwards and Haime, 1860)	Sometimes common
Acropora variabilis (Klunzinger, 1879)	
Acropora vaughani Wells, 1954	Common
Genus *Astreopora* Blainville, 1830	
Astreopora myriophthalma (Lamarck, 1816)	Uncommon
Family Euphyllidae Veron, 2000	
Genus *Plerogyra* Milne Edwards and Haime, 1848	
Plerogyra sinuosa (Dana, 1846)	Uncommon
Family Oculinidae Gray, 1847	
Genus *Galaxea* Oken, 1815	
Galaxea fascicularis (Linnaeus, 1767)	Very common
Genus *Gyrosmilia* Milne Edwards and Haime, 1851	
Gyrosmilia interrupta (Ehrenberg, 1834)	Uncommon
Family Siderasteridae Vaughan and Wells, 1943	
Genus *Anomastraea* Marenzeller, 1901	
Anomastraea irregularis Marenzeller, 1901	Uncommon
Genus *Siderastrea* Blainville, 1830	
Siderastrea savignyana Milne Edwards and Haime, 1850	Rare
Genus *Psammocora* Dana, 1846	
Psammocora contigua (Esper, 1797)	Common
Psammocora explanulata Horst, 1922	Sometimes common
Psammocora haimeana Milne Edwards and Haime, 1851	Rare
Psammocora nierstraszi Horst, 1921	Rare
Psammocora profundacella Gardiner, 1898	Sometimes common
Psammocora superficialis Gardiner, 1898	Sometimes common
Genus *Coscinaraea* Milne Edwards and Haime, 1848	
Coscinaraea columna (Dana, 1846)	Sometimes common
Coscinaraea monile (Foskål, 1775)	Sometimes common
Family Agariciidae Gray, 1847	
Genus *Pavona* Lamarck, 1801	
Pavona bipartita Nemenzo, 1980	Rare
Pavona cactus (Forskål, 1775)	Common
Pavona danai Milne Edwards and Haime, 1860	Rare
Pavona decussata (Dana, 1846)	Common
Pavona diffluens (Lamarck, 1816)	Sometimes common
Pavona explanulata (Lamarck, 1816)	Common
Pavona frondifera (Lamarck, 1816)	Sometimes common
Pavona varians Verrill, 1864	Sometimes common
Genus *Leptoseris* Milne Edwards and Haime, 1849	
Leptoseris explanata Yabe and Sugiyama, 1941	Rare

Leptoseris mycetoseroides Wells, 1954	Sometimes common
Family Fungiidae Dana, 1846	
Genus *Cycloseris* Milne Edwards and Haime, 1849	
Cycloseris costulata (Ortmann, 1889)	Rare
Cycloseris curvata (Hoeksema, 1989)	Rare
Cycloseris cyclolites Lamarck, 1801	Sometimes common
Genus *Fungia* Lamarck, 1801	
Fungia concinna Verrill, 1864	Rare
Fungia corona Döderlein, 1901	Rare
Fungia fungites (Linneaus, 1758*)*	Uncommon
Fungia moluccensis Horst, 1919	Rare
Fungia repanda Dana, 1846	Uncommon
Ctenactis crassa (Dana, 1846)	Rare
Ctenactis echinata (Pallas, 1766)	Uncommon
Genus *Herpolitha* Eschscholtz, 1825	
Herpolitha limax (Houttuyn, 1772)	Uncommon
Herpolitha weberi Horst, 1921	Uncommon
Genus *Halomitra* Dana, 1846	
Halomitra pileus (Linnaeus, 1758)	Found in isolated patches
Family Pectiniidae Vaughan and Wells, 1943	
Genus *Echinophyllia* Klunzinger, 1879	
Echinophyllia aspera (Ellis and Solander, 1788)	Uncommon
Echinophyllia echinata (Saville-Kent, 1871)	Uncommon
Echinophyllia orpheensis Veron and Pichon, 1980	Rare
Genus *Oxypora* Saville-Kent, 1871	
Oxypora crassispinosa Nemenzo, 1979	Uncommon
Oxypora lacera Verrill, 1864	Sometimes common
Genus *Mycedium* Oken, 1815	
Mycedium elephantotus (Pallas, 1766)	Rare
Mycedium umbra Veron, 2000	Uncommon
Family Merulinidae Verrill, 1866	
Genus *Hydnophora* Fischer de Waldheim, 1807	
Hydnophora exesa (Pallas, 1766)	Sometimes common
Hydnophora microconos (Lamarck, 1816)	Uncommon
Hydnophora pilosa Veron, 1985	Sometimes common
Genus *Merulina* Ehrenberg, 1834	
Merulina ampliata (Ellis and Solander, 1786)	Sometimes common
Merulina scheeri Head, 1983	Rare
Family Dendrophylliidae Gray, 1847	
Genus *Turbinaria* Oken, 1815	
Turbinaria irregularis, Bernard, 1896	Rare
Turbinaria mesenterina (Lamarck, 1816)	Rare
Turbinaria reniformis Bernard, 1896	Common

Turbinaria stellulata (Lamarck, 1816)	Rare
Family Mussidae Ortmann, 1890	
Genus *Blastomussa* Wells, 1961	
Blastomussa merleti Wells, 1961	Rare
Genus *Acanthastrea* Milne Edwards and Haime, 1848	
Acanthastrea brevis Milne Edwards and Haime, 1849	Common
Acanthastrea echinata (Dana, 1846*)*	Uncommon
Acanthastrea faviaformis Veron, 2000	Rare
Acanthastrea hemprichii (Ehrenberg, 1834)	Uncommon
Acanthastrea lordhowensis Veron & Pichon, 1982	Rare
Genus *Lobophyllia* Blainville, 1830	
Lobophyllia corymbosa (Forskål, 1775)	Common
Lobophyllia hataii Yabe and Sugiyama, 1936	Uncommon
Lobophyllia hemprichii (Ehrenberg, 1834)	Common
Lobophyllia robusta Yabe and Sugiyama, 1936	Rare
Genus *Symphyllia* Milne Edwards and Haime, 1848	
Symphyllia agaricia Milne Edwards and Haime, 1849	Rare
Symphyllia radians Milne Edwards and Haime, 1849	Common
Symphyllia valenciennesii Milne Edwards and Haime, 1849	Uncommon
Family Faviidae Gregory, 1900	
Genus *Favia* Oken, 1815	
Favia albidus Veron, 2000	Common
Favia danae Verrill, 1872	Common
Favia favus (Forskål, 1775)	Common
Favia helianthoides Wells, 1954	Uncommon
Favia laxa (Klunzinger, 1879)	Common
Favia matthaii Vaughan, 1918	Uncommon
Favia maxima Veron, Pichon & Wijsman-Best, 1972	Sometimes common
Favia pallida (Dana, 1846)	Common
Favia rosaria Veron, 2000	Uncommon
Favia rotumana (Gardiner, 1899)	Rare
Favia speciosa Dana, 1846	Common
Favia stelligera (Dana, 1846)	Uncommon
Favia veroni Moll and Borel-Best, 1984	Rare
Genus *Favites* Link, 1807	
Favites abdita (Ellis and Solander, 1786)	Sometimes common
Favites chinensis (Verrill, 1866)	Uncommon
Favites complanata (Ehrenberg, 1834)	Uncommon
Favites flexuosa (Dana, 1846)	Uncommon
Favites halicora (Ehrenberg, 1834)	Uncommon

Favites pentagona (Esper, 1794)	Sometimes common
Favites russelli (Wells, 1954)	Sometimes common
Favites spinosa (Klunzinger, 1879)	Rare
Genus *Goniastrea* Milne Edwards and Haime, 1848	
Goniastrea australensis (Milne Edwards and Haime, 1857)	Common
Goniastrea edwardsi Chevalier, 1971	Rare
Goniastrea favulus (Dana, 1846)	Rare
Goniastrea pectinata (Ehrenberg, 1834)	Common
Goniastrea peresi (Faure and Pichon, 1978)	Rare
Goniastrea retiformis (Lamarck, 1816)	Sometimes common
Genus *Platygyra* Ehrenberg, 1834	
Platygyra acuta Veron, 2000	Sometimes common
Platygyra daedalea (Ellis and Solander, 1786)	Common
Platygyra lamellina (Ehrenberg, 1834)	Uncommon
Platygyra sinensis (Milne Edwards and Haime, 1849)	Common
Genus *Oulophyllia* Milne Edwards and Haime, 1848	
Oulophyllia bennettae (Veron & Pichon, 1977)	Rare
Oulophyllia crispa (Lamarck, 1816)	Rare
Genus *Leptoria* Milne Edwards and Haime, 1848	
Leptoria phrygia (Ellis and Solander, 1786)	Rare
Genus *Montastrea* Blainville, 1830	
Montastrea curta (Dana, 1846)	Common
Montastrea magnistellata Chevalier, 1971	Sometimes common
Genus *Plesiastrea* Milne Edwards and Haime, 1848	
Plesiastrea versipora (Lamarck, 1816)	Sometimes common
Genus *Diploastrea* Matthai, 1914	
Diploastrea heliopora (Lamarck, 1816)	Sometimes common
Genus *Leptastrea* Milne Edwards and Haime, 1848	
Leptastrea bottae (Milne Edwards and Haime, 1849)	Common
Leptastrea inaequalis Klunzinger, 1879	Common
Leptastrea pruinosa Crossland, 1952	Common
Leptastrea purpurea (Dana, 1846)	Common
Leptastrea transversa Klunzinger, 1879	Common
Genus *Cyphastrea* Milne Edwards and Haime, 1848	
Cyphastrea chalcidium (Forskål, 1775)	Uncommon
Cyphastrea japonica Yabe and Sugiyama, 1932	Rare
Cyphastrea microphthalma (Lamarck, 1816)	Common
Cyphastrea serailia (Forskål, 1775)	Common
Genus *Echinopora* Lamarck, 1816	
Echinopora forskaliana (Milne Edwards and Haime, 1850)	Uncommon

Echinopora gemmacea Lamarck, 1816	Uncommon
Echinopora irregularis Veron, Turak and DeVantier, 2000	Common
Echinopora lamellosa (Esper, 1795)	Sometimes common
Family Poritidae Gray, 1842	
Genus *Porites* Link, 1807	
Porites columnaris Klunzinger, 1879	Common
Porites echinulata Klunzinger, 1879	Rare
Porites harrisoni Veron, 2000	Sometimes common
Porites lobata Dana, 1846	Common
Porites lutea Milne Edwards & Haime, 1851	Common
Porites monticulosa Dana, 1846	Common
Porites nodifera Klunzinger, 1879	Rare
Porites rus (Forskål, 1775)	Common
Porites solida (Forskål, 1775)	Common
Porites stephensoni Crossland, 1952	Not known
Porites vaughani Crossland, 1952	Rare
Genus *Goniopora* Blainville, 1830	
Goniopora burgosi Nemenzo, 1955	Rare
Goniopora ciliatus Veron, 2000	Rare
Goniopora columna Dana, 1846	Common
Goniopora djiboutiensis Vaughan, 1907	Common
Goniopora lobata Milne Edwards and Haime, 1860	Common
Goniopora minor Crossland, 1952	Sometimes common
Goniopora pearsoni Veron, 2000	Uncommon
Goniopora planulata (Ehrenberg, 1834)	Rare
Goniopora savignyi Dana, 1846	Rare
Goniopora somaliensis Vaughan, 1907	Rare
Goniopora stokesi Milne Edwards and Haime, 1851	Rare
Goniopora stutchburyi Wells, 1955	Sometimes common
Goniopora tenella (Quelch, 1886)	Rare
Goniopora tenuidens (Quelch, 1886)	Rare
Genus *Alveopora* Blainville, 1830	
Alveopora daedalea (Forskål, 1775)	
Alveopora spongiosa Dana, 1846	Rare
Alveopora tizardi Bassett-Smith, 1890	Rare
Alveopora viridis Quoy and Gaimard, 1833	Rare

ANNEX 4: Trees and shrubs important for Agriculture

S/N	Species	Common Name	status	Uses
1.	*Acacia albida*	*Apple ring acacia*	*vulnerable*	*Live fence, soil fertility amelioration*
2.	*Acacia nilotica*	*Egyptian mimosa*	*Very vulnerable*	*Live fence, tanning*
3.	*Acacia polyacantha*	*Falcon's clow*	*Gomero*	*Dysentery,gastric ulcer (bark)*
4.	*Acacia Senegal*	*Gum Arabic tree*		*Live fence, wind break, gum Arabic, soil ameloration*
5.	*Adansonia digitata*	*Baobab*	*Critically endangered*	*Providing shelter, food and fibers*
6.	*Agave sisilana*	*Sisal*		*Bee forage, live fence, fibber*
7.	*Albizzia anthelmintica*	*Worm cure albizia*		*used as anthelmintic (Bark powder)*
8.	*Balanites aegyptiaca*	*Desert date*	*vulnerable*	*Food, treatment of malaria (leaves)*
9.	*Boscia senegalensis*	*Boscia*		*Food, medicine (Cough, head pustules (leaves)*
10.	*Boscia angustifolia*	*Boscia*	*Endangered*	*Swellings (bark)*
11.	*Buddleja polystachya*	*Buddleia*		*Antihelmentica (leaves & florescence)*
12.	*Cadaba farinose*	*Cadaba*		*Food (young shoots),Medicine (leaves, roots, ash*
13.	*Cajanus cajan*	*Pegeon pea*		*Soil fertility amelioration, food*
14.	*Calotropis procera*	*Dead Sea fruit*		*Warts, swellings, inflammatory wounds (Milky exudates)*
15.	*Huernia macrocarpa*	*Ango*		*Stems are eaten row*
16.	*Carica papaya*	*Papaya*		*Its fruit as a Food, medicines*
17.	*Casuarina cunninghamiana*	*Beefwood*		*Wind-break, soil fertility amelioration*
18.	*Colutea abyssinica*		*Critically endangered*	
19.	*Cordia africana*	*Awhi*	*vulnerable*	*Food(fruit)medicine (bark, roots) fodder leaves bee forage (flower)*
20.	*Crolotaria grhamiana*	*Lion's claw*		*Soil fertility amelioration*
21.	*Diospyros mespiliformis*	*African ebony*	*Critically endangered*	*Food (fruit) carvings (timber), medicine*
22.	*Dovialis caffra*	*Kei apple*		*Live fence, food, bee forage*

S/N	Species	Common Name	status	Uses
23.	*Eucalyptus globules*	*Fever tree*		*Cough (leaves)*
24.	*Flueggia virosa*	*Flueggia*	*Critically endangered*	*Sprain, rabbis (roots, young twigs)*
25.	*Grewia flavescens*	*Grewia*		*Stomach disorders (roots)*
26.	*Huernia macrocarpa*	*Ango*		*Stems are eaten row*
27.	*Hyphaen ethebaica*	*doum palm*	*vulnerable*	*Food, fiber,*
28.	*Lawsonia inermis*	*Henna*	*vulnerable*	*Lawsone "Dye", perfume, fodder,*
29.	*Leucaena leucocephala*	*Leucaena*		*Fodder, soil fertility amelioration*
30.	*Meriandra bengalensis*	*Meriandra*		*Boiled leaves used to treat cold & stomach ache*
31.	*Mimusops kummel*	*Schimper's bullet tree*	*Critically endangered*	*Food (fruit), smoke bath (wood)*
32.	*Moringa oleifera*	*Cabbage tree*		*Food,*
33.	*Opuntiaficus-indica*	*Prickly pear*		*Food (fruit) bee forage (flower) fodder (young stem)*
34.	*Ostegia integrifolia*	*Ostegia*	*vulnerable*	*Insecticide (whole part)*
35.	*Oxytenanthera abyssinica*	*Lowland bamboo*	*Critically endangered*	*Fodder, walking stick, fence*
36.	*Psidium guajava*	*Guava*		*Food*
37.	*Sclerocarya birrea*	*Sclerocarya*	*Critically endangered*	*Food , drink (fruit) fodder , bee forage (leaves, fruit)*
38.	*Senna alexandriana*	*Alexandrian senna*	*Critically endangered*	*Stomach purgative*
39.	*Sesbania sesban*	*Sesbania*	*Critically endangered*	*Fodder, soil fertility amelioration*
40.	*Syzygium guineense*	*Guinea syzygium*	*Critically endangered*	*Food , carvings*
41.	*Tamarindus indica*	*Indian date*	*Critically endangered*	*Food (fruit pulp), fodder (leaves) medicine (bark, leaves, fruit, root)*
42.	*Terminalia brownii*	*Brown'smyrobalan*		*Cure jaundice & other liver mal functioning (bark) dye clothes*
43.	*Vangueria madagascariensis*	*Vangueria*	*Critically endangered*	*Food (fruit) support for grapes (branches)*
44.	*Ximenia americana*	*Hog plum*	*Critically endangered*	*Food, farm tools, Anti-vomit,leech, corneal opacity*
45.	*Ziziphus spina-christi*	*Ziziphus*		*Food (fruit) fodder (leaves, fruit) live fence, medicine*