THE REPUBLIC OF THE UNION OF MYANMAR

# FIFTH NATIONAL REPORT TO THE UNITED NATIONS CONVENTION ON BIOLOGICAL DIVERSITY

March 2014

# The Republic of the Union of Myanmar

# Fifth National Report to the Convention on Biological Diversity

**Ministry of Environmental Conservation and Forestry**

**Nay Pyi Taw**

**March 2014**

## Executive Summary

Being a signatory country to the United Nations Convention on Biological Diversity, Myanmar is implementing actions aimed at the conservation of its natural heritage and biodiversity in accordance with the provisions of the Convention. Myanmar also recognizes its obligations, in accordance with Article 26 of the Convention and with national conservation policy, to submit regular National Reports on implementation of the Convention, and the effectiveness of national biodiversity conservation efforts. Accordingly, Myanmar submitted its First National Report in 1994, Third National report in 2005, and Fourth National Report in 2009. This document represents the Fifth National Report of Myanmar to the Convention in relation to the Decision X/10 adopted at the tenth meeting of the Conference of Parties to the CBD, held on 18-29 October 2010 in Nagoya, Japan.

This report is composed of three main parts, providing the latest information on the country's implementation on biodiversity conservation since the Fourth National Report in 2009. **Part I** provides the latest information on the Status, Trends and Threats to the different types of Biodiversity in Myanmar. **Part II** presents the current degreeof implementation of the National Biodiversity Strategy and Action Plan (NBSAP), and the achievements of mainstreaming biodiversity into relevant sectoral and cross-sectoral strategies, plans and programmes. Finally, **Part III** examines the linkages and contribution of Myanmar's NBSAP implementation towards the 2020 Aichi Biodiversity Targets and the 2015 Targets of the Millennium Development Goals.

The numerous different landscapes and seascapes in Myanmar are home to a wide range of habitats and wildlife. However, a nationwide comprehensive survey on wild flora and fauna has not yet been possible. To date, most of the scientific work on biodiversity is project or site based, though these have nonetheless discovered several new species since the last National Report. As of December 2013, the total number of known species by taxonomic group, is; 11,824 plants, 252 mammals, 1,056 birds, 293 reptiles, 139 amphibian and 775 fish. This is an increase over the Fourth national Report of 24 plant species, one mammal species, 21 reptile species and 57 amphibian species, of which 22 reptiles and 6 amphibian species are believed endemic to Myanmar. However, comprehensive, country wide surveys are still needed to determine the total number of species in the country.

Myanmar is working to conserve its biodiversity through its protected area network, stakeholder engagement, and enforcement of laws and regulations. However, many challenges remain. While there is no comprehensive national assessment of the changes in biodiversity over the reporting period, the available data show that the trends since 2009 are downwards for most biological diversity. Natural forests have been declining in both quantity and quality for decades, with an especially significant loss of mangrove forests. The main factors are increasing resource utilization due to human population growth, and high timber

demand from China, India and Thailand following their domestic logging bans since the late 1980s.

Traditional farming practices and indigenous knowledge have contributed to conservation of plant genetic diversity in Myanmar for many centuries. However, the use of local crop landraces such as horticultural and cereal crops has been largely replaced with modern hybrid or otherwise 'improved' varieties. Moreover, most of the natural habitats of crop wild relatives have now been destroyed by infrastructure development. Although no nationwide comprehensive census has been possible due to a lack of resources, bird surveys regularly conducted in wetland protected areas reveal that from 2009 to 2013 the number of migratory birds at Inlay Lake and non-migratory birds at Moeyungyi Wetland Sanctuary increased. One indicator of trends in fish biodiversity in Myanmar is a 40 year decline in marine fisheries productivity. From 1980 to recent years the Catch Per Unit Effort (CPUE) decreased from 200 kilograms per hour in to approximately 75-80 kilograms per hour. This indicates that the marine fauna and flora are being affected by habitat degradation – particularly degradation of mangrove forests, coral reefs and sea grasses – mainly due to human activities and climate change.

The major threats to biodiversity in Myanmar are improper land use, illegal hunting and trade, the introduction of invasive species, infrastructure development and climate change. Underlying factors include poverty, economic growth and increasing consumption, increased demand on natural resources from neighbouring countries, limited environmental safeguards, lack of comprehensive land-use policies and planning, undervaluation of ecosystems, ecosystem services and biodiversity (particularly in development planning) and limited grassroots support for conservation. Participation of local communities in the conservation and sustainable use of Myanmar's natural resources is essential in order to effectively protect the country's biodiversity.

Several bodies are implementing action plans outlined in the NBSAP (Ministry of Environmental Conservation and Forestry, 2011), though NBSAP is still not being implemented at a national scale. Myanmar's NBSAP outlines nine strategic directions together with five-year action plans for different sectors. Most of the activities being implemented by respective ministries appear to be in line with the objectives of the NBSAP. Although biodiversity conservation activities are being mainstreamed into relevant sectors including forestry, agriculture, mining, trade, health, education and science and technology, better integration of NBSAP's actions into respective departmental plans is still needed. Moreover, Myanmar also needs to formulate measurable indicators for progress on NBSAP implementation.

Myanmar's NBSAP does not refer to the 2020Aichi Biodiversity Targets, adopted in 2010. However, many sectoral actions are well aligned with these, as noted in this report, and

Myanmar is planning to soon update the NBSAP to better address the Aichi Biodiversity Targets.

Some of the country's biodiversity conservation activities also align with the implementation of the Millennium Development Goals, particularly Target 7 which relates to environmental sustainability, including the integration of sustainable development principles into country policies and programmes and reducing the loss of biological diversity. The implementation of Target 7 is measured by three different indicators: proportion of land area covered by forests, proportion of terrestrial and marine areas protected, and the proportion of species threatened with extinction.

Although remarkable loss of forest cover was observed during the period from 1990 to 2010, the area of reserved forests and protected public forests has increased from 22.8% of total country's area in 2005 to 25% in 2013. Moreover, 38 protected areas, covering 5.6% of country's total area, have now been established and another seven areas (1.2% of total area) have been proposed, pending stakeholder consultation and ground surveying. No data is available regarding the proportion of locally threatened species in Myanmar, however, according to the International Union for Conservation of Nature (IUCN), 356 species of wild flora and fauna in Myanmar are considered to be globally threatened. It is trusted that this fifth national report provides a comprehensive review of implementation activities to protect and conserve Myanmar's biodiversity. The report will be useful for producing improved biodiversity conservation plans as it highlights the gaps for full implementation of Myanmar's NBSAP and for linking the NBSAP with the Aichi Biodiversity Targets.

# Table of Content

**EXECUTIVE SUMMARY** ..... i

**TABLE OF CONTENT** ..... iv

**PART I STATE, TREND AND THREATS TO BIODIVERSITY** ..... 1

**CHAPTER 1 INTRODUCTION** ..... 2

**CHAPTER 2 STATE AND TRENDS OF BIODIVERSITY** ..... 4

2.1 STATE OF BIODIVERSITY ..... 4
2.2 TRENDS OF BIODIVERSITY ..... 5
*2.2.1 Changes in Forest Cover* ..... 5
*2.2.2 Changes in Mangrove Forests* ..... 6
*2.2.3 Changes in Bird Species* ..... 7
*2.2.4 Changes in Reptile and Amphibian Species* ..... 8
*2.2.5 Changes in Agrobiodiversity* ..... 9
*2.2.6 Changes in Marine and Aquatic Species* ..... 9

**CHAPTER 3 THREATS TO BIODIVERSITY** ..... 11

3.1 LAND USES ..... 11
3.2 ILLEGAL WILDLIFE HUNTING AND TRADE ..... 14
3.3 INVASIVE ALIEN SPECIES ..... 14
3.4 THREATS TO AGROBIODIVERSITY ..... 14
3.5 THE UNDERLYING FACTORS OF THREATS TO BIODIVERSITY ..... 14
*3.5.1 Poverty* ..... 14
*3.5.2 Economic Growth and Increasing Consumption* ..... 15
*3.5.3 Increased Natural Resources Demand from Neighbouring Countries* ..... 15
*3.5.4 Limited Environmental Safeguards* ..... 15
*3.5.5 Lack of Comprehensive Land-use Policies and Planning* ..... 15
*3.5.6 Undervaluation of Ecosystem, Ecosystem services and Biodiversity in Development Planning* ..... 16
*3.5.7 Limited Grassroots Support for Conservation* ..... 16
3.6 CLIMATE CHANGE VULNERABILITY ..... 16

**PART II IMPLEMENTING THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN AND MAINSTREAMING BIODIVERSITY** ..... 18

**CHAPTER 4 IMPLEMENTING THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN** ..... 19

4.1 NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN ..... 19
4.2 ASSESSMENT OF NBSAP IMPLEMENTATION ..... 19
*4.2.1 Action Plan toward Sustainable Forest Management* ..... 19
*4.2.2 Action Plan toward Sustainable Wildlife Conservation and Protected Area Management* ..... 22
*4.2.3 Action Plan toward Sustainable Freshwater Resource Management* ..... 27
*4.2.4 Action Plan toward Ssustainable Management of Coastal, Marine and Island Ecosystems* ..... 28
*4.2.5 Action Plan towards Sustainable Management of Land Resources* ..... 30
*4.2.6 Action Plan toward Sustainable Management of Agriculture, Livestock and Fisheries (Linking with Agriculture and Livestock Biodiversity)* ..... 31
*4.2.7 Action Plan toward Sustainable Ecotourism* ..... 34
*4.2.8 Action Plan toward Eenhancing Environmental Quality Management and Biosafety* ..... 35
*4.2.9 Action Plan toward Sustainable Management for Mineral Resource Utilization* ..... 37

**CHAPTER 5 MAINSTREAMING BIODIVERSITY** ..... 39

5.1 MAINSTREAMING BIODIVERSITY INTO ENVIRONMENT AND FORESTRY SECTOR ..... 39
5.2 MAINSTREAMING BIODIVERSITY INTO AGRICULTURAL SECTOR ..... 39
5.3 MAINSTREAMING BIODIVERSITY INTO LIVESTOCK AND FISHERY SSECTOR ..... 40
5.4 MAINSTREAMING BIODIVERSITY INTO EDUCATION SECTOR ..... 42
5.5 MAINSTREAMING BIODIVERSITY INTO TRADE SECTOR ..... 42

5.6 MAINSTREAMING BIODIVERSITY INTO HEALTH SECTOR ..... 43
5.7 MAINSTREAMING BIODIVERSITY INTO MINING SECTOR ..... 44
5.8 MAINSTREAMING BIODIVERSITY INTO SCIENCE AND TECHNOLOGY SECTOR ..... 44

**PART III PROGRESS TOWARDS AICHI BIODIVERSITY TARGETS AND CONTRIBUTIONS TO THE TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS ..... 46**

**CHAPTER 6 IMPLEMENTING 2020 AICHI BIODIVERSITY TARGETS ..... 47**

6.1 LINK THE ACTION PLANS OF NBSAP WITH 2020 AICHI BIODIVERSITY TARGETS ..... 47
6.2 IMPLEMENTING THE 2020 AICHI BIODIVERSITY TARGETS ..... 56

**CHAPTER 7 BIODIVERSITY CONSERVATION RELEVANT TO MILLENNIUM DEVELOPMENT GOALS ..... 58**

7.1 PROPORTION OF LAND AREA COVERED BY FOREST ..... 58
7.2 PROPORTION OF PROTECTED LAND AND WATER AREAS ..... 59
7.3 PROPORTION OF THREATENED SPECIES ..... 59

**APPENDIX 1 STEERING COMMITTEE FOR PREPARING CBD FIFTH NATIONAL REPORT AND UPDATING NBSAP ..... 61**

**APPENDIX 2 SUMMARY OF PREPARATION PROCESS OF FIFTH NATIONAL REPORT TO THE CBD ..... 63**

**APPENDIX 3 IMPLEMENTATION OF THE CBD PROGRAMME OF WORK ..... 64**

IMPLEMENTING THE PROGRAMME OF WORK ON PROTECTED AREAS (POWPA) ..... 64
IMPLEMENTING THE GLOBAL STRATEGY FOR PLANT CONSERVATION (GSPC) 2011-2020 TARGETS ..... 73
IMPLEMENTING THE CARTAGENA PROTOCOL ON BIOSAFETY ..... 77
IMPLEMENTING THE NAGOYA PROTOCOL ON ACCESS TO GENETIC RESOURCES AND THE FAIR AND EQUITABLE SHARING OF BENEFITS ARISING FROM THEIR UTILIZATION ..... 77

**REFERENCES ..... 78**

**GLOSSARY ..... 79**

## List of Tables

**Table 1.** Selected New Species Recorded in Myanmar Since 2009

**Table 2.** Number of Recorded Species in Myanmar (By Group)

**Table 3.** Endemic Species in Myanmar

**Table 4.** Forest Cover in Myanmar in 2010

**Table 5.** Establishment of Protected Areas in Myanmar

**Table 6.** Threatened Species in Myanmar

## List of Figures

**Figure 1.** Major Vegetation Types in Myanmar

**Figure 2.** Migratory Birds Found Outside of Protected Areas: a. Nordmann's Greenshank (*Tringa guttifer*) from Nga Mann beach, Ayeyarwady Region; b. Spoon-billed Sand piper (*Eurynorhynchus pygmeus*) from Nantha Island, Rakhine State

**Figure 3.** Forest Cover and Mean Annual Deforestation Rates between 1990 and 2010

**Figure 4.** Loss of Mangrove Forests in Myanmar between 1980 and 2010

**Figure 5.** Number of Bird Species Recorded at Selected Wetland Protected Areas, 2012 and 2013

**Figure 6.** Changes in Recorded Reptile and Amphibian Species in Myanmar, 1997 to 2010

**Figure 7.** Soil Erosion after Shifting Cultivation

**Figure 8.** Clearing Natural Forest for Agricultural Expansion

**Figure 9.** Environmentally Unsound Mining Causes Deterioration of Aquatic Ecosystems

**Figure 10.** Land Degradation due to Poor Land Use Practices in Upstream Area

**Figure 11.** Establishment of Protected Areas from 1920 to March, 2014

**Figure 12.** Location of Protected Areas and ASEAN Heritage Parks in Myanmar

**Figure 13.** Management Activities of PAs in Myanmar

## List of Boxes

**Box 1.** Migration of Globally Threatened Species

**Box 2.** Marine Ecosystem Survey

**Box 3.** Research on *Hlisa ilish* (Nga Tha Lauk) Fish

**Box 4.** Conservation of the Burmese Star Tortoise (*Geochelone platynota*)

**Box 5.** Myanmar Biodiversity Investment Vision (MBCIV)

**Box 6.** Poacher to Protector

**Box 7.** Conservation of the Burmese roofed turtle (*Batagur trivittata*) in the wild and captivity

**Box 8.** Community-Based Natural Resource Management (CBNRM)

**Box 9.** Mithun Conservation

**Box 10.** Spatial Monitoring and Reporting Tool (SMART) application in law enforcement monitoring of protected areas

## Abbreviations

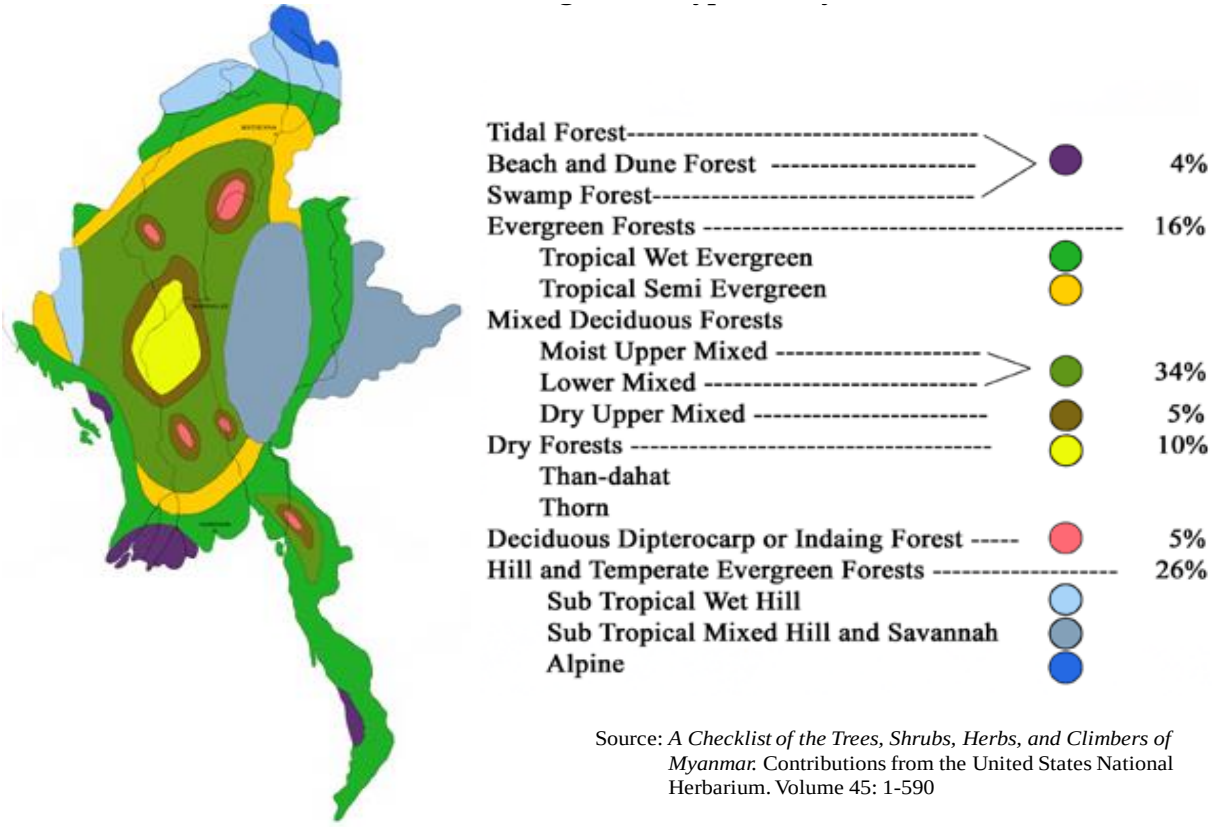
| | |
|---|---|
| AAC | Annual Allowable Cut |
| ACB | ASEAN Centre for Biodiversity |
| AHPs | ASEAN Heritage Parks |
| BCCP | Biodiversity and Climate Change Project |
| BOBLMEP | Bay of Bengal Large Marine Ecosystem Project |
| CFIs | Community Forestry Instructions |
| CIAT | International Center for Tropical Agriculture |
| CITES | Convention on International Trade in Endangered Species of Wild Flora and Fauna |
| CR | Critically Endangered |
| DAR | Department of Agricultural Research |
| DHT | Directorate of Hotels and Tourism |
| DoA | Department of Agriculture |
| DoF | Department of Fisheries |
| DTM | Department of Traditional Medicine |
| DWRIRS | Directorate of Water Resources and Improvement of River Systems |
| DZGD | Dry Zone Greening Department |
| ECD | Environmental Conservation Department |
| EFI | European Forest Institute |
| EIA | Environmental Impact Assessment |
| EN | Endangered Species |
| EOC | Environment Operations Centre |
| EPA | Environmental Performance Assessment |
| FD | Forest Department |
| FESR | Framework for Economic and Social Reform |
| GEF | Global Environment Facility |
| GSPC | Global Strategy for Plant Conservation |
| IAS | Invasive Alien Species |
| ICIMOD | International Centre for Integrated Mountain Development |
| IID | Institute for International Development |
| IPM | Integrated Pest Management |
| IPRD | Information and Public Relation Department |
| IRL | Reduced Impact Logging |
| ITTO | International Tropical Timber Organization |
| IUCN | International Union for Conservation of Nature |
| MCDC | Mandalay City Development Committee |
| MDGs | Millennium Development Goals |

| | |
|---|---|
| MFCC | Myanmar Forest Certification Committee |
| MOAI | Ministry of Agriculture and Irrigation |
| MOECAF | Ministry of Environmental Conservation and Forestry |
| MOM | Ministry of Mines |
| MSS | Myanmar Selection System |
| NBSAP | National Biodiversity Strategy and Action Plan |
| NIVA | Norwegian Institute of Water Resources |
| PAs | Protected Areas |
| PES | Payment for Ecosystem Services |
| PoPs | Persistence of Pollutants |
| PoWPA | Programme of Work on Protected Areas |
| RECOFTC | Regional Community Forestry Training Centre |
| REDD+ | Reducing Emission from Deforestation and Forest Degradation+ |
| RRD | Relief and Resettlement Department |
| SFM | Sustainable Forest Management |
| SGP | Small Grant Program |
| SMART | Spatial Monitoring and Reporting Tool |
| SMTA | Standard Material Transfer Agreement |
| SoER | State of Environment Report |
| TLAS | Timber Legality Assurance System |
| UNCBD | United Nations Convention on Biological Diversity |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment programme |
| UN-HABITAT | United Nations Human Settlements Programme |
| VU | Vulnerable Species |
| WCS | Wildlife Conservation Society |
| YCDC | Yangon City Development Committee |

# Part I State, Trend and Threats to Biodiversity

## Chapter 1 Introduction

Myanmar is the largest country in mainland Southeast Asia with an area of 676,577 km$^2$. The country is located at the junction of three different ecoregions: the Sino-Himalayan region in the north, the Indochinese region in the east, and the Malayan Peninsular region in the south. This position together with high variations in rainfall, temperature, topography and an extensive river network has created diverse forest types in Myanmar, ranging from sub-alpine forest in the north to tropical evergreen forest in the south (Figure 1).




Source: *A Checklist of the Trees, Shrubs, Herbs, and Climbers of Myanmar.* Contributions from the United States National Herbarium. Volume 45: 1-590

**Figure 1.** Major Vegetation Types in Myanmar.

Sustaining the country's biodiversity is a national goal. Myanmar is doing its utmost to reach this using available human resources, funding and technical expertise. To sustain this biodiversity a wide variety of projects are being implemented by national staff and in collaboration with international organizations. However, compared to other countries in the region, Myanmar has so far received very limited international assistance for biodiversity conservation.

The conservation of nature and biodiversity is deep-rooted in the Myanmar's cultures, traditions, and religions. Outside of PAs, Buddhist Monks are the principle persons who are highly contributing to conserving biodiversity outside of PAs.

In Myanmar, a number of locations are notable for supporting migratory bird species, several of which are declining in global population, and identified as critically endangered in

the IUCN “Red List” (Figure 2). Some of these sites are currently outside of the protected area system, and their existence reflects good conservation practise by Myanmar people.


**Figure 2.** Migratory Birds Found Outside of Protected Areas: a. Nordmann's Greenshank (*Tringa guttifer*) at Nga Mann beach, Ayeyawady Region; b. Spoon-billed Sand piper (*Eurynorhynchus pygmeus*) on Nan Tha Island, Rakhine State.

Myanmar is recognized as one of the most biodiverse countries in the world. However, surveys and monitoring are still lacking for many areas, especially for aquatic ecosystems. In addition, more detailed scientific documentation of species richness and the biodiversity values of Northern Myanmar is still required.

# Chapter 2 State and Trends of Biodiversity

## 2.1 State of Biodiversity

The numerous different landscapes and seascapes in Myanmar are home to a wide range of habitats and wildlife. However, a nationwide comprehensive survey of wild flora and fauna has not been possible. To date, most of the scientific work on biodiversity has been project or site based. Nevertheless, several new species have been discovered within these sites. Select species discovered since 2009, (after the publication of the Fourth CBD National Report) are presented in Table 1. A complete list of species discovered since 2009 is summarized in Tables 2 and 3.

**Table 1.** Selected New Species Recorded in Myanmar Since 2009.

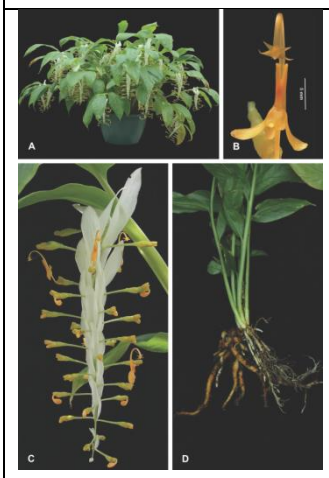
| | |
|---|---|
|  | ▪ Myanmar Snub-nosed Monkey (*Rhinopithecus strykeri*).<br>▪ Discovered near the northern Myanmar-China border (Kachin State) in 2010. |
|  | ▪ *Globba sherwoodiana* W.J.Kress & V.Gowda<br>▪ Distributed across Myanmar.<br>***Source*:** PhytoKeys 13: 5–14 (2012), doi: 10.3897/ phytokeys.13.2670, www.phytokeys.com |
|  | ▪ *Curcuma arracanensis* W.J.Kress & V.Gowda<br>▪ Growing in evergreen forest of Rakhine Yoma.<br>***Source*:** PhytoKeys 13: 5–14 (2012), doi: 10.3897/ phytokeys.13.2670, www. phytokeys.com |

**Table 2.** Number of Recorded Species in Myanmar (By Group).

| Species group | | Number of species | | Remark |
|---|---|---|---|---|
| | | Current Status | 4th National Report | |
| Plant (Gymnosperms and Angiosperms) | | 11,824 | 11,800 | +24 |
| Mammals | | 252 | 251 | + 1 |
| Bird | | 1056 | 1056 | – |
| Reptile | *Snakes* | 172 | 153 | + 19 |
| | *Lizards* | 87 | 87 | – |
| | *Turtles and tortoises* | 32 | 32 | – |
| | *Crocodiles* | 4 | 4 | – |
| Amphibian | *Frogs and toads* | 116 | 79 | + 37 |
| | *Caecilians* | 2 | 2 | – |
| | *Salamanders* | 1 | 1 | – |
| Fish | *Fresh water fish* | 310 | 310 | – |
| | *Marine fish* | 465 | 465 | – |

**Table 3.** Endemic Species in Myanmar.

| Species group | Number of species | | Remark |
|---|---|---|---|
| | Current Status | 4th National Report | |
| Plant (Gymnosperms and Angiosperms) | 8 | 8 | – |
| Mammals | 1 | 1 | – |
| Bird | 2 | 2 | – |
| Reptile | 29 | 7 | + 22 |
| Amphibian | 6 | – | + 6 |

## 2.2 Trends of Biodiversity

Myanmar is conserving its biodiversity through its protected area network, stakeholder engagement, and enforcement of laws and regulations. However, many challenges remain. While there is no comprehensive national assessment of the changes in biodiversity over the reporting period, the trends since 2009 are described in the following sections.

### 2.2.1 Changes in Forest Cover

Myanmar has the highest proportion of forest cover of any country in Southeast Asia (FAO 2010). The Myanmar Selection System (MSS) is intended to ensure sustainable management of production forests. Consequently, Myanmar has been a leading timber export country for over a century while still maintaining relatively high forest cover. However, during this time natural forests have been declining in both quantity and quality. The main factors are increasing resource utilization due to a growing population and high timber

demand from neighbouring countries following their enactment of restrictive domestic logging regulations.

Forest covered 58% of Myanmar's terrestrial area in 1990, but has declined continuously since; to 51.5% in 2000, 49.2% in 2005 and 47% in 2010. The average annual deforestation rate thus averaged around 1% over this period (Figure 3). Closed forests, with canopy cover of over 40%, were 45.6% in 1990, decreasing by more than half to 19.9% by 2010 (Table 4). The impact of these declines on biodiversity are unknown, but of serious concern to the government.

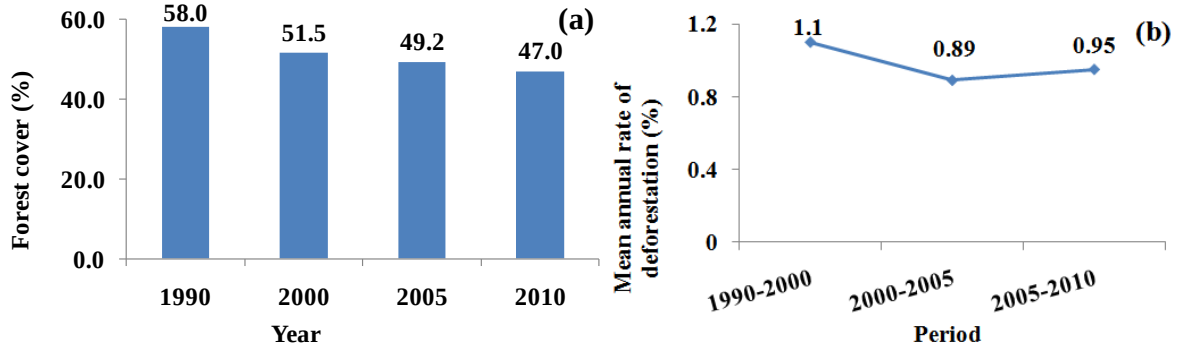



**Figure 3.** Forest Cover and Mean Annual Deforestation Rates between 1990 and 2010.

**Table 4.** Forest Cover in Myanmar in 2010.

| Category | Area ('000 ha) | % of total land area |
|---|---|---|
| Closed forest | 13,445 | 19.9 |
| Open forest | 18,328 | 27.1 |
| Total forest | 31,773 | 47.0 |
| Other wooded land | 20,113 | 29.7 |
| Other | 13,896 | 20.5 |
| Water body | 1,903 | 2.8 |
| **Total** | **67,658** | **100** |

*Source: Remote Sensing and GIS Section, Planning and Statistics Division, Forest Department, 2011.*

### 2.2.2 Changes in Mangrove Forests

Mangrove forests are characteristic of Myanmar's nearly 3,000 km of coast, a gift from nature that provides for many basic community needs and protects coastal areas from natural disasters. However, mangrove forests have deteriorated due to unsustainable use. The mangrove deforestation rate is now the highest of all forest types for which data is available; over the past 30 years the country lost around 58% of its mangrove forests (Figure 4).

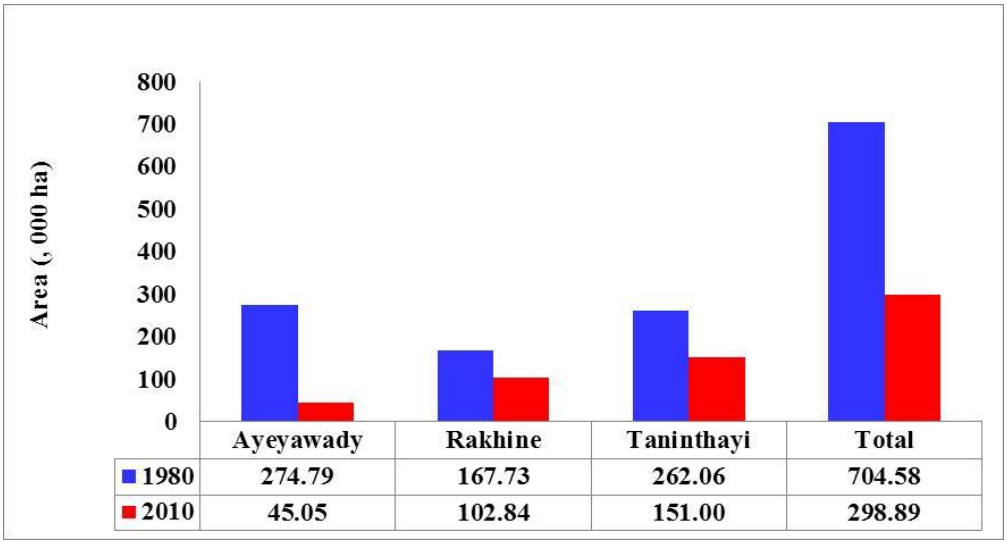



**Figure 4.** Loss of Mangrove Forests in Myanmar between 1980 and 2010.

### 2.2.3 Changes in Bird Species

With 1,056 bird species recoded, Myanmar is one of the richest countries for avian diversity in Southeast Asia. Although no nationwide comprehensive census has been possible due to a lack of resources, bird surveys are regularly conducted in wetland protected areas. There were no dramatic changes in bird numbers between 2012 and 2013 in Inlay Lake and Moeyungyi Wetland Wildlife Sanctuaries. Indeed the number of migratory birds increased in 2013 at Inlay Lake, while residential birds increased in Moeyungyi Wetland Sanctuary over the same period (Figure 5).

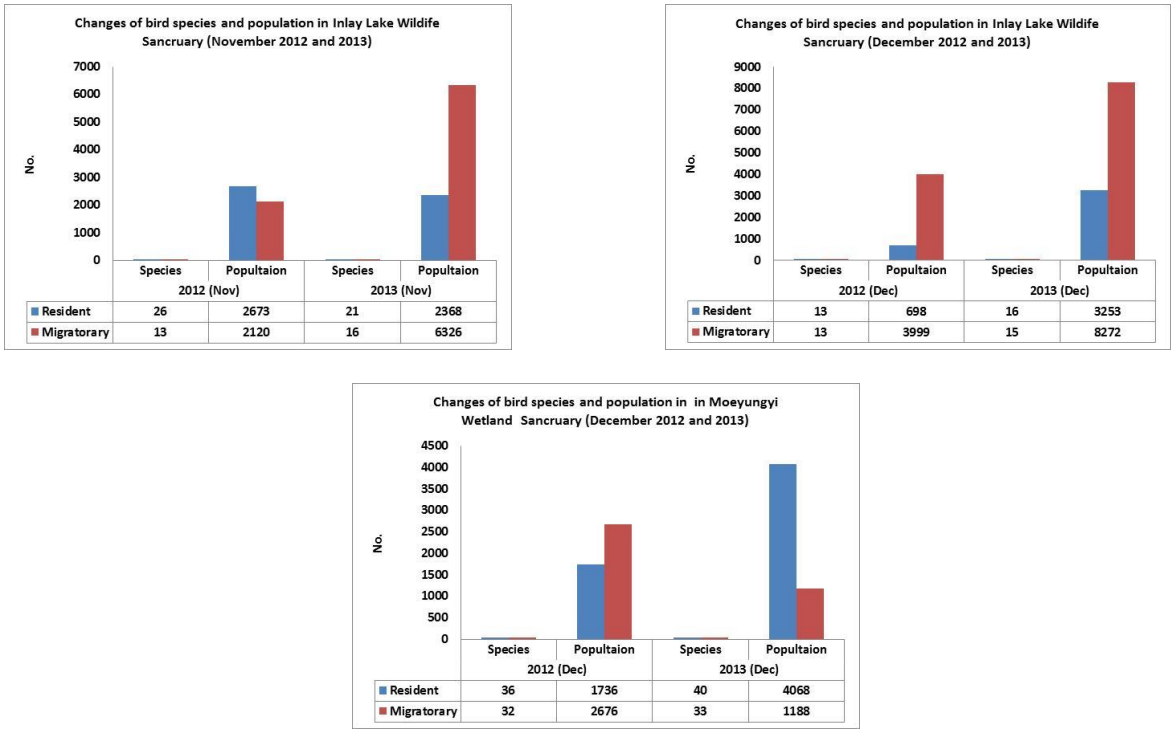



**Figure 5.** Number of Bird Species Recorded at Selected Wetland Protected Areas, 2012 and 2013.

### 2.2.4 Changes in Reptile and Amphibian Species

The Forest Department, in collaboration with the Smithsonian Institute, has conducted a national inventory of reptile and amphibian species. The inventory has further added to the number of known reptile and amphibian species in Myanmar (Figure 6).

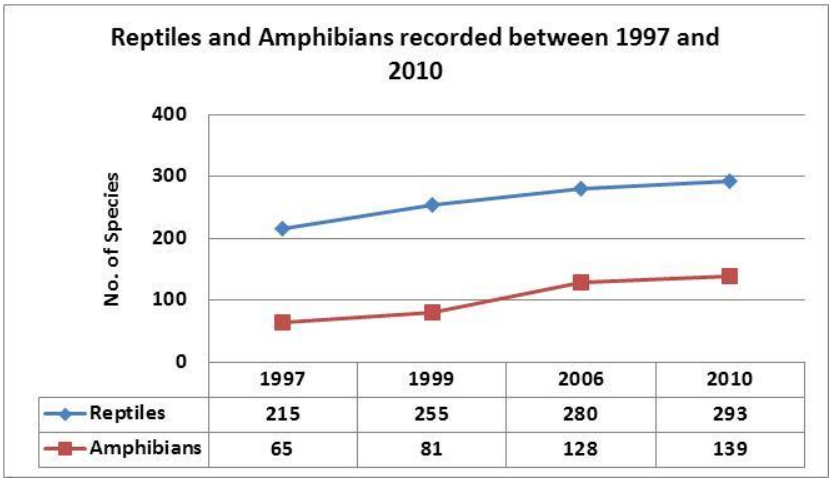
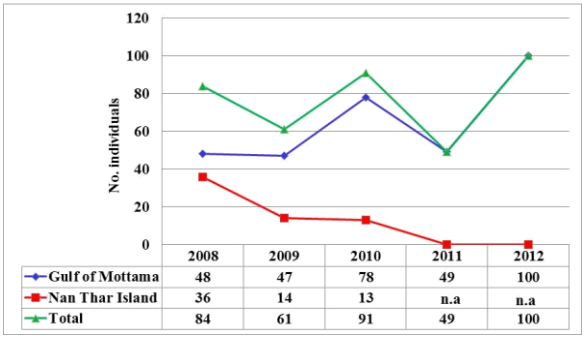



**Figure 6.** Changes in Recorded Reptile and Amphibian Species in Myanmar, 1997 to 2010.

**BOX 1. MIGRATION OF GLOBALLY THREATENED SPECIES**

The spoon-billed sandpiper (*Eurynorhynchus pygmeus*), a critically endangered species with a global population believed to be below 400 individuals, is a migrant visitor to Myanmar in the winter season. The Biodiversity and Nature Conservation Association (BANCA), a local civil society group, has been recording the number of spoon-billed sandpipers during the migration season since 2008.




Results indicate that along the 8,000 km East Asia-Australasia Flyway the Gulf of Mottama in Southern Myanmar and Nan Thar Island in Rakhine State, in the west of the country, are critical wintering grounds for the species.

**n.a.** – *no data is available due to lack of survey.*

### 2.2.5 Changes in Agrobiodiversity

Under a wide range of agroecosystems, a diversity of tropical, subtropical and temperate agricultural species are distributed in Myanmar, and those plant genetic resources serve as a foundation for further agricultural development. Myanmar people recognize the value of plant genetic resources (PGR) and traditional farming practices and indigenous knowledge have contributed to the conservation of PGR in Myanmar for many centuries.

Since 1990 the Myanmar Seed Bank and international partners have conducted participatory field surveys, farmer visits and focal group discussions to inventory crop landraces. This work has indicated that the distribution and extent of plant genetic resources in the country is changing. For example, use of local crop landraces such as cereal crops in Shan state, in the eastern mountainous region of Myanmar, has been largely replaced with modern hybrid varieties. Moreover, most of the natural habitats of wild crop relatives formerly distributed in along roadsides and forest margins have been destroyed by transportation and other infrastructure development. For example,

*Oryza ridleyi, O. granulata, O. officinalis, O. nivara, and O. rufipogon*

Wild *Vigna spp.*, Sword bean

Finger millet, Fox' tail millet, small millets, and wild and cultivated Job' tear (Coix spp.)

Perilla

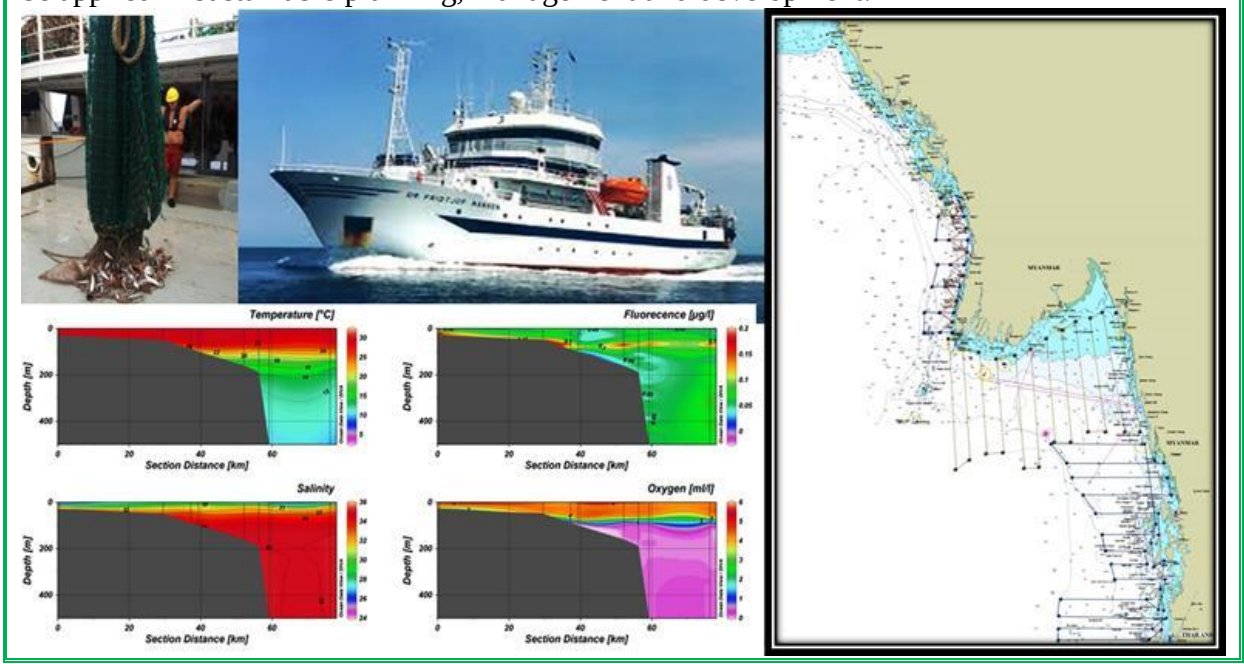
### 2.2.6 Changes in Marine and Aquatic Species

In Myanmar, marine fauna and flora are being affected by habitat degradation, especially in mangrove forests, coral reefs and sea grasses. This degradation is primarily due to human activities but is increasingly impacted by climate change as well. Some species have been vastly depleted and others have migrated to new habitats, e.g. moving to areas cooler with cooler temperatures. Such changes are also observed for freshwater fish species in northern Myanmar. One striking the indicator of changes in fish populations is the decline in Catch Per Unit Effort (CPUE) over the past 40 years. The rate has decreased from approximately 200 kilograms per hour in 1980 to 75-80 kilograms per hour in recent years.

Systematic data on fish distribution and population is very limited due to lack of scientific research and expeditions over the past several years. Indeed, until 2013 the Fisheries Department had to rely on a 1979 survey for planning in the Myeik Archipelago. However, a recent survey cruise of Myanmar marine fisheries and oceanography by the ship RV Dr. Fridtjof Nansen has recorded several new marine species and will provide more up to date and comprehensive data (report in progress).

## Box 2. Marine ecosystem Survey

Myanmar has a long coastline and large marine territory. Its marine resources play an important role in the country's development. However, natural resource utilization must be on a sustainable basis and it is important to have access to current data in order to ensure sustainable fisheries management. Myanmar is currently using marine data that was obtained more than 30 years ago. To fulfil this gap, the Department of Fisheries conducted a marine ecosystem survey with the technical and financial support of the Norwegian Government from 13th November to 17th December, 2013. The main objectives were; (i) to understand the presence/absence and abundance of marine species, including fish, (ii) build capacity, (iii) measure environmental parameters and, (iv) identify genetic resources for select species. Researchers are currently analysing the survey results. Once analysed, this information will be applied in sustainable planning, management and development.



# Chapter 3 Threats to Biodiversity

In Myanmar, ecosystems and biodiversity face threats from a range of underlying causes. More work is needed to fully understand the forces driving biodiversity loss. However, past research can give adequate insight into these pressures. These major driving forces and threats to biodiversity are discussed below.

## 3.1 Land Uses

Myanmar is a largely agricultural county. However, most cultivation employs techniques that can significantly degrade the natural environment. In particular, shifting cultivation in upland areas, over abstraction of ground water, and uncontrolled pesticide and herbicide use all negatively affect ecosystems and biodiversity (Figure 7).

**Figure 7.** Soil Erosion Resulting from Shifting Cultivation.

Available site-specific data shows that ecosystems and biodiversity are deteriorating mainly due to unsustainable human activities. The clearance of natural forests for agricultural expansion, both for smallholders and industrial agriculture, is leading to habitat loss for endangered species including the tiger (*Panthera tigris*) and Asian elephant (*Elephas maximus*) (Figure 8).

**Figure 8.** Clearing Natural Forest for Agricultural Expansion.

Small scale gold mining is a major polluting industry in the headwaters of many of Myanmar's rivers (Figure 9), ecosystems and biodiversity more widely, and negatively affects aquatic diversity and human health (Figure 9). This is resulting in the deterioration of aquatic ecosystems, aquatic biodiversity and human health. These effects in turn result in chronic, negative impacts to the livelihoods of rural communities. Hardest hit are landless, poor, rural or otherwise disadvantaged people who rely on natural resources for subsistence.

**Figure 9.** Environmentally Unsound Mining Causes Deterioration of Aquatic Ecosystems.

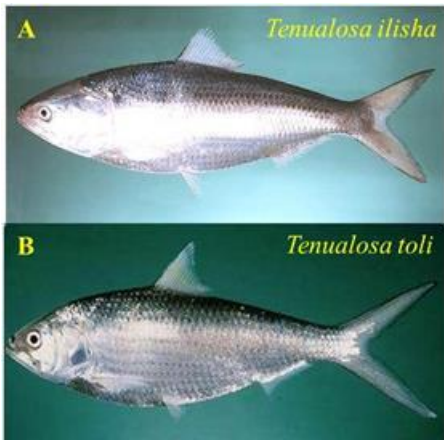
Such unsound land-use practices are severely threatening the environment and associated biodiversity, both directly and indirectly, while also worsening the socio-economic situation of local communities, particularly by damaging agricultural land in downstream

areas (Figure 10). Consequently, this increases reliance on natural forests, further increasing pressures on ecosystems and biodiversity.

**Figure 10.** Land Degradation due to Poor Land Use Practices in Upstream Area.

**BOX 3. RESEARCH ON *Hlisa ilish* ("NGA THA LAUK") FISH**

The *Nga Tha Lauk* (*Hlisa ilish*) can be found in near shore marine environments locations along Myanmar's coastline. It is an important commercial species and provides a significant income source for coastal communities. However, sound data on the distribution and abundance of *Nga Tha Lauk* is very limited. In this context, research on *Nga Tha Lauk* was included in "Bay of Bengal Large Marine Ecosystem" project in 2013 that is jointly implemented with FAO.




The aim of this research is to develop a bio-economic model of the *ilish* as a first step towards improved management of this fishery. The following activities will be conducted during the research project:

- Calculating the optimal sustainable yield for the *ilish* fishery
- Comparing the current catch rate with the calculated optimal rate
- Finding an economically and socially reasonable path from the current situation to the optimal sustainable yield level

This study will provide baseline information concerning the bio-economics of the *ilish* fishery and recommendations for regulating the fishing effort over time, leading to a recovery of *ilish* stocks. The findings and recommendations will support the identification of a sustainable yield for the *ilish* fishery and prevent further biological and economic decline in Myanmar.

## 3.2 Illegal Wildlife Hunting and Trade

High demand from expanding illegal wildlife markets in neighbouring countries is rapidly threatening the endangered wildlife of Myanmar. Poverty and a lack of alternative livelihoods compound the situation.

## 3.3 Invasive Alien Species

Little is known about the status of invasive alien species in Myanmar, but a few IAS have been observed in the country, introduced primarily by water, air and/or land transport. Transboundary movement of IAS is potentially high along the Myanmar's international borders with India, Bangladesh, China, Laos and Thailand. IAS can also be introduced unintentionally by tourists or through the transport of cargo or movement of pets, plant parts, seeds and biological residues. Some IAS may be intentionally imported for use in of research, manufacture of medicine or ornamental and industrial uses. Though the impact of IAS has not been comprehensively assessed, some impacts on wetland ecosystems and natural forests have been observed.

## 3.4 Threats to Agrobiodiversity

A variety of human activities threaten the agrobiodiversity of Myanmar. Factors such as the replacement of local landraces with modern varieties, agricultural area expansion, overgrazing, dams and canal construction and urbanization are major threats to the agrobiodiversity of Myanmar. Compounding these, climate change further threatens the future biodiversity of the country. More efforts are needed to survey and inventory plant genetic resources (PGRs) in Myanmar since the previous collection missions have focused only on local areas or specific target crops. Financial constraints and a lack of well trained persons for ecogeographic studies of PGRs are also major constraints to surveying and inventorying agrobiodiversity in Myanmar. Large areas of the country remain to be explored, especially in the remote areas of the far north, highlands and border areas where indigenous plant diversity and farmers' knowledge have not yet been well documented.

## 3.5 The underlying Factors of Threats to Biodiversity

The underlying factors of threats to ecosystems and biodiversity can be stated as follows.

### 3.5.1 Poverty

The majority of Myanmar's population is poor, mainly relying on farming and natural resources for subsistence livelihoods. In particular, shifting cultivation and hunting in mountainous areas due to poverty decrease biodiversity. Although Myanmar has made notable progress in reducing poverty, 26 % of the population still remains below the poverty line (Ministry of National Planning and Economic Development, 2013). Unsustainable, natural resource-dependent livelihoods are strongly correlated with extreme poverty. The

poorest citizens are highly dependent on natural resources, particularly in upland areas. In many cases, use of natural resources by rural communities is potentially sustainable. However, various factors, including external economic forces, population growth, and loss of access to land, can lead to unsustainable levels of natural resource use, and degradation and loss of natural habitats. These problems have been worsened by decades of armed conflict in some, resulting in thousands of people abandoning their land. Poverty and land degradation in the uplands of Myanmar are linked in a mutually reinforcing cycle that is difficult to break. Short-term benefits are given priority in development projects, and the neglect of ecosystem and biodiversity values leads to failure to meet conservation targets. This seriously impacts ecosystems and biodiversity, particularly when funding for restoration or rehabilitation is lacking or insufficient.

### 3.5.2 Economic Growth and Increasing Consumption

While poverty is one major underlying factor for biodiversity loss, economic growth and increasing consumption are likely to be another in Myanmar, as they are throughout the World. Due to improvements in the political situation in Myanmar, foreign direct investment is now rising, resulting in economic growth. This could lead to increased use of natural resources. For example, increased construction work increases extraction of natural resources such as sand. In the short term economic growth will likely increase pressure on the country's natural resources. In the long term it may also offer additional resources for biodiversity conservation by lifting people out of poverty and providing increased funding for enforcement and education.

### 3.5.3 Increased Natural Resources Demand from Neighbouring Countries

Enhanced logging regulations and an expansion of the illegal wildlife market in neighbouring countries have increased pressure on Myanmar's natural forests and biodiversity. Most documented seizures of illegal timber and wildlife trade take place close to or en route to international borders.

### 3.5.4 Limited Environmental Safeguards

After enacting the Environmental Conservation Law on 30 March 2012, environmental safeguards are now required for development activities. However, much improvement is needed on the implementation and enforcement of this requirement.

### 3.5.5 Lack of Comprehensive Land-use Policies and Planning

In Myanmar, one of the major factors for forest degradation and habitat and biodiversity loss is a lack of land-use policies and planning. Moreover, unplanned expansion of commercial plantations, such as oil palm and cassava, is leading to large-scale conversion of forest areas. Under the guidance of the Union President, a Land Scrutinizing Committee was formed in 2013 to steer the development of a comprehensive Land Use Policy and Land

Use Management Plan. The committee is chaired by the Union Minister of the Ministry of Environmental Conservation and Forestry (MOECAF).

### 3.5.6 Undervaluation of Ecosystem, Ecosystem services and Biodiversity in Development Planning

Globally, market prices tend to reflect only the direct use values of natural resources, ignoring indirect contributions or inherent value. For this reason, natural resources tend to be severely undervalued. This is broadly the case in Myanmar, where decisions about natural resource use are typically based only on direct use values, such as timber or hydroelectric revenues. Generally, it is perceived that the immediate benefits of exploiting a natural resource are more attractive than the long-term benefits accrued from conservation of a resource, such as watershed protection, soil erosion control or other ecological services.

### 3.5.7 Limited Grassroots Support for Conservation

Although in general the people of Myanmar are supportive of conservation objectives, rural people living in close proximity to protected areas may not be supportive of conservation efforts and protected area management. Reasons for this may include low awareness about the objectives or value of conservation, lack of mechanisms for local communities to benefit from PAs, and limited opportunities for grassroots participation in conservation activities.

## 3.6 Climate Change Vulnerability

There have been no comprehensive studies on the impacts of climate change on biodiversity in Myanmar, but the country is likely to face the impacts of rising global average temperatures in several areas. The Projected Climate Change and Vulnerability report for Myanmar (2001-2100) predicts the following (NAPA 2013):

- A general increase in temperature across the country, particularly from December to May, with the Central and Northern regions experiencing the greatest increases;
- An increase in clear sky days, exacerbating drought periods;
- An increase in rainfall variability during the rainy season including an increase across the country from March to November (particularly in Northern Myanmar), and decrease between December and February;
- An increase in the risk of flooding resulting from a late onset and early withdrawal of monsoon events;
- An increase in the occurrence and intensity of extreme weather events, including cyclones/strong winds, flood/storm surges, intense rains, extreme high temperatures and drought.

It is currently difficult to predict detailed future national climate patterns due to a lack of localized data, but preparations nonetheless required to mitigate or adapt to the broad

trends that are expected. Some researchers have hypothesized that the dry zone of Myanmar is migrating slowly to the southeast and more comprehensive study and monitoring are urgently needed. Recently, the Department of Fisheries (DOF) prepared a proposal for a project “Fish Adaptation: Strengthening the adaptive capacity and resilience of fisheries and aquaculture-dependent livelihoods in Myanmar”, to submit to the Global Environment Facility (GEF). This project intends to improve fisheries policy and law for adaption of climate change, and to improve fisheries in marine, coastal and inland waters, that are likely to be highly vulnerable to climate change impacts.

# Part II Implementing the National Biodiversity Strategy and Action Plan and Mainstreaming Biodiversity

# Chapter 4 Implementing the National Biodiversity Strategy and Action Plan

## 4.1 National Biodiversity Strategy and Action Plan

Since 2009, the Forest Department (FD) of MOECAF developed a National Biodiversity Strategy and Action Plan (NBSAP) through multi-stakeholder consultation workshops and thematic working group meetings of individuals from government departments, NGOs and academic institutions. The NBSAP was finalized in 2011 and approved by the Union Government at Meeting No. 16/2012 on 3rd May, 2012.

The NBSAP is composed of six chapters, starting with a general description of Myanmar's biodiversity and the context for biodiversity conservation, followed by a discussion of threats. The NBSAP then moves into describing strategies for sustainable biodiversity conservation, and detailed Action Plans (2011-2030) to be implemented by relevant organizations.

The NBSAP is a national-level framework for guiding effective management and utilization, and has been disseminated to relevant organizations.

## 4.2 Assessment of NBSAP Implementation

Progress on implementation of the nine Action Plans that contribute to achieving the ten strategies in the NBSAP is presented below.

### 4.2.1 Action Plan toward Sustainable Forest Management

| No. | NBSAP Action Plans | Assessment of implementation (Implementing Agency) |
|---|---|---|
| 1 | Determine the Annual Allowable Cut (AAC) based on the needs of the changing socio-economic, environmental and silvicultural considerations and limit harvesting of timber of all species to the specified AAC. | ▪ Conducting forest inventory and calculate the AAC. (Forest Department-FD)<br>▪ Timber production will be in line with AAC starting 2015-16 fiscal year.<br>▪ Myanmar Certification Committee (MFCC) was formed to support sustainable forest management (SFM). (MOECAF) |
| 2 | Monitor prescriptions in forest working plans for sustainable forest management. | ▪ Reviewing and revising the 30-year national forestry master plan and district forest management plans to be in line with present conditions. (FD) |
| 3 | Provide a mechanism for involvement of international/ local institutions, local communities and NGOs, in forest planning, | ▪ Myanmar Forest Certification Committee (MFCC) is developing Forest Management Certification and Chain of Custody Certification to ensure that all forest products are extracted under SFM and follow systematic legal steps from cutting to end users. |

| No. | NBSAP Action Plans | Assessment of implementation (Implementing Agency) |
|---|---|---|
| | implementation, and evaluation. | MFCC is composed of government officials, experts from local institutions and NGOs. (MOECAF)<br>▪ Myanmar is promoting the Timber Legality Assurance System (TLAS) in collaboration with European Forest Institute (EFI), NGOs and INGOs. (MOECAF) |
| 4 | Conduct Environmental Impact Assessment (EIA) of forestry projects. | ▪ The Environmental Conservation Law (2012) prescribes that EIA should be conducted for development activities including large scale forest plantation establishment. (MOECAF) |
| 5 | Endorse and implement the National Code of Harvesting. | ▪ Reduced impact logging (RIL) methods are being applied to timber extraction. (Myanmar Timber Enterprise) |
| 6 | Impose effective law enforcement against encroachment, poaching, illicit logging and illegal extraction of forest products, and effective monitoring along international boundaries against illegal trade of forest products, wildlife, etc. | ▪ Nodal points have been designated between Myanmar and India to share information for enhancing collaboration on transboundary illegal wildlife and forest product trade. (FD)<br>▪ Illegal wildlife and forest product trade is being combated through collaboration of relevant enforcement organizations. (FD)<br>▪ In collaboration with TRAFFIC, two trainings on species identification were conducted for law enforcement officers. (FD)<br>▪ A forest police force was established and action to halt illegal logging has been strengthened. (FD) |
| 7 | Replant watershed areas to restore forest cover in critical watersheds. | ▪ Watershed conservation activities conducted between 2010 and 2012 include (FD):<br>▪ Natural forest conservation – 86,392 ha in 2010; 79,435 ha in 2011 and 79,894 ha in 2012.<br>▪ Enrichment planting – 3,217 ha in 2010; 3,177 ha in 2011 and 3,136 ha in 2012.<br>▪ Natural regeneration – 12,671 ha in 2010; 11,865 ha in 2011 and 10,429 ha in 2012.<br>▪ Forest plantation – 8,450 ha in 2010; 5,554 ha in 2011 and 3,076 ha in 2012.<br>▪ In collaboration with the Norwegian Institute of Water Resources (NIVA), capacity building on |

| No. | NBSAP Action Plans | Assessment of implementation (Implementing Agency) |
|---|---|---|
| | | integrated water resource management was conducted. (FD)<br>▪ Forest plantations are being established to conserve the watersheds above dams, reservoirs and rivers in central Myanmar. (Dry Zone Greening Department, DZGD)<br>▪ The "Inlay Lake Conservation and Rehabilitation Project" is undertaking improved watershed management with funding support from the Norwegian Government. (UNDP)<br>▪ The project "Developing Inlay Lake Conservation: A Plan for the Future" received funding support from the Norwegian Government. (Institute for International Development, IID)<br>▪ The project "Long Term Restoration and Conservation Plan for Inlay Lake" is supported by funding from the Norwegian Government. (UN-HABITAT) |
| 8 | Establish a mechanism for benefit sharing in community forestry programs through preparation of statutory agreements and other legislative supports. | ▪ In collaboration with the Regional Community Forestry Training Centre (RECOFTC), research underway on community forestry for strengthening community forestry instructions. (FD) |

**BOX 4. CONSERVATION OF THE BURMESE STAR TORTOISE (*Geochelone platynota*)**

The Burmese star tortoise is a critically endangered species endemic to the dry zone of central Myanmar. It is now believed to be extinct in the wild as a result of chronic subsistence harvesting and over-collection for the pet trade. Despite the imperilled status of wild populations, captive breeding efforts in Myanmar have proven extremely successful and resulted in a remarkable increase in numbers; over 3,000 star tortoises are held in facilities in Myanmar, and this number is increasing every year. Because the objective of any conservation-breeding program should ultimately be the reestablishment of viable wild populations of critically endangered species, a draft reintroduction protocol was developed for Minzontaung Wildlife Sanctuary (MWS) in 2011. As a prelude to the proposed reintroduction, a National Star Tortoise Conservation Workshop was held at Lawkanandar Wildlife Sanctuary in October 2012. Furthermore, an education and community outreach program funded by Disney Worldwide Conservation Fund was conducted during 2012 and 2013 in the villages surrounding the sanctuary to enlist local support for reintroduction efforts. Part of the latter project involved establishing a clandestine network of Community Conservation Volunteers (CCV) to provide information on illegal poaching, fuel wood collecting, and timber harvesting within the sanctuary. In keeping with our original proposal, a group of 150 captive-reared tortoises were selected for release, health assessments of these animals have been completed, pre-release pens built in the sanctuary, and a "donation ceremony" involving local Buddhist clergy and a shaman were conducted. The first group of 50 captive-bred tortoises is slated for release in April 2014, followed by a second group in November 2014, and the third group in April 2015. Given the potential value of star tortoises in the illicit wildlife trade, security remains a serious concern for the reintroduction program. Security at the assurance colony and holding pens is provided by MWS Rangers 24 hours a day, seven days a week. Once tortoises are released into the wild, active patrols will be conducted by Forest Department rangers. Additionally, the local police were informed about the project and remain alert for illegal activity.

### 4.2.2 Action Plan toward Sustainable Wildlife Conservation and Protected Area Management

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| 1 | Promote conservation education programs. | ▪ Public education is one of the major management activities in Pas. Between 2009 and 2013, 296 education activities were conducted for communities living around PAs. (FD)<br>▪ Biodiversity is included as a topic in university curricula. (Dagon University, Higher Education |

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| | | Department, Ministry of Education)<br>▪ Since 1 April 2013, environmental education programmes are being broadcast on Myanmar Radio. So far, 39 segments on environmental education. (Myanmar Radio and Television-MRTV)<br>▪ An educational programme on forests and the environment is being re-released on Myanmar Television. (MRTV)<br>Movies - 7<br>Songs - 18<br>TV Spot - 1<br>Extension - 16<br>Total 42<br>▪ During 2013, 55 news and 23 articles related to biodiversity were published in daily newspapers. (News And Periodical Enterprise)<br>▪ Public education on fish conservation and dolphin protection is being conducted. (Department of Fisheries - DoF) |
| 2 | Introduce buffer zone management in peripheral areas around PAs to achieve the harmonization between sustainability of biodiversity and sustainable development of local communities. | ▪ According to Protection of Wildlife and Natural Areas Rules (2002), buffer zones can be demarcated in or outside of PAs, and the extraction of forest product from buffer zones is allowed in a sustainable basis. (FD)<br>▪ The Protection of Wildlife and Natural Areas Rules (2002) allow the designation of core zone and buffer zone areas in PAs in order to protect. (FD)<br>▪ Conduct pilot community-based natural resource management in selected PAs as in preparation for introducing buffer zones. (FD and Wildlife Conservation Society-WCS)<br>▪ Introducing participatory ecosystem and biodiversity conservation and management. (FD and partner INGOs) |
| 3 | Strengthen ex-situ conservation and research roles of botanic | ▪ Increasing the number of zoological gardens from two to four. (FD) |

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| | and zoological gardens. | ▪ Strengthening staff capacity on ex-situ conservation. (FD)<br>▪ Collaboration with international botanical gardens. (FD)<br>▪ Public awareness is being raised and plant genetic resources are conserved through nine medicinal herb parks located across the country. (Department of Traditional Medicine-DTM) |
| 4 | Conduct status surveys of priority species, studying their distribution and link results to conservation management. | ▪ In collaboration with Norway, a marine ecosystem survey was conducted in 2013 to support the sustainable utilization of marine resources. (DoF)<br>▪ Annual bird surveys are being conducted at wetland PAs and the findings are linked with conservation planning. (FD)<br>▪ Population surveys on two endemic species, Myanmar Golden Deer (*Cervus eldi thamin*) and Myanmar Star Tortoise is being conducted regularly at relevant PAs, and the findings are linked with conservation and management planning. (FD)<br>▪ In collaboration with British Broadcasting Corporation (BBC), endangered wildlife has been surveyed with camera traps in and outside PAs. (FD)<br>▪ Research on fish is being conducted, and the results are linked to fisheries management. (DoF) |
| 5 | Check loss of biodiversity outside PAs. | ▪ Assess the population status and trend of Irrawaddy Dolphin along the Ayeyawady River. (DoF and WCS) |
| 6 | Strengthen conservation and management of biological diversity and promote sustainable use of biological resources in line with the CBD and national policies. | ▪ Increase number of PAs from 35 (26,214.29 $km^2$, 3.87 % of country area) in 2009 to 38 (37,932.23 $km^2$, 5.61 % of country area) in 2013. (FD)<br>▪ Biodiversity is integrated into national strategies and policies such as Millennium Development Goals, economic and social reform strategies, ASEAN social-cultural community, and individual ministry action plans. (Multiple agencies)<br>▪ Integrating biodiversity conservation and |

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| | | sustainable natural resource management in projects such as REDD+ initiatives. (FD)<br>▪ Developing a feasibility assessment report for conservation and development initiatives in the Brahmaputtra Salween Landscape in Northern Myanmar connected with the. (FD)<br>▪ Establishment of collaborative research programs for exploration and collection of local crop landraces and wild crop relatives throughout the country, particularly remote mountainous regions, conservation in Myanmar Seed Bank and duplicate materials were sent to international gene banks such as Global Seed Vault in Norway and RDA Gene Bank of Korea, enhancing local landrace utilization through field and laboratory characterization and evaluation. (Department of Agricultural Research-DAR)<br>▪ Current activities include on-farm management and improvement of PGR for food and agriculture. Local lowland and upland rice varieties and local soybean varieties were characterized and evaluated to select the promising varieties. Farmer-maintained local rice landraces were collected, propagated and screened for higher yield and pest and disease resistance. Under existing national policies, farmers are provided with technical assistance, quality seed and money before the rice sowing season. However, prioritization of on-farm management and improvement of PGR for food and agriculture within the relevant national activities needs to be established throughout the country. (DAR) |
| 7 | Promote local communities participation in biodiversity conservation and consider the benefits of local people in management to increase the positive perceptions and attitudes towards PAs and | ▪ Conduct pilot on community-based natural resource management in selected PAs. (FD and WCS)<br>▪ Introduce community participation in ecosystem and biodiversity conservation and management. (FD and partner INGOs)<br>▪ In collaboration with Istituto Oikos, Italy, management plan for Lampi Marine National Park |

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| | biodiversity conservation. | is being developed in consultation with multiple stakeholders including local communities. (FD)<br>▪ Strengthening community participation in conservation activities. (FD) |
| 8 | Monitor the ongoing process of NBSAP and implement it with participation of all stakeholders. | ▪ No management or steering committee has been formed for NBSAP implementation, but several activities across multiple sectors are strongly connected with NBSAP. |
| 9 | Promote regional coordination to protect the AHPs. | ▪ Implementation of the Biodiversity and Climate Change Project (BCCP) and Small Grant Program of ASEAN Centre for Biodiversity (ACB), and strengthening the conservation in ASEAN heritage parks (AHPs). (FD) |
| 10 | Collaborate with India, China, Thailand, Bangladesh and the CITES signatories to monitor illegal trade of forest and wildlife products along international boundaries. | ▪ Nodal points have been designated between Myanmar and India to share information for enhancing combat on transboundary trade in illegal wildlife and forest product. (FD)<br>▪ Myanmar is proposing that transboundary illegal wildlife trade ahould be addressed in the Brahmaputra Salween Landscape development and conservation initiatives, a regional program of ICIMOD to be implemented by Myanmar, India and China. (FD)<br>▪ Participating in CITES “Operation Cobra”. (FD)<br>▪ Forming the national wildlife law enforcement taskforce by the following institutions:<br>▪ FD<br>▪ Myanmar Police Force<br>▪ National Races and Border Areas Development Department<br>▪ Customs Department<br>▪ Union Attorney General’s Office<br>▪ Directorate of Trade<br>▪ General Administration Department |
| 11 | Implement priority needs for mammals, reptiles, amphibians, | ▪ Conservation actions are prioritized for endemic species (Myanmar golden deer and Myanmar star |

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| | birds and plants. | tortoise), endangered species (tiger and elephant) and migratory bird species (globally important species). (FD)<br>▪ Medicinal orchid species are propagated using tissue culture. To prevent over-collection from the wild, local communities are being encouraged to grow medicinal orchids in home gardens and homesteads through distribution of seedlings. (FD) |
| 12 | Monitor the impact of invasive alien species (IAS) on biodiversity. | ▪ Developing the methodology for controlling invasive alien plant species. (FD)<br>▪ Research on controlling *Mimosa diplotricha*. (FD)<br>▪ Examining the affect of *Prosopis juliflora* on the environment and local communities. (FD) |
| 13 | Develop measures for managing IAS. | ▪ Planning to build capacity to develop IAS protection plan. (FD) |

### 4.2.3 Action Plan toward Sustainable Freshwater Resource Management

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| 1 | Implement integrated water resource management using a river basin approach. | ▪ Address technical aspects of basin management and cooperate with the Mekong River Commission as a dialogue partner. (Directorate of Water Resources and Improvement of River Systems-DWRIRS)<br>▪ Forming a National Water Resources Committee to steer national integrated water resources management and basin planning. (Union Government)<br>▪ In collaboration with Norwegian Institute of Water Resources (NIVA), increased capacity for integrated water resource management. (FD) |
| 2 | Promote river training activities. | ▪ River trainings are being promoted in important rivers such as the Ayeyawady, Chindwin and Sittung Rivers. (DWRIRS)<br>▪ Strengthening capacity on river training. (DWRIRS)<br>▪ Conducting joint surveys and assessment with the |

| No. | NBSAP Action Plans | Implementation (Implementing agency) |
|---|---|---|
| | | international institutions to strengthen technical aspect in the river trainings. (DWRIRS) |
| 3 | Establish proper sewage treatment systems. | ▪ Sewage treatment systems are conducted in mega cities. (Yangon City Development Committee, YCDC; Mandalay City Development Committee, MCDC) |
| 4 | Construct wastewater treatment facilities in selected cities and areas. | ▪ Operating waste water treatment plant in Yangon, which treats 12,300 $m^3$/day of sewage from six townships in the downtown area serving a population of about 325,000. (YCDC) |
| 5 | List more wetlands in the ASEAN's wetlands of international importance. | ▪ Including wetland ASEAN Heritage Parks of Myanmar in the Biodiversity and Climate Change Project (BCCP) and Small Grant Program of ASEAN Centre for Biodiversity (ACB). (FD) |
| 6 | Increase participation in water resources program of the Mekong River Commission. | ▪ As a dialogue partner of Mekong River Commission, cooperating in the technical aspect with Mekong River Commission. (DWRIRS)<br>▪ Participating in conferences, workshops and flood forum, and presenting the technical papers. (DWRIRS)<br>▪ Participating in water resource management using a river basin approach and junior riparian professional program. (DWRIRS) |

### 4.2.4 Action Plan toward Ssustainable Management of Coastal, Marine and Island Ecosystems

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| 1 | Protect and check environmental damage to coastal areas of Myanmar. | ▪ Feasibility assessment on planning for improving conservation in coastal area and delta region. (DWRIRS)<br>▪ Conducting research on fish habitats such as mangrove, sea grass and coral reef, environmental education and community participated conservation in Myeik Archipelago under the Bay of Bengal Large Marine Ecosystem Project (BOBLME) of Food and Agricultural Organization (FAO). (DoF)<br>▪ Conducting joint surveys and assessments with |

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| | | international institutions to develop improved river basin and water resources trainings in the Ayeyawady Delta and coastal areas. (DWRIRS)<br>▪ Managing sand extraction in a systematic manner. (DWRIRS) |
| 2 | Stop fishing for species at risk until they are restored to their normal numbers or status. | ▪ Bann fishing in areas and waters inhabited by endangered fish, increase fish stock through hatcheries, contribute fish stock to local communities and educate fishermen and aquaculture farms through extension agents. (DoF) |
| 3 | Ban destructive fishing practices such as dynamiting, poisoning, electrocution, and using unauthorized fishing methods and gears; develop new practices to replace them. | ▪ In collaboration with relevant institutes and organ-izations, monitor fisheries, hold extension trainings to avoid destructive fishing methods (as defined under the Myanmar Marine fisheries Law(1990) and Freshwater Fisheries Law(1991)), order departmental instructions and restrictions. (DoF) |
| 4 | Conduct constant patrols and encourage research and long-term monitoring of unauthorized fishing. | ▪ Department of Fisheries and WCS conduct monitoring and surveillance at the Irrawaddy Dolphin Protected Area in collaboration with Local authorities and Local Police. (DoF) |
| 5 | Establish a coastal and marine research centre using university of marine science as a nucleus. | ▪ Though a University of Marine Science and a Marine Research Centre have not been formed yet, the Marine Science Department of Mawlamyaing University is conducting marine research. (Marine Science Department of Mawlamyaing University, Ministry of Education) |
| 6 | Conduct a survey of fish diversity. | ▪ Conducted a marine fisheries resource and oceanography survey in Myanmar waters with the financing and technical support of Norwegian Government. (DoF) |
| 7 | Develop participatory approaches for community based fishery resource conservation and management. | ▪ Raising rare and endangered fish species at aquaculture stations and restoring fish stocks in collaboration with local communities and local fishermen. (DoF)<br>▪ A fish survey of Indawgyi Lake was conducted in collaboration with experts from relevant institutes and with the support of Fauna and Flora International (FFI). (FD-FFI) |

### 4.2.5 Action Plan towards Sustainable Management of Land Resources

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| 1 | Adopt a well-defined or clear-cut land use policy aiming at sustainable development and ensuring environmental sustainability. | ▪ Formulating national land use policy in consultation with relevant stakeholders. (FD)<br>▪ National land use policy formulation is based on roadmap consisting of seven steps. (FD) |
| 2 | Formulate an integrated land use plan that takes into consideration national priorities and goals based on scientifically categorized different land uses. | ▪ Developing land use management plan under existing laws and procedures through multi-stakeholder consultation process. (FD)<br>▪ Pilot study is being conducted in Taungoo District for the development of land use management plan. (FD) |
| 3 | Establish a National Land Use Commission. | ▪ A National Land Scrutinizing Committee is leading land policy reform. (Government of Myanmar) |
| 4 | Practice EIA on conversion of land resources. | ▪ The Environmental Conservation Law, enacted 30th March 2012, specifies that EIAs must be prepared for any development project. (Environmental Conservation Department, ECD) |
| 5 | Increase knowledge of desert and mountain ecosystems and identify areas most at risk from floods, soil erosion, etc. | ▪ In collaboration with UNDP, Multi-hazard Risk Assessment in the Rakhine State of Myanmar (2011) and Natural Disaster Risk in Ayeyawady Delta Due to Climate Change (2010) were developed. (Relief and Resettlement Department-RRD) |
| 6 | Encourage proper water management in the dry zone. | ▪ One of the four major tasks of the Dry Zone Greening Department (DZGD) is the management and development of water resources in the dry zone of Myanmar. DZGD is implementing the following activities related to this task:<br>▪ Construction of small ponds, small earthen dams and check dams<br>▪ Proper utilization of underground water<br>▪ Construction of river water pumping systems<br>▪ Construction of rainwater harvesting tanks<br>▪ Greening mountainous areas through active afforestation<br>▪ Strengthening institutional capacity, extension |

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| | | services and rural livelihoods in the Central Dry Zone and Ayeyawady Delta regions of Myanmar to improve food security. This will be achieved by shifting Myanmar's agricultural R&D to farmers, effective extension outreach to farmers and implementing JICA-funded Water Saving Agriculture Development Projects in the Central Dry Zone of Myanmar. (DAR)<br>▪ Conducting trainings for the river water pumping projects. (DWRIRS) |
| 7 | Promote the practising of permanent agriculture in shifting cultivation affected area. | ▪ Promoting a transition from shifting cultivation to more permanent crops and improving ecosystems by implementing improved land use practices such as sloping agricultural land technology. (Department of Agriculture-DoA)<br>▪ Promoting community forestry and agroforestry. (FD) |

### 4.2.6 Action Plan toward Sustainable Management of Agriculture, Livestock and Fisheries (Linking with Agriculture and Livestock Biodiversity)

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| 1 | Conduct environmental analysis as part of land use planning to ensure that environmentally valuable lands and sensitive areas are not encroached on for agriculture expansion and thus avoiding adverse environmental impacts. | ▪ Assessment of impact of development activities on the environment and analysis for appropriate indicators in environmental performance assessments (EPA) in 2008 and 2010. (ECD)<br>▪ Preparing Myanmar's first State of the Environment Report (SoER) in collaboration with UNDP and UN-HABITAT. (ECD) |
| 2 | Stop unsustainable agricultural and other land uses leading to deforestation, soil degradation and desertification and develop appropriate sustainable farming systems such as sloping agricultural land technology (SALT), practising appropriate | ▪ Promoting replacement of shifting cultivation with more permanent crops, and improving ecosystem health by implementing land use practices such as sloping agricultural land technology. (DoA)<br>▪ Promoting community forestry and agroforestry. (FD) |

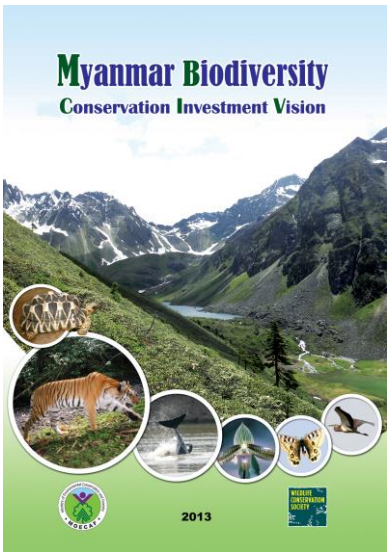
| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| | cropping patterns, and take measures to implement them. | |
| 3 | Monitor the use of chemical fertilizers and pesticides to prevent excessive overuse and soil and water pollution as well as destructive fishing practices. | ▪ Monitoring on registration, import and use of pesticides and research on water and soil management to reduce chemical fertilizer runoff. (DoA)<br>▪ Education on avoiding destructive fishing and the use of pesticides and chemical fertilizers that negatively affect natural resources. (DoF) |
| 4 | Drive enforcement of laws, order, rules and regulations in fisheries. | ▪ In collaboration with the coast guard, Myanmar Navy, Myanmar police force and local administration laws, rules and regulations relating to fisheries management are beingenforced. (DoF) |
| 5 | Promote protection of fisheries in sustainable development. | ▪ In collaboration with relevant organizations, conduct education on avoiding destructive fishing practices, monitoring fisheries and enforcing the Myanmar Marine fisheries Law (1990) and Freshwater Fisheries Law (1991) and following departmental instructions, orders and restrictions. (DoF) |
| 6 | Provide farmer-to-farmer technical extension services for sustainable food production. | ▪ Sharing knowledge and techniques of outstanding farmers through Farmer Channel TV and the weekly Farmer Journal. (DoA) |
| 7 | Drive increased agricultural production by raising productivity on existing lands rather than through opening up of new lands. | ▪ Improve agricultural production by promoting high quality/yield seeds, land reformand encouraging the production of marketable crops. (DoA)<br>In collaboration with the International Agricultural Research Centre of Australia, strengthen institutional capacity, extension services and rural livelihoods in the Central Dry Zone and Ayeyawady Delta regions.I Improving agricultural development and food security by shifting agricultural R&D to farmers and through effective farmer extension education. (DoA) |
| 8 | Promote organic farming and develop a national standard for certification. | ▪ Myanmar organic fertilizer standard has been developed, and government approval is required for certification. (DoA) |

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| 9 | Strengthen the institutional capacity and facility for national seed and gene bank at the DAR, Yezin. | ▪ With support of Japan International Cooperation Agency (JICA), seed banks, laboratory facilities and field equipment have been upgraded. (DAR)<br>▪ Plant genetic resources conservation and effective utilization trainings are annually conducted as part of a program to strengthen the capacity of seed bank staff. (DAR)<br>▪ Staff attend plant genetic resources conservation and effective utilization trainings abroad. (DAR)<br>▪ Local crops and wild varieties from throughoutMyanmar, including remote hill regions are collected and conserved under a research programme jointly implemented by the Myanmar National Seed Bank and international organizations. (DAR)<br>▪ Species conserved at the National Seed Bank are also submitted to the Global Seed Vault in Norway and Korea's RDA Gene Bank and the examination of PGR for strengthening plant propagation. (DAR)<br>▪ Selecting promising local rice and soya bean varieties for further research andimproving growing techniques. (DAR)<br>▪ Encouraging farmers to select high yield and pest resistant local rice varieties and to propagate these varieties.<br>▪ Improving PGR to improve crop quality, yield and adaptability to climate change. (DAR) |
| 10 | Create public awareness for PGR conservation. | ▪ Conserving medicinal plant genetic resources through conservation and raising public awareness at the nine medicinal herb parks located across the country,(DTM)<br>▪ Educating the public – through TV programmes, weekly journals and the NISM-GPA Myanmar website (National Information Sharing Mechanism on the Implementation of Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture NISM-GPA, www.pgrfa.org/gpa/mmr/mmrwelcom |

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| | | eil.html) – about the importance of plant genetic resources and promotingtheir participation in conservation. (DAR) |

**BOX 5. MYANMAR BIODIVERSITY INVESTMENT VISION (MBCIV)**

The Ministry of Environmental Conservation and Forestry (MOECAF) and the Wildlife Conservation Society (WCS) collaborated on the biodiversity conservation investment visioning process. This was conducted with the participation of a total of 85 stakeholders from government and civil society. The process included structured interviews with government agencies, local and international NGOs, universities, individual experts and private citizens. The results of this process led to the "Myanmar Biodiversity Conservation Investment Vision (MBCIV)", published in 2013.




This process achieved the following: a) an updated analysis of the policy, socioeconomic and civil society context for conservation efforts; b) a re-prioritization of threats to biodiversity and analysis of the drivers of its loss; c) integrated relevant results of research on climate change adaptation and mitigation into the analyses of biological priorities and strategies for conservation action; d) mapped out patterns of investment by conservation funders in the country, including governments, multilateral/bilateral agencies and foundations; e) engaged a wide constituency of stakeholders in defining a common conservation vision and reaching broad agreement on national priorities for investment in conservation action; and f) published the "Myanmar Biodiversity Conservation Investment Vision 2013" as an update of "Myanmar: Investment Opportunities for Biodiversity Conservation 2005".

This process also contributed to the implementation and updating processes of the National Biodiversity Strategies and Action Plan (NBSAP) and supported the strengthening of the protected area system in Myanmar.

### 4.2.7 Action Plan toward Sustainable Ecotourism

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| 1 | Introduce conservation awareness and environmental education into the syllabus of tourism related courses conducted by the Ministry of Hotels and Tourism (MOHT) | ▪ Including environmental education and conservation awareness in tourism related trainings. (Directorate of Hotels and Tourism, DHT)<br>▪ Covering nature-based tourism or ecotourism as topics in tourism related trainings. (FD) |

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| | and other relevant ministries. | |
| 2 | Develop an ecotourism policy that ensures benefits for local communities. | ▪ Including ecotourismdevelopment in the Myanmar Tourism Master Plan (20132020). (DHT)<br>▪ The following concept notes are being developed by the GMS Environment Operation Centre (EOC):<br>▪ Preparation of an Ecotourism Development Strategy for Protected Areas<br>▪ Preparation of a Regulation on the Distribution of Ecotourism Benefits |
| 3 | Train FD's staff to understand the essence of ecotourism as well as the needs of ecotourism operations in order to ensure the supporting of ecotourism for conservation. | ▪ Educating FD staff about ecotourism through departmental trainings. (FD) |
| 4 | Encourage private tour operators to undertake day-to-day ecotourism activities abiding by the rules and regulations of the PAs. | ▪ Travel and tourist agencies are being informed of rules to be obeyed by visitors at PAs. (FD) |

### 4.2.8 Action Plan toward Eenhancing Environmental Quality Management and Biosafety

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| 1 | Set up a special task force for facilitating environmental quality management and biosafety. | ▪ Facilitating biosafety related matters; examining concerns related toGMOs and issuing non-GMO Certificates. (DoA)<br>▪ Lecturing on the conservation of biosafety, environmental conservation and quality control in departmental trainings and aquaculture trainings. (DoF) |
| 2 | Enact the drafted Myanmar Environmental Protection Law. | ▪ Enacted the Environmental Conservation Law of Myanmar on 30 March 2012. (Union Government) |
| 3 | Develop national air quality standard taking into consideration the environmental | ▪ Developing industrial waste water quality standard as the first step to formulating an environmental quality standard. (Ministry of Science and |

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| | standard in other ASEAN countries. | Technology) |
| 4 | Promote air pollution monitoring sites. | ▪ Monitoring air pollution by setting up monitoring stations in Yangon and Mandalay. (YCDC and MCDC) |
| 5 | Develop public awareness to promote community involvement in monitoring and disposal of domestic wastes. | ▪ Public education and increasing awareness on waste disposal is regularly conducted in Yangon City. (YCDC)<br>▪ Programmes on reducing plastic bags use in cities. (YCDC and MCDC) |
| 6 | Strengthen sewage management systems and sewage treatment for domestic waste, especially in big cities. | ▪ Improving sewage management systems and sewage treatment in large cities, promoting private sector participation in waste collection, raising public awareness on domestic waste. (YCDC and MCDC) |
| 7 | Educate the general public to promote environmentally sound waste management including waste reduction, recycling and composting. | ▪ Public education programme for using waste as raw materials in recycling plants; 73 tons of waste recycled in 2012-2013 and 52 tons in 2013-2014 (as of December, 2013). fiscal years(YCDC) |
| 8 | Promote water quality management. | ▪ Water quality assessments at dams and along major rivers are being conducted regularly. (MOAI)<br>▪ Monitoring and control of drinking water quality. (Ministry of Health-MOH)<br>▪ Monitoring the water quality of private and industrial tube wells and issuing certificates of fitness for new tube wells. (MOH)<br>▪ Monitoring contamination of river water quality caused by mining. (Ministry of Mines)<br>▪ Controlling municipal waste discharge water. (YCDC)<br>▪ Control of treated water for industrial waste water. (Ministry of Industry)<br>▪ Monitoring water quality in major rivers. (Ministry of Transport) |
| 9 | Promote people awareness on persistence Organic pollutants | ▪ Public education on integrated pest management (IPM) to reduce PoPs and encourage development |

| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| | (PoPs). | of pest-resistant seedlings. (DAR) |
| 10 | Enforce the Conservation of Water Resources and Rivers Law enacted in 2006. | ▪ Support departmental orders, procedures and instructions to comply with the Conservation of Water Resources and Rivers Law. (DWRIRS) |
| 11 | Cooperate in carrying out River Water Qualities for ASEAN countries. | ▪ Since the year 2000, river quality has been measured at 52 stations along the Ayeyawady and Chindwin Rivers every February and March, and data and information are exchanged. (DWRIRS) |
| 12 | Advocate for enacting Biosafety Law. | ▪ A Biosafety Law (third draft) has been developed, and now requires revision in line with updated information and in consultation with stakeholders, before proceeding for approval. (DoA) |
| 13 | Raise public awareness on biosafety and food safety. | ▪ Public talk shows on biosafety and food safety are included in TV programs. (DAR) |

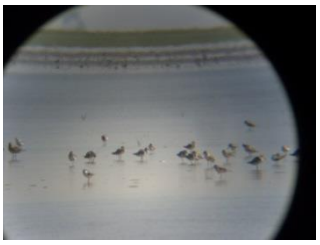
### 4.2.9 Action Plan toward Sustainable Management for Mineral Resource Utilization

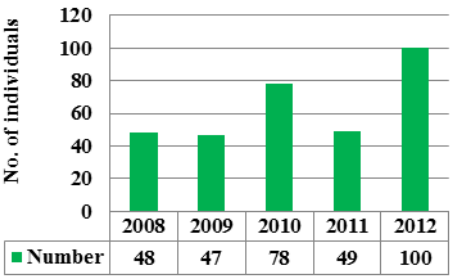
| No. | NBSAP Action Plans | Implementation (Implementing Agency) |
|---|---|---|
| 1 | Introduce EIA during exploration work. | ▪ Environmental Conservation Law (2012) requires EIAs for mineral exploitation projects. (ECD) |
| 2 | Undertake pilot projects for protection, rehabilitation and reclamation of mining areas. | ▪ Regulation of mining near rivers in accordance with the Conservation of Water Resources and Rivers Law/Rules. (DWRIRS)<br>▪ Strengthening capacity on risk management in mining and rehabilitation of mined areas. (Ministry of Mines-MoM) |
| 3 | Upgrade technical skills of those involved in mining operations. | ▪ Conducting pilot activities for conservation in mining areas, rehabilitation and mine closure plans. (MoM)<br>▪ Requiring EIAs and mine closure plans in mining applications. (MoM) |
| 4 | Assign experts for effective monitoring systems. | ▪ Strengthening technical capacity of staff. (MoM) |
| 5 | Identify appropriate locations for solid waste management. | ▪ Monitoring and strengthening capacity and education on solid waste disposal management. (MoM) |

## BOX 6. POACHER TO PROTECTOR

Generally, law enforcement and community outreach programmes are major activities in biodiversity conservation. Several studies have shown that law enforcement alone is not enough to achieve meaningful conservation. Furthermore, community outreach by itself may raise the awareness of the local communities on the importance of environment or certain species, but their behaviour or unsustainable practices can hardly be changed unless alternative or better livelihoods are provided. At least one species-focused project has successfully demonstrated that conservation can be achieved by creating alternative livelihoods.

The spoon-billed sandpiper is a critically endangered species with a global population believed to be below 400 individuals. The birds migrate from northeastern Russian to the Gulf of Mottama every winter. In 2010, a local NGO, Biodiversity and Nature Conservation Association (BANCA), held a series of consultation meetings with stakeholders including bird poachers and local government on how to shift from bird poaching to alternative livelihoods. The result was that targeted local communities – professional and opportunistic bird poachers – agreed to cease hunting sandpipers and engage in alternative livelihoods such as fishing, farming and raising poultry. These activities were supported by BANCA, with some conditions. Education programmes were conducted in the rest of the communities. Monitoring results reveal that bird hunting has decreased, and bird poachers have changed their livelihoods. As a result the sandpiper population is increasing.






This programme highlights that effective conservation can be achieved through three means; enforcement, outreach and livelihood support, particularly in dealing with economically marginalized people. Such good practices are fundamental to encourage stakeholder participation in conservation in the long run.

The next step is to further shift the local community from poachers to protectors by creating jobs and income sources through ecotourism and bird watching, thus building directly on the knowledge and experience of former bird poachers.

# Chapter 5 Mainstreaming Biodiversity

Myanmar is facing challenges in sustainable development, poverty reduction, achievement of its Millennium Development Goals, and harmonization of economic development and environmental stability. However, Myanmar is increasing efforts to balance economic development and environmental stability at a time when development investment is increasing rapidly due to political improvements, and has integrated this goal into national level planning frameworks, strategies and action plans.

The Government of the Republic of the Union of Myanmar is implementing a Framework for Economic and Social Reforms (FESR), which is directly connected with global, regional and national sustainable development strategies such as the Millennium Development Goals (MDGs), ASEAN Socio-Cultural Community Blueprint (ASCC), and National Comprehensive Development Plan (NCDP). All of these strategies highlight the need for biodiversity to be central to sustainable development.

## 5.1 Mainstreaming Biodiversity into Environment and Forestry Sector

One of the six areas addressed by the Myanmar Forest Policy (1995) is "safeguarding soils, water catchments, ecosystems, biodiversity and plant [and] animal genetic resources, scenic reserves and national heritage sites". One priority of this policy is to strengthen wildlife management through the establishment of a network of national parks, wildlife reserves and sanctuaries.

The Ministry of Environmental Conservation and Forestry formulated a 30-year national forestry master plan (NFMP) from 2001 to 2031, within which biodiversity conservation is given specific consideration. The NFMP target is to double protected area coverage to 10% of total land area within the plan period. As the NFMP is implemented, new district forest management plans now include the working cycle of local protected areas.

Lastly, the environmental conservation law (2012) forms the legal backbone for safeguards to biodiversity and ecosystems when development investment is planned.

## 5.2 Mainstreaming Biodiversity into Agricultural Sector

As the mainstreaming of biodiversity conservation in agriculture sector, Ministry of Agriculture and Irrigation (MOAI) is implementing plant genetic resources, conducting measures prevention of the potential impacts on biodiversity from agriculture, and the promotion of agricultural practices toenhance conservation of biological diversity.

Conservation on plant genetic resources has been initiated since 1990 by setting up Seed Bank, and MOAI has made efforts to expand existing ex situ conservation and enhance utilization of different crop species and their wild relative species.

As of December 2013, there have been nearly 12,000 accessions (i.e., samples) from 24 different crop species conserved in the Seed Bank. Also, passport data for 112 different

crop species are registered. Characterization data on 9,609 accessions from 22 different crop species are recorded at the Department of Agricultural Research.

For the development agriculture and food security, the plant genetic resources conserved at Seed Bank are sharing to local and international organizations for research, and plant propagation purposes using Standard Material Transfer Agreement (SMTA). Currently, the approaches for sharing benefits rising from plant genetic resources utilization are being developed.

Among the crop species conserved at Seed Bank, rice, wild rice, butter bean and banana varieties are propagated and conserved at Global Seed Vault of Norway, Gene Bank of International Rice Research Institute, RDA Gene Bank of Republic of Korea and International Center for Tropical Agriculture (CIAT) of Colombia so that that protection status of that crops are improved.

To strengthen public awareness and participation in plant genetic resources, in collaboration with FAO, National Information Sharing Mechanism on the Implementation of Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (NISM-GPA, www.pgrfa.org/gpa/mmr/mmrwelcomeil. html) is developed, and public awareness is also conducted through Farmers' Channel, Farmer's Journal, Argro-economy Journal and public media.

The Ministry of Agriculture and Irrigation has enacted several laws and regulations in order to prevent potential impacts on biodiversity from the agricultural sector. The Pesticide Law (1990) establishes regulations that reduce the impact of chemical pesticides on wild fauna and flora diversity. Other laws, including the Fertilizer Law (2002), the Plant Pest Protection Law (2011), and the Seeds Law (2011), seek to prevent the intrusion of plant pests, diseases and other invasive alien species into Myanmar.

Agricultural practices such as the conversion of shifting cultivation into more permanent crops, no-till agriculture and other soil improvement practices are being conducted in order to reduce soil erosion and enhance the diversity of soil microbes. Moreover, some biosafety measures such as inspection of genetically modified organisms (GMOs) and issuance of Non-GMO certificates are also being implemented by the Ministry of Agriculture and Irrigation, with the ultimate goal of enhancing biodiversity conservation.

## 5.3 Mainstreaming Biodiversity into Livestock and Fishery Ssector

In order to integrate biodiversity conservation into the livestock sector, the Ministry of Livestock, Fisheries and Rural Development implemented the Cattle Slaughter Prohibition Act (1947) and the Animal Health and Development Law (1994). Also, in cooperation with local and international organizations, the Livestock Breeding and Veterinary Department (LBVD) has conducted conservation of livestock biodiversity, especially in-situ conservation

of local buffalo and chicken breeds. Currently, the conservation of the locally important buffalo species *Shwe Ni* is being conducted in Salin Township, Magwe Region, and the in-situ conservation of local chicken species in Nyaung Oo Township, Mandalay Region and Hlegu Township in Yangon Region.

In terms of ex-situ conservation, semen from the mithun *(Bos frontalis)*, a semi-domestic bovine species found in Chin State, has been collected and conserved by cryo-preservation techniques and stored at the semen bank in the Artificial Insemination Section of the Livestock Breeding and Veterinary Department. Moreover, the phenotypic and genotypic characterization of domestic cattle, goats and chicken species is being conducted in Mandalay Region, Magwe Region and Shan State, in cooperation with the International Atomic Energy Agency (IAEA). In addition, the concept of biodiversity conservation, natural resource management and biosafety are being integrated in livestock breeding and capacity building training in order to raise awareness on biodiversity conservation among livestock breeding and veterinary staff.

Regarding biodiversity conservation in the fishery sector, the Department of Fisheries (DoF) has been monitoring freshwater and marine fishing activities, protection from overexploitation of endangered fish species, decreasing the use of destructive fishing methods through training and awareness, and the implementation of species-specific conservation in accordance with the Myanmar Marine Fisheries Law (1990), the Fresh Water Fisheries Law (1992) and other related rules and regulations.

The Department of Fisheries also established a fish breeding centre where endangered fish species are being bred, re-introduced into rivers, streams and other habitats, and distributed to local breeders.

A number of endangered sea turtles nest in Myanmar and reside in its territorial waters. Conservation of such species is being implemented in cooperation with international organizations. In order to conserve marine turtles, turtle hatching stations were established in Nga Pu Taw and Bogalay townships (Ayeyawady Region). These hatching stations conduct research and conservation activities, including collection of marine turtle eggs from threatened or disturbed nests, incubating them in artificial turtle nurseries, and later releasing them to the wild.

In 2005, the Department of Fisheries notified a protection area for the globally vulnerable Irrawaddy Dolphin (*Orcaella brevirostris*), in a section of the upper Ayeyawady River. Conservation activities such as regular patrols, awareness raising and law enforcement are being conducted in collaboration with the Myanmar Police Force, township authorities and local communities. In addition, a Shark Protection Area was established off of the Tanintharyi coast, stretchingfrom Ross Island to Lampi Island, with the objective of protecting endangered shark species from extinction.

## 5.4 Mainstreaming Biodiversity into Education Sector

The Government of Myanmar recognizes the important role of the education sector in the long term conservation of biodiversity. Therefore, the concepts of biodiversity conservation are integrated in teaching curricula, seminars, talks and workshops activities.

Starting at the primary level, concepts of basic ecology, the environment and biodiversity are included in courses with the goal of promoting environmental awareness among students. Also, subjects related to environmental studies, conservation and management are included in post-graduate studies, while subjects related to ecology and biodiversity are taught in undergraduate courses at numerous universities and institutes under the Department of Higher Education (DHE). Every year, post-graduate and doctoral research related to biodiversity conservation is conducted by the various departments of zoology and botany under the DHE.

## 5.5 Mainstreaming Biodiversity into Trade Sector

With the aim of reducing biodiversity loss, the Ministry of Environmental Conservation and Forestry (MOECAF) is taking action against the illegal trade of forest products, wildlife and their parts in accordance with the Forest Law (1992) and Protected of Wildlife and Protected Areas Law (1994). Moreover, in order to implement effective law enforcement activities against the illegal wildlife trade, a National Wildlife Law Enforcement Taskforce was established in 2007, and restructured in 2011 with representatives from seven line departments responsible for combating illegal wildlife trade.

In order to secure the conservation of endangered species, the Ministry of Commerce is issuing import and export certificates in consultation with the Ministry of Environmental Conservation and Forestry for forest and wildlife products, Ministry of Agriculture and Irrigation for agricultural products, and Ministry of Livestock, Fisheries and Rural Development for livestock and aquatic products. At the same time, as a signatory to the Convention on International Trade of Endangered Species (CITES), trade in endangered wild flora and fauna are being regulated by the Myanmar CITES Management Authority through issuance of CITES Export and Import Permits in line with the rules and regulations of the Convention.

**BOX 7. CONSERVATION OF THE BURMESE ROOFED TURTLE (*Batagur trivittata*) IN THE WILD AND CAPTIVITY**

The Burmese Roofed Turtle is a globally endangered species endemic to Myanmar and known only in the Ayeyawady, Chindwin, Sittaung, and lower Salween rivers. Historically reported to be common, it has declined in the face of rampant egg collection, conversion of nesting beaches to seasonal agricultural fields, and chronic over-harvesting of adults by fishermen. By the 1970s the Burmese Roofed Turtle was assumed to be extinct until it was "rediscovered" in Dokthawady River during a 2001 expedition lead by the Wildlife Conservation Society (WCS). Subsequently, turtles obtained from the Chindwin River and temple ponds in Mandalay were used to found a captive assurance colony at the Yadanabon Zoological Gardens. Additionally, an aggressive in situ conservation programme was implemented along the upper Chindwin River to arrest declines among the few remaining wild turtles. This programme is based at Limpha Village and consists of; 1) protection and monitoring of nesting beaches by locally hired "conservation wardens", 2) collection and transport of eggs to a protected beach for incubation, 3) headstarting of hatchling turtles, and 4) an education and outreach campaign. Over 700 turtles have been hatched and reared successfully as part of the headstarting programme. In situ conservation efforts continue on the upper Chindwin River. Three staff are now permanently designated at the headstarting facility in Limpha village and are also responsible for liaising with fishermen to reduce potential losses of turtles in fishing gear, and supervising beach monitoring and collection of turtle eggs for incubation. In the wild, the number of wild breeding female roofed turtles has remained relatively stable since 2006. A recent survey found evidence that an additional female is nesting along Nam Thalet Chaung. However, with fewer than 10 females remaining in the wild, this aggressive conservation programme must be continued if this population is to survive.

## 5.6 Mainstreaming Biodiversity into Health Sector

In order to integrate the conservation of biodiversity, the Ministry of Health developed "the National Environment and Health Action Plan" in 2010 in collaboration with the National Commission on Environmental Affairs (NCEA), now reformed into the Environmental Conservation Department of MOECAF. Moreover, the Ministry of Health has been implementing the Community-Based Arsenic Mitigation Project in order to address the contamination of arsenic in rivers, streams and tube wells that can affect both public health and the survival of aquatic species.

In order to achieve effective conservation of rare and endangered medicinal plant species, the Department of Traditional Medicine has established the National Herbal Park and eight other herbal plant conservation gardens. In order to conserve the traditional practices and genetic resources of traditional medicine, the Department of Traditional Medicine has

also established the National Museum of Traditional Medicine and National Herbarium of Medicinal Plants in Nay Pyi Taw, and a Museum of Traditional Medicine at the University of Traditional Medicine in Mandalay.

Moreover, in order to conserve indigenous knowledge of traditional medicine, eight checklists of traditional plants and their indigenous usage have been published by the Department of Traditional Medicine and the Department of Medical Research.

## 5.7 Mainstreaming Biodiversity into Mining Sector

In order to minimize negative environmental impacts, the Ministry of Mines enacted the Myanmar Mines Law in 1994 and has since implemented conservation activities including inspection of mines, mineral conservation, mining related environmental controls, restoration of mining affected areas, content and methodology for Environmental and Social Impact Assessments of mine operations, and regulations requiring environmental restoration and health care plans to be included in project proposals.

At present, the Myanmar Mines Law (1994) is being revised to integrate regulations on reducing impacts to the environment and biodiversity as well as promoting "green mining" activities in line with the international guidelines.

Apart from the Myanmar Mines Law, the Ministry of Mines also integrates regulations related to environmental conservation in other laws related to mining such as the Myanmar Gemstone Law (1994), which provides regulations to prevent deforestation and water or soil pollution due to gemstone mining, and the Myanmar Pearl Law (1995) which provides regulations to prevent extinction of oysters in Myanmar's coastal areas.

## 5.8 Mainstreaming Biodiversity into Science and Technology Sector

The Ministry of Science and Technology (MoST) has been conducting scientific research on microbial conservation, plant resource conservation in tissue culture, and the conservation of semi-domesticated mithun (*Bos frontalis*) through systematic breeding.

In terms of microbial conservation, MoST has established an integrated team to conduct research on microbial utilization in biofertilizer, biofungicides, biopesticides, microbial plant-growth hormones and the production of secondary metabolites. This team is trying to exploit and conserve indigenous microbes which are being scientifically identified and used for industrial, social and rural development.

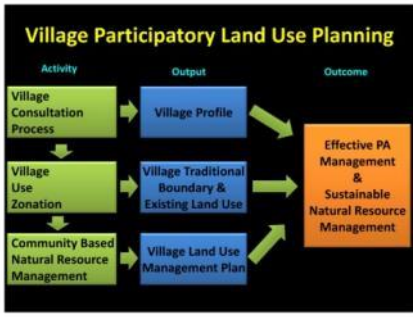
In order to promote the conservation of PGR and conduct scientific research on plant tissue culture, MoST established a Plant Tissue Culture Laboratory at the Department of Biotechnology in 1998. For the first ten years, most research concentrated on micropopagation of ornamental plants such as orchids. But since 2009, research activities have extended to fruit trees including bananas, sweet orange, dragon fruit and pineapple. Moreover, due to the growing importance of the conservation of medicinal plants,

micropropagation studies of local medicinal plants have expanded and the production of bioactive compounds with medicinal values are being conducted using plant cell culture techniques.

Lastly, the Department of Animal Biotechnology under Kyayk Se Technological University has carried out systemic breeding of mithun (*Bos frontalis*) for milk production. Breeding and cross-breeding were performed and calves distributed to farmers located in the areas of Mandalay, Magwe and Mawlamyaing for socio-economic development.

**BOX 8. COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT (CBNRM)**

The Forest Department (FD) and the Wildlife Conservation Society (WCS) have been collaborating on Community Based Natural Resource Management (CBNRM) as a tool to enhance community participation in protected area management and sustainable natural resource use by local communities. This work is carried out under the existing legal framework of the Wildlife and Protected Area Law (1994). The process involves three interconnected activities – Village Consultation Process (VCP), Village Use Zonation (VUZ) and Community Based Natural Resource Management (CBNRM) as integral parts of village participatory land use planning.




During the VCP, survey teams conduct a village timeline, listing and ranking natural resources, assessing the trends of key resources, analyzing household income and expenditure, and projecting population growth. A village profile is then developed combining all information collected during this process, which serves as a baseline to assess future socio-economic change.

During zonation, the villager's traditional boundary and existing land uses are identified through participatory sketch mapping. Major landmarks along the village boundary and main land use types are verified through participatory ground truthing using GPS. For sustainable natural resource management, participatory resource inventories are conducted and a natural resource management area is identified. The village then develops a management plan for their NRM area based on measured supply and demand. Entrepreneur villagers are identified and supported to develop their own individual plans for agroforestry. Village nurseries are also established to supply seedling needs for these individual plans.

CBNRM is being practiced in 17 villages in Hkakaborazi National Park, 32 villages in Hukaung Valley Wildlife Sanctuary, 19 villages in Htamanthi Wildlife Sanctuary, and eight villages in Minsontaung Wildlife Sanctuary. This process will be rolled out to other protected areas.

## PART III Progress towards Aichi Biodiversity Targets and Contributions to the Targets of the Millennium Development Goals

# Chapter 6 Implementing 2020 Aichi Biodiversity Targets

Myanmar formulated its NBSAP in April 2009. The CBD COP 10, held in October in 2010 in Nagoya, Japan, further introduced the "Aichi Biodiversity Targets" to 2020. Thus although Myanmar's NBSAP does not incorporate the Aichi Targets, the specific action plans within the NBSAP still help achieve the Aichi Targets.

## 6.1 Link the Action Plans of NBSAP with 2020 Aichi Biodiversity Targets

| Aichi Target | Actions identified within the Myanmar NBSAP (2012) |
|---|---|
| ***Strategic goal A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.*** | |
| 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 | ▪ Promote conservation education programmes.<br>▪ Create public awareness for PGR conservation.<br>▪ Introduce environmental education into the syllabi of tourism related courses.<br>▪ Educate the general public to promote environmentally sound waste management including waste reduction, recycling and composting.<br>▪ Promote people awareness on PoPs.<br>▪ Raise public awareness on biosafety and food safety. |
| 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 nation accounting, as appropriate, and reporting systems | ▪ Introduce buffer zone management in PAs to achieve sustainability of biodiversity and sustainable development of local communities.<br>▪ Strengthen conservation and management of biological diversity and promote sustainable use of biological resources.<br>▪ Promote local communities participation in biodiversity conservation and consider the benefits of local people in management.<br>▪ Develop participatory approaches for community-based fishery resource conservation and management.<br>▪ Conduct EIAs. |

| | Aichi Target | Actions identified within the Myanmar NBSAP (2012) |
|---|---|---|
| 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 | ▪ Introduce buffer zone management in PAs to achieve sustainability of biodiversity and sustainable development of local communities.<br>▪ Strengthen conservation and management of biological diversity and promote sustainable use of biological resources.<br>▪ Monitor the use of chemical fertilizers and pesticides to prevent excessive overuse.<br>▪ Promote organic farming and develop a national standard for certification.<br>▪ Develop an ecotourism policy that ensures benefits for local communities.<br>▪ Set up a special task force for facilitating environmental quality management and biosafety.<br>▪ Enact the drafted Myanmar Environmental Protection Law. |
| 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 | ▪ Determine the Annual Allowable Cut (AAC) based on the changing socio-economic, environmental and silvicultural considerations.<br>▪ Monitor prescriptions in forest working plans for sustainable forest management.<br>▪ Impose effective law enforcement against illegal activities on wildlife and effective monitoring along international boundaries.<br>▪ Ban destructive fishing practices and develop new practices to replace them.<br>▪ Conduct constant patrols and encourage research and long-term monitoring of unauthorized fishing.<br>▪ Adopt a well-defined or clear-cut land use policy.<br>▪ Promote protection of fisheries in sustainable development.<br>▪ Conduct research on sustainable means of food production, processing and utilization.<br>▪ Drive increased agricultural production by raising productivity on existing lands.<br>▪ Develop activities related to sustainable pasture |

| Aichi Target | Actions identified within the Myanmar NBSAP (2012) |
|---|---|
| | land use. |
| ***Strategic goal B. Reduce the direct pressures on biodiversity and promote sustainable use.*** | |
| 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 | ▪ Reforest watershed areas to restore forest cover in critical watersheds.<br>▪ Protect and check environmental damage to coastal areas of Myanmar.<br>▪ Ban destructive fishing practices.<br>▪ Adopt a well-defined or clear-cut land use policy.<br>▪ Formulate an integrated land use plan that takes into consideration national priorities and goals based on scientifically categorized different land uses.<br>▪ Establish a National Land Use Commission.<br>▪ Practice EIA.<br>▪ Promote the practising of permanent agriculture in shifting cultivation affected area.<br>▪ Undertake pilot projects for protection, rehabilitation and reclamation of mining areas. |
| 6. By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying eco-system 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 | ▪ Protect and check environmental damage to coastal areas.<br>▪ Stop fishing for species at risk until they are restored to their normal numbers or status.<br>▪ Ban destructive fishing practices.<br>▪ Conduct constant patrols and encourage research and long-term monitoring of unauthorized fishing.<br>▪ Establish a coastal and marine research centre using university of marine science as a nucleus.<br>▪ Conduct a survey of fish diversity.<br>▪ Develop participatory approaches for community based fishery resource conservation and management.<br>▪ Drive enforcement of laws, order, rules and regulations in fisheries. |

| Aichi Target | | Actions identified within the Myanmar NBSAP (2012) |
|---|---|---|
| 7. | By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity | ▪ Monitor prescriptions in forest working plans for sustainable forest management.<br>▪ Impose effective law enforcement against illegal activities on wildlife.<br>▪ Introduce buffer zone management in PAs to achieve sustainability of biodiversity and sustainable development of local communities.<br>▪ Implement integrated water resource management using a river basin approach.<br>▪ Ban destructive fishing practices.<br>▪ Conduct a survey of fish diversity.<br>▪ Conduct research on sustainable means of food production, processing and utilization.<br>▪ Drive increased agricultural production by raising productivity on existing lands.<br>▪ Develop activities related to sustainable pasture land use. |
| 8. | By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity | ▪ Conduct Environmental Impact Assessment (EIA).<br>▪ Establish proper sewage treatment systems.<br>▪ Construct wastewater treatment facilities in selected cities and areas.<br>▪ Set up a special task force for facilitating environmental quality management and biosafety.<br>▪ Enact the drafted Myanmar Environmental Protection Law.<br>▪ Develop national air quality standard.<br>▪ Promote air pollution monitoring sites.<br>▪ Encourage training for technical persons on air quality management.<br>▪ Develop public awareness to promote community involvement in monitoring and disposal of domestic wastes.<br>▪ Network with other ASEAN countries for sharing cleaner production technologies.<br>▪ Educate the general public to promote environmentally sound waste management including waste reduction, recycling and |

| Aichi Target | Actions identified within the Myanmar NBSAP (2012) |
|---|---|
| | composting.<br>▪ Promote water quality management.<br>▪ Promote people awareness on PoPs.<br>▪ Enforce the Conservation of Water Resources and Rivers Law enacted in 2006.<br>▪ Cooperate in carrying out River Water Qualities for ASEAN countries.<br>▪ Upgrade technical skills of those involved in mining operations.<br>▪ Identify appropriate locations for solid waste management. |
| 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 | ▪ Collaborate with neighbouring countries and CITES signatories to monitor the trade of introduced species.<br>▪ Monitor the impact of IAS on biodiversity.<br>▪ Develop measures for managing IAS. |
| 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 | ▪ Protect and check environmental damage to coastal areas.<br>▪ Ban destructive fishing practices.<br>▪ Conduct constant patrols and encourage research and long-term monitoring of unauthorized fishing.<br>▪ Establish a coastal and marine research centre using university of marine science as a nucleus.<br>▪ Develop participatory approaches for community based fishery resource conservation and management.<br>▪ Monitor the use of chemical fertilizers and pesticides to prevent excessive overuse.<br>▪ Drive enforcement of laws, order, rules and regulations in fisheries.<br>▪ Promote protection of fisheries in sustainable development. |

| Aichi Target | Actions identified within the Myanmar NBSAP (2012) |
|---|---|
| ***Strategic goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.*** | |
| 11. By 2020, at least 17 per cent of terrestrial and inland water areas 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 seascape | ▪ Introduce buffer zone management in PAs to achieve sustainability of biodiversity and sustainable development of local communities.<br>▪ Conduct status surveys of priority species, studying their distribution and link results to conservation management.<br>▪ Check loss of biodiversity outside PAs.<br>▪ Promote local communities participation in biodiversity conservation and consider the benefits of local people in management.<br>▪ Promote regional coordination to protect the AHPs.<br>▪ Implement priority needs for mammals, reptiles, amphibians, birds and plants. |
| 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 | ▪ Impose effective law enforcement against illegal activities on wildlife.<br>▪ Strengthen ex-situ conservation and research roles of botanic and zoological gardens.<br>▪ Conduct status surveys of priority species, studying their distribution and link results to conservation management.<br>▪ Check loss of biodiversity outside PAs.<br>▪ Promote local communities participation in biodiversity conservation and consider the benefits of local people in management.<br>▪ Monitor the ongoing process of NBSAP and implement it with participation of all stakeholders.<br>▪ Collaborate with neighbouring countries and CITES signatories to monitor illegal trade of wildlife.<br>▪ Implement priority needs for mammals, reptiles, amphibians, birds and plants.<br>▪ Conduct a survey of fish diversity. |

| Aichi Target | Actions identified within the Myanmar NBSAP (2012) |
|---|---|
| 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 | ▪ Strengthen ex-situ conservation and research roles of botanic and zoological gardens.<br>▪ Provide farmer-to-farmer technical extension services for sustainable food production.<br>▪ Commission a study on genetic diversity and conservation for local livestock breeds.<br>▪ Promote organic farming and develop a national standard for certification.<br>▪ Strengthen the institutional capacity and facility for national seed and gene bank at the DAR, Yezin.<br>▪ Create public awareness for PGR conservation.<br>▪ Develop sui generis system for protecting Myanmar's PGR. |
| ***Strategic goal D: Enhance the benefits to all from biodiversity and ecosystem services.*** | |
| 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 | ▪ Provide a mechanism for involvement of relevant stakeholder in forest planning, implementation, and evaluation.<br>▪ Establish a mechanism for benefit sharing in community forestry programs.<br>▪ Introduce buffer zone management in peripheral areas around PAs to achieve the harmonization between sustainability of biodiversity and sustainable development of local communities.<br>▪ Promote local communities participation in biodiversity conservation and consider the benefits of local people in management.<br>▪ Develop participatory approaches for community based fishery resource conservation and management.<br>▪ Develop an ecotourism policy that ensures benefits for local communities. |

| Aichi Target | Actions identified within the Myanmar NBSAP (2012) |
|---|---|
| 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% of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification | ▪ Monitor prescriptions in forest working plans for sustainable forest management.<br>▪ Reforest watershed areas to restore forest cover in critical watersheds.<br>▪ Increase knowledge of desert and mountain ecosystems and identify areas most at risk from floods, soil erosion, etc.<br>▪ Promote the practising of permanent agriculture in shifting cultivation affected area.<br>▪ Conduct environmental analysis as part of land use planning to ensure that environmentally valuable lands and sensitive areas are not encroached on for agriculture expansion.<br>▪ Stop unsustainable agricultural and other land uses leading to deforestation, soil degradation and desertification and develop appropriate sustainable farming systems.<br>▪ Undertake pilot projects for protection, rehabilitation and reclamation of mining areas. |
| 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 | ▪ Establish a mechanism for benefit sharing in community forestry programs through preparation of statutory agreements and other legislative supports.<br>▪ Commission a study on genetic diversity and conservation for local livestock breeds.<br>▪ Strengthen the institutional capacity and facility for national seed and gene bank at the DAR, Yezin. |
| ***Strategic goal E. Enhance implementation through participatory planning, knowledge management and capacity-building*** | |
| 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 | ▪ Strengthen conservation and management of biological diversity and promote sustainable use of biological resources in line with the CBD and national policies.<br>▪ Monitor the ongoing process of NBSAP and implement it with participation of all stakeholders. |

| Aichi Target | | Actions identified within the Myanmar NBSAP (2012) |
|---|---|---|
| 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 | ▪ Introduce buffer zone management in PAs to achieve sustainability of biodiversity and sustainable development of local communities.<br>▪ Establish a mechanism for benefit sharing in community forestry programs through preparation of statutory agreements and other legislative supports.<br>▪ Promote local communities participation in biodiversity conservation and consider the benefits of local people in management.<br>▪ Provide farmer-to-farmer technical extension services for sustainable food production. |
| 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 | ▪ |
| 20. | By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties | ▪ Provide a mechanism for involvement of international/local institutions, local communities and NGOs, in forest planning, implementation, and evaluation.<br>▪ Monitor the ongoing process of NBSAP and implement it with participation of all stakeholders. |

## 6.2 Implementing the 2020 Aichi Biodiversity Targets

As mentioned, the Myanmar NBSAP does not include the 2020 Biodiversity Targets or Aichi Biodiversity Targets that appeared at CBD COP 10. Although several activities under the NBSAP also contribute to the Aichi targets (see Section 6.1), Myanmar needs to revise its NBSAP to meet Aichi commitments, particularly for the following:

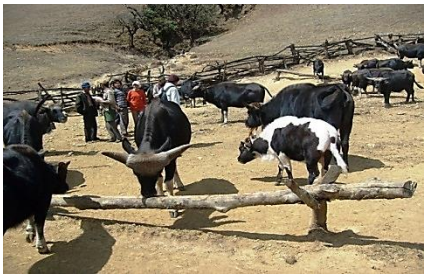
- Target 19: *By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied*
- Target 20: *By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties*.

In this regard, Myanmar is preparing to update the NBSAP through a similar multi-stakeholder consultation process as was used for the current version.

Since Myanmar's NBSAP was adopted by the Union Government in 2012, and is valid for twenty years (2011-2030), it is not necessary to completely rewrite the plan. Updating will therefore be focused on addressing any gaps between the current NBSAP and the Aichi Targets.

The most important aspect to be considered in updating the NBSAP is to include national targets that contribute to global targets, and measurable indicators of progress towards their achievement.

## BOX 9. MITHUN CONSERVATION



The mithun is the domesticated form of the Gaur (*Bos frontalis*). Also known as the "Cattle of Hilly Regions", it is found in mountainous areas of north-west Myanmar, particularly in Chin State. The mithun plays an important role in the day to day socio-economic life of the local tribal population, but has been gradually decreasing due to pressure for meat production. In this region, there is no systemic breeding programme. In response, in 2008 the Department of Animal Biotechnology of Kyauk Se Technical University initiated systematic mithun breeding using thirteen females and two males.

Mithun were thence distributed to farmers from Mandalay, Magwe and Mawlamyaing, and kept in the same conditions as local zebu and dairy cattle. Breeding and cross-breeding were performed, and 60 calves were produced from adult female mithun. Six females were artificially bred using Holstein semen straws. In total, six cross-bred mithun – three males and three females – were obtained. Results indicated that heterosis in mithun is very high, because all offspring crossbred from dairy cattle exhibited mithun phenotypicality. These F1 offspring (female) are further bred for studying milk production, and the results are still awaited. Generally, pure-bred mithun and crossbred offspring exhibited good adaptation to environmental change, and did not show any indication of heat stress. Therefore, mithun may be successfully reared with semi-intensive systems in tropical settings.

# Chapter 7 Biodiversity Conservation Relevant to Millennium Development Goals

As a signatory party to the Millennium Declaration since September 2010, Myanmar is taking great steps to achieve the Millennium Development Goals (MDGs). Myanmar is following the fundamental principles of the Millennium Declaration, and the principles are included within the national Framework for Economic and Social Reform (FESR). Of the eightMDGs, number seven refers to biodiversity conservation matters:

| Target | Indicators to monitor progress |
|---|---|
| **Target 7.A**<br>Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources | *Proportion of land area covered by forest* |
| **Target 7.B**<br>Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss | *Proportion of terrestrial and marine areas protected*<br>*Proportion of species threatened with extinction* |

## 7.1 Proportion of Land Area Covered by Forest

According to national forest cover assessments conducted by the Forest Department, the total forested area covered 61 per cent and 59 per cent of Myanmar's terrestrial area in 1975 and 1989 respectively. Between 1975 and 1989 forest loss amounted to 2 per cent of Myanmar's total area (1989 Forest Cover Appraisal, Forest Department). Estimates by FAO and the Forest Department (2010) indicate that the total forest area has been steadily decreasing over the past several years: 1990(58 per cent), 2000 (52 per cent), 2005 (49 per cent) and 2010 (47 per cent) of the total land area. These data show a remarkable loss of forest cover (11 per cent of total terrestrial area) in the twenty years from 1990 to 2010.

The major drivers of deforestation are increased population, high demand for timber and wood fuel, agricultural expansion, urbanization, and development of infrastructure such as dams, reservoirs, roads etc. The Myanmar population reached about 60 million in 2013 whereas it was 57.25 million in 1998.

In order to control deforestation and increase forest cover, Myanmar is strengthening sustainable forest management practices, expanding the permanent forest estate, establishing forest plantations, developing community forestry, and strictly implementing the Myanmar Selection System.

Achievements include an increase in the area of reserved forests and protected public forests from 22.75 per cent of the total land area in 2005, to 25.01 per cent in 2013. The Myanmar Forest Policy further targets further expansion to 30 per cent by 2030-2031.

To reduce timber extraction from natural forests and to restore degraded forest areas, private investment in plantations has been promoted since 2006/07. Forest plantations can be categorized as economic, watershed protection, industrial or village used/woodlot. The annual planting rate of forest plantations increased to 33,499 hectares from 2000 to 2013, while increasing by 30,842 hectares between 1981and 1999.

Although past timber harvests exceeded the annual allowable cut, logging has been reduced since 2013 to within the allowable cut and in line with the existing Myanmar Selection System. It is also planned to ban log exports from 2014 onward and there are plans to further decrease timber production in accordance with the allowable cut.

## 7.2 Proportion of Protected Land and Water Areas

One of six imperatives of the Myanmar Forest Policy (1995) is "safeguarding soils, water catchments, ecosystems, biodiversity and plant animal genetic resources, scenic reserves and national heritage sites". The main objective of this imperative is to strengthen wildlife management through establishment of a network of national parks, wildlife reserves and sanctuaries. Furthermore, the 30-year forestry sector master plan targets protected area coverage at 10% of country area by 2030. As of March 2014, 38 areas, covering 5.61% of country's area, have been established as protected areas. Another seven areas (1.19%) have been proposed for futurePA designaton (Table 5); this would result in PAs covering 6.81%. Additional PAs will be designation to meet the national target of 10% or more.

Among the 45 established and proposed PAs, only four are marine Pas, despite Myanmar's long coastline and large marine area. There is a real and pressing need to protect a greater proportion of marine area by designation of marine PAs.

**Table 5.** Establishment of Protected Areas in Myanmar.

| No. | Status of notification | Number | Total area ($km^2$) | % of total land area |
|---|---|---|---|---|
| 1 | Notified Protected Areas | 38 | 38029.23 | 5.61 |
| 2 | Proposed Protected Areas | 7 | 8062.89 | 1.19 |
| | **Total** | **45** | **46092.13** | **6.81** |

## 7.3 Proportion of Threatened Species

According to the IUCN Red List (2013), 356 of Myanmar's known species are considered to be globally threatened with extinction (Table 6).

**Table 6.** Threatened Species in Myanmar.

| Taxonomic Group | Critically Endangered | Endangered | Vulnerable | Total |
|---|---|---|---|---|
| Mammal | 2 | 18 | 29 | 49 |
| Bird | 8 | 10 | 27 | 45 |
| Reptile | 5 | 7 | 10 | 22 |
| Amphibian | 0 | 0 | 0 | 0 |
| Fish | 7 | 116 | 14 | 137 |

| Taxonomic Group | Critically Endangered | Endangered | Vulnerable | Total |
|---|---|---|---|---|
| Invertebrate aquafauna | 0 | 3 | 44 | 47 |
| Plant | 14 | 13 | 29 | 56 |
| **Total** | **36** | **167** | **152** | **356** |

*Source: International Union for Conservation of Nature (IUCN) 2013.*

Conservation of threatened species both in and outside of their natural habitats is being promoted. The Wildlife Protection Act (1936) was replaced by the Protection of Wildlife and Protected Areas Law in 1994. The main functions of the latter law are to strengthen the protected areas network, promote conservation of critical habitats and associated flora and fauna and support effective conservation. In particular, Myanmar will promote effective conservation of threatened species through the participation of local communities in conservation management and sustainable resource utilisation.

## APPENDIX 1:Steering Committee for Preparing CBD Fifth National Report and Updating NBSAP

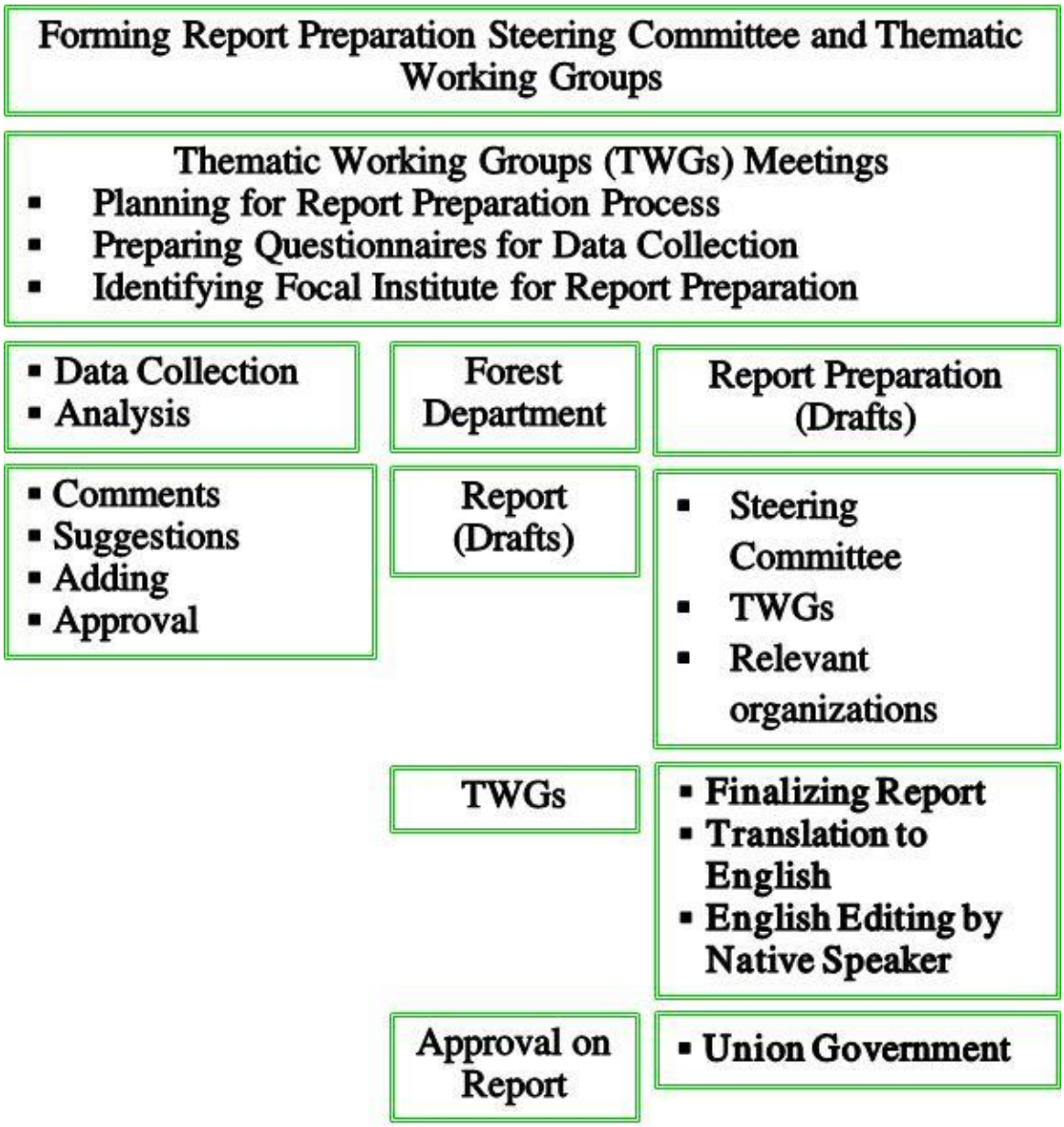
The steering committee for preparing CBD 5th National Report and updating NBSAP was formed with following persons from the relevant organizations.

| No. | Position | Organization | Status |
|---|---|---|---|
| 1 | Director General | Planning and Statistics Department, Ministry of Environmental Conservation and Forestry (MOECAF) | Chair |
| 2 | Director General | Forest Department, MOECAF | Vice-Chair |
| 3 | Deputy Director General | Environmental Conservation Department, MOECAF | Member |
| 4 | Director | Environmental Conservation Department, MOECAF | Member |
| 5 | Director | General Administration Department, Ministry of Home of Affairs | Member |
| 6 | Director | Department of Agricultural Planning, Ministry of Agriculture and Irrigation (MOAI) | Member |
| 7 | Director | Settlement and Land Record Department, MOAI | Member |
| 8 | Director | Public Work, Ministry of Construction | |
| 9 | Director | Department of Human Settlement and Housing Development, Ministry of Construction | Member |
| 10 | Director | Planning Department, Ministry of National Planning and Economic Development | Member |
| 11 | Director | Livestock Breeding and Veterinary Department, Ministry of Livestock, Fisheries and Rural Development | Member |
| 12 | Director | Department of Fishery, Ministry of Livestock, Fisheries and Rural Development | Member |

| No. | Position | Organization | Status |
|---|---|---|---|
| 13 | Director | Directorate of Water Resources & Improvement of River Systems, Ministry of Transport | Member |
| 14 | Director | Direcrorate of Hotel and Tourism, Ministry of Hotel and Tourism | Member |
| 15 | Director | Directorate of Industry , Ministry of Industry | Member |
| 16 | Professor | Zoology Department, Yangon University, Ministry of Education | Member |
| 17 | Professor | Botany Department, Yangon University, Ministry of Education | Member |
| 18 | Professor | Marine Science Department, Mawlamyaing University, Ministry of Education | Member |
| 19 | Director | Department of Health, Ministry of Health | Member |
| 20 | Professor | Mandalay Technology University, Ministry of Science and Technology | |
| 21 | Director | Pollution Control & Cleaning Department, Nay Pyi Taw City Development Committee | Member |
| 22 | Director | Yangon City Development Committee | Member |
| 23 | Director | Agriculture and Livestock Breeding Department, Mandalay City Development Committee | Member |
| 24 | Director (Retd.) | Forest Resource Environment Development and Conservation Association | Member |
| 25 | Country Coordinator | Wildlife Conservation Society | Member |
| 26 | Director | Nature and Wildlife Conservation Division, Forest Department, MOECAF | Secretary |

## APPENDIX 2:Summary of Preparation Process of Fifth National Report to the CBD

The process preparation of the fifth national report to the CBD includes the formation of a steering committee and working groups, consultations on the development of questionnaires for data collection, selecting focal institutions for report preparation, data collection and analysis, preparing the report draft and validation, translation to English, getting approval from the national environmental conservation committee, and final approval from the Union government. The process can be summarized as follows:



## APPENDIX 3: Implementation of the CBD Programme of Work

### Implementing the Programme of Work on Protected Areas (PoWPA)

| Targets | | Implementation |
|---|---|---|
| **Programme Element 1: Direct actions for planning, selecting, establishing, strengthening, and managing, protected area systems and sites** | | |
| Target 1 | By 2010, terrestrially, and 2012 in the marine area, a global network of comprehensive, representative and effectively managed national and regional protected area system is established as a contribution to (i) the goal of the Strategic Plan of the Convention and the World Summit on Sustainable Development of achieving a significant reduction in the rate of biodiversity loss by 2010; (ii) the Millennium Development Goals - particularly goal 7 on ensuring environmental sustainability; and (iii) the Global Strategy for Plant Conservation. | ▪ PAs in Myanmar cover diverse ecosystems and vegetation types but gap analysis is still needed to understand the representativeness of PAs.<br>▪ Myanmar Forest Policy (1995) mandates to establish PAs at 5% of the country's area, but is intended to double to 10% under the National Forestry Master Plan (2001-2031).<br>▪ No. of PAs increased from 34 (3.86% of land area) in 2009 to 38 (5.61%) in 2013). |
| Target 2 | By 2015, all protected areas and protected area systems are integrated into the wider land- and seascape, and relevant sectors, by applying the ecosystem approach and taking into account ecological connectivity and the concept, where appropriate, of ecological networks. | ▪ Among the 45 established and proposed PAs, seven are connected with neighbouring countries (four with Thailand, two with India and one with China)<br>▪ Conservation activities are being promoted in the northern forest complex where five PAs are connected.UNDP and WCS are preparing the project proposal of Strengthening Sustainability of Protected Area Management in Myanmar that will be conducted in five PAs of Northern Myanmar through GEF funding support.<br>▪ A "reef to ridges" program is being implemented in the Sundaic |

| Targets | | Implementation |
|---|---|---|
| | | bioregion in collaboration with Fauna and Flora International. This program is the first landscape/seascape approach in conservation of Myanmar, and consists of marine and terrestrial PAs. |
| Target 3 | Establish and strengthen by 2010/2012 transboundary protected areas, other forms of collaboration between neighbouring protected areas across national boundaries and regional networks, to enhance the conservation and sustainable use of biological diversity, implementing the ecosystem approach, and improving international cooperation. | ▪ Participating in ICIMOD's regional programme of transboundary development and conservation initiatives in the Brahmaputra-Salween Landscape. Five PAs within Myanmar's northern forest complex are included in the programme, together with PAs in India and China.<br>▪ Funding for transboundary conservation in the Taninthayi range has been requested from ITTO, to include established and proposed PAs. |
| Target 4 | All protected areas to have effective management in existence by 2012, using participatory and science-based site planning processes that incorporate clear biodiversity objectives, targets, management strategies and monitoring programmes, drawing upon existing methodologies and a long-term management plan with active stakeholder involvement. | ▪ Park offices are setup at 20 PAs in Myanmar and will follow five-year operational action plans. However no scientifically based park management plans have yet been developed.<br>▪ In collaboration with Istituto Oikos, an Italian NGO, the FD has prepared a draft management plan for Lampi Marine National Park through a multi-stakeholder consultation process and is awaiting final validation and approval from MOECAF.FD has prepared guidelines for park management plan preparation based on IUCN guidelines, but Myanmar needs to strengthen human resources and finances before developing individual plans. |
| Target 5 | By 2008, effective mechanisms for identifying and preventing, and/or | ▪ Park offices are reporting threats to PAs, with a focus on illegal hunting |

| Targets | | Implementation |
|---|---|---|
| | mitigating the negative impacts of key threats to protected areas are in place. | and logging, unsustainable land use practices such as shifting cultivation and gold mining.<br>▪ To reduce threats, effective law enforcement is being promoted, public education and communication being strengthened, and local communities are being encouraged to participate in conservation, particularly through community forestry and agroforestry. |
| **Programme Element 2: Governance, Participation, Equity and Benefit Sharing** | | |
| Target 6 | Establish by 2008 mechanisms for the equitable sharing of both costs and benefits arising from the establishment and management of protected areas. | ▪ In Myanmar, PAs belong to the Union Government, which provides 100% of funding; currently no mechanism for sharing of costs and benefits exists.<br>▪ However, Myanmar is looking to REDD+ and PES as opportunities for funding PAs and sharing economic benefits from conservation with local communities. |
| Target 7 | Full and effective participation by 2008, of indigenous and local communities, in full respect of their rights and recognition of their responsibilities, consistent with national law and applicable international obligations, and the participation of relevant stakeholders, in the management of existing, and the establishment and management of new, protected areas | ▪ Although the rights of indigenous and local communities are fully respected in PA management, the participation of indigenous and local communities in management is still lacking in the current legal framework.<br>▪ Recently, the government is encouraging a more people-centred approach, which should present a good opportunity for including indigenous and local communities in future PA management.<br>▪ Zoning in the Lampi Marine National Park Management Plan (draft) is mainly based on consultation with local communities. |

| Targets | | Implementation |
|---|---|---|
| **Programme Element 3: Enabling Activities** | | |
| Target 8 | By 2008 review and revise policies as appropriate, including use of social and economic valuation and incentives, to provide a supportive enabling environment for more effective establishment and management of protected areas and protected areas systems. | ▪ PAs in Myanmar are managed mainly under the Myanmar Forest Policy (1995), and the Protection of Wildlife and Protected Areas Law (1994) and accompanying Rule (2002).<br>▪ The policy and legal framework for PA management includes social integration, although economic valuation is still lacking. |
| Target 9 | By 2010, comprehensive capacity building programmes and initiatives are implemented to develop knowledge and skills at individual, community and institutional levels, and raise professional standards. | ▪ A needs assessment for capacity building among relevant government staff.<br>▪ Capacity building trainings, joint research and surveys with international organizations.<br>▪ In collaboration with the Norwegian Environment Agency, the FD conducted a training of trainers (ToT) programme for biodiversity and PA management. |
| Target 10 | By 2010 the development, validation, and transfer of appropriate technologies and innovative approaches for the effective management of protected areas is substantially improved, taking into account decisions of the Conference of the Parties on technology transfer and cooperation. | ▪ A needs assessment of PA management revealed the use of spatial information in conservation and management is very limited, though these are crucial. Data management systems are also currently lacking in Myanmar's PAs.<br>▪ The ToT programme included the application of GPS in patrolling, and linking the information with conservation planning. Field guides, laptop computers, GPS units and other field equipment have been provided to staff at some PAs.<br>▪ Trainings for the application of the PA Spatial Monitoring And Reporting |

| Targets | | Implementation |
|---|---|---|
| | | Tool (SMART) have been conducted in collaboration with WCS.<br>▪ SMART is now being promoted in PAs for law enforcement and monitoring. |
| Target 11 | By 2008, sufficient financial, technical and other resources to meet the costs to effectively implement and manage national and regional systems of protected areas are secured, including both from national and international sources, particularly to support the needs of developing countries and countries with economies in transition and small island developing States. | ▪ The Union Government is providing funding for PAs, but the funding mainly covers staff salaries and infrastructure maintenance.<br>▪ In comparison to other developing countries, Myanmar currently receives very low levels of international assistance for biodiversity conservation. |
| Target 12 | By 2008 public awareness, understanding and appreciation of the importance and benefits of protected areas is significantly increased. | ▪ In Myanmar, patrolling and public education are the major tools for biodiversity conservation and PA management.<br>▪ Between 2009 and 2013, education activities were conducted among communities living around the PAs on 296 occasions.<br>▪ In addition, public awareness campaigns are conducted at pagoda festivals and international days such as World Wetlands Day, Forestry Week, World Environment Day etc. |
| **Programme Element 4: Standards, assessment, and monitoring** | | |
| Target 13 | By 2008, standards, criteria, and best practices for planning, selecting, establishing, managing and governance of national and regional systems of protected areas are developed and adopted. | ▪ Myanmar has its own procedures for PAs selection, establishment and planning mainly based on the Protection of Wildlife and Natural Areas Law/ Rules.<br>▪ PA governance is hierarchical, with Park offices following orders of the |

| Targets | | Implementation |
|---|---|---|
| | | Ministry. Stakeholder participation in PA governance has only recently been piloted |
| Target 14 | By 2010, frameworks for monitoring, evaluating and reporting protected areas management effectiveness at sites, national and regional systems, and transboundary protected area levels adopted and implemented by Parties. | ▪ Management effectiveness is mainly assessed based on the implementation of operational action plans.<br>▪ Each PA submits monthly patrolling reports to the FD.<br>▪ Standardized framework for monitoring, evaluating and reporting protected areas management effectiveness has not been developed but some PAs are implementing SMART, a useful tool for monitoring and evaluating PAs' effectiveness. |
| Target 15 | By 2010, national and regional systems are established to enable effective monitoring of protected-area coverage, status and trends at national, regional and global scales, and to assist in evaluating progress in meeting global biodiversity targets. | ▪ Monitoring of PA land cover, status and trends has not been conducted, primarilydue to the lack of standard PA management plans.<br>▪ Some site-level assessments of deforestation and forest degradation within and outside PAs are available, but are ad hoc and limited in scope. |
| Target 16 | Scientific knowledge relevant to protected areas is further developed as a contribution to their establishment, effectiveness, and management. | ▪ In collaboration with international organizations, the FD is conducting research and scientific surveys in PAs across the country, and the findings are used to improve PA management. |

## Biodiversity Conservation by PAs

Myanmar is establishing PAs to conserve biodiversity, to fulfil its commitments to CBD, and to maintain diverse, representative ecosystems and biodiversity. After the CBD 4$^{th}$ National Report submitted in 2009, the protected area coverage increased from 35 (26,214 km$^2$) to 38 (37,932 km$^2$) (Figure 11). Including proposed parks, Myanmar currently has 5.61% of its total area under protected areas, which is within the relevant policy target.

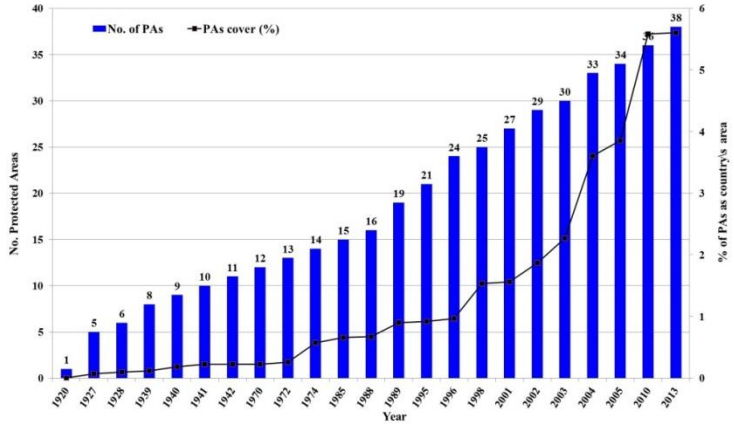



**Figure 11.** Establishment of Protected Areas from 1920 to March, 2014.

Myanmar's PAs include the sub-temperate forests in the north and mangrove and tropical rain forests in the south (Figure 12). Among the 38 PAs, seven are ASEAN Heritage Parks (AHPs), which is the highest number among the ASEAN member states. Another seven areas with significant biodiversity, representing a further 1.19% (8,062.9 $km^2$; 809,290.2 hectares) of the country's area, are notified as proposed PAs. Their establishment is in process.

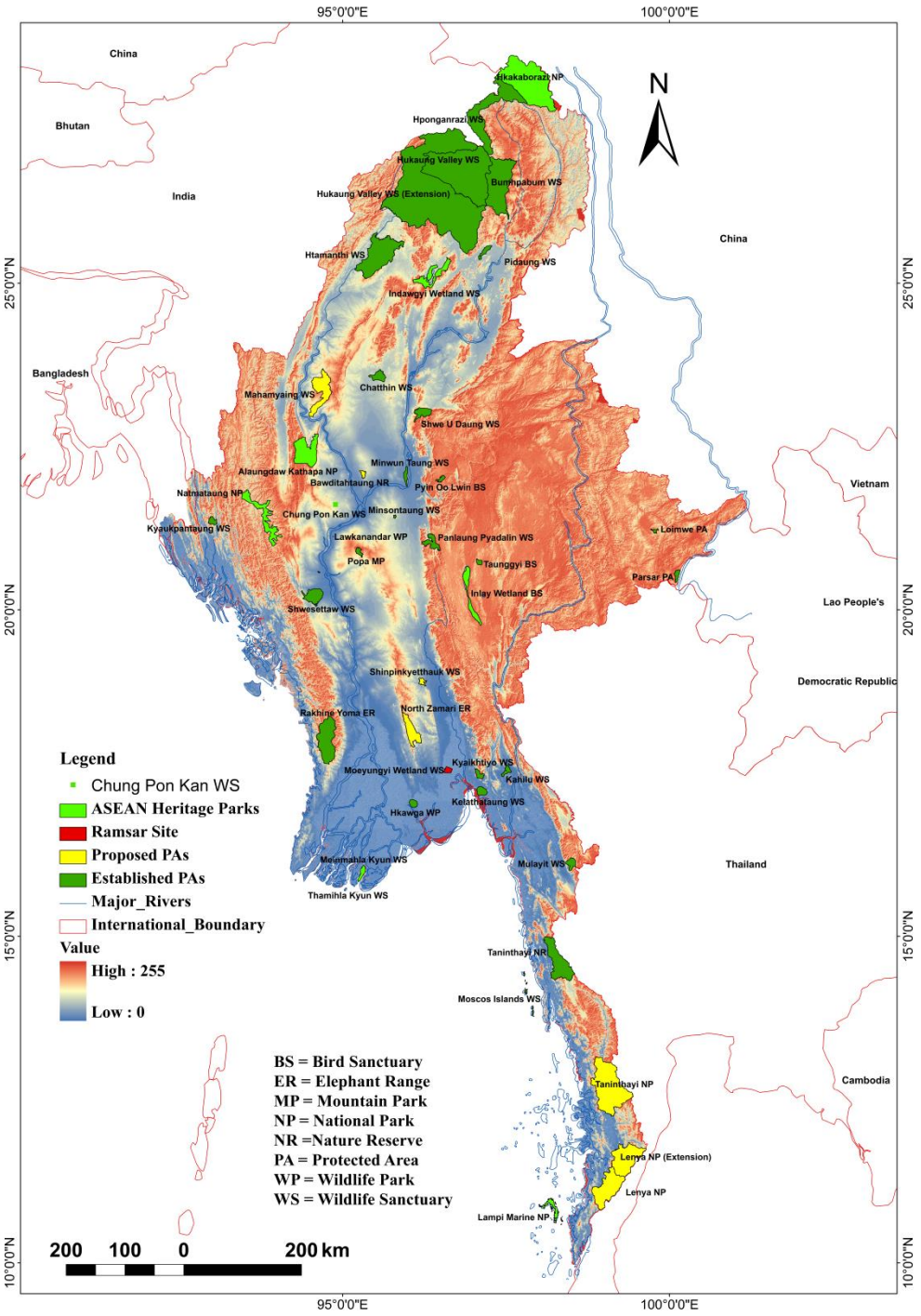



**Figure 12.** Location of Protected Areas and ASEAN Heritage Parks in Myanmar.

Park warden offices have been established at 20 PAs, and patrolling is conducted to prevent illegal hunting and logging. Environmental education is also conducted for the local communities surrounding the protected areas to get local people's participation in conservation. Patrolling and education programs conducted during 2009-2010 and 2012-2013 are presented below.

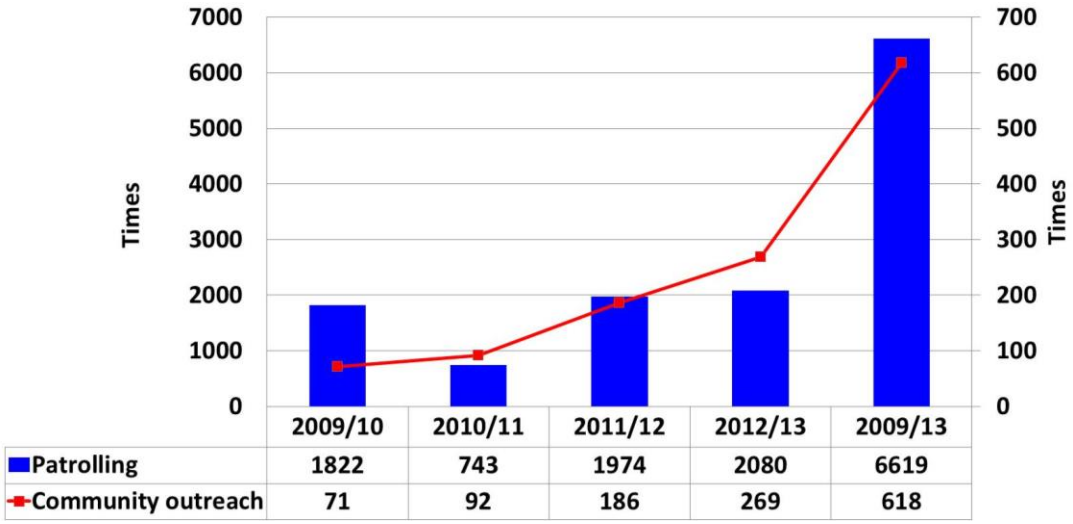
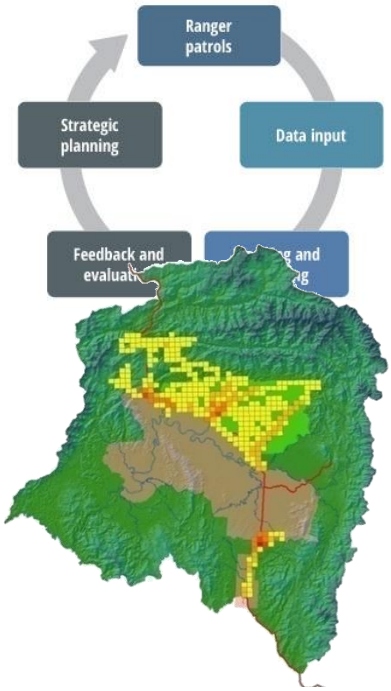



**Figure 13.**Management Activities of PAs in Myanmar.

In addition, the long-term existence of wildlife and sustainability of ecosystems are being promoted in collaboration with international organisations.

**BOX 10. SPATIAL MONITORING AND REPORTING TOOL (SMART) APPLICATION IN LAW ENFORCEMENT MONITORING OF PROTECTED AREAS**




SMART is both a ranger-based data collection tool and a suite of best practices aimed at helping protected area and wildlife managers better monitor, evaluate and adaptively manage their patrolling activities. SMART was started by a diverse group of conservation practitioners who understood the needs of front-line enforcement and who recognized the day-to-day difficulties faced by many conservation managers across the world: operating on thinly stretched resources in the face of escalating threats to biodiversity. SMART is much more than a data collection tool; it is a suite of best practices developed designed to help protected area and wildlife managers better plan, evaluate and implement their activities and to promote good governance.

SMART has been implemented in Hukaung Valley Wildlife Sanctuary, Hkakaborazi National Park, Htamanthi Wildlife Sanctuary, Taninthayi Nature Reserve, Irrawaddy Dolphin Protected Area, Alaungdaw Kathapa National Park and Rakhine Yoma Elephant Range. The Forest Department is building the capacity of staff to implement SMART through trainings jointly organised with the Wildlife Conservation Society, and also by participating in overseas trainings. Over 50 Forest Department staff have so far been trained in the application of SMART. The long-term plan is to roll out SMART in all protected areas in Myanmar.

## Implementing the Global Strategy for Plant Conservation (GSPC) 2011-2020 Targets

| Targets | | Implementation |
|---|---|---|
| ***Objective I: Plant diversity is well understood, documented and recognized*** | | |
| Target 1 | An online flora of all known plants. | ▪ A checklist of the trees, shrubs, herbs, and climbers of Myanmar is available online at http://botany.si.edu/myanmar. |
| Target 2 | An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action. | ▪ Limited assessment of the conservation status of plant diversity to date, mostly focused on orchids. |
| Target 3 | Information, research and associated outputs, and methods necessary to implement the Strategy developed and shared. | ▪ Limited research on plant diversity, most of which is site based or small scale.<br>▪ The information, results and findings are shared among the relevant institutes. |
| ***Objective II: Plant diversity is urgently and effectively conserved*** | | |
| Target 4 | At least 15 per cent of each ecological region or vegetation type secured through effective management and/or restoration. | ▪ Established and proposed PAs cover all ecological regions or vegetation types of Myanmar.<br>▪ But a comprehensive gap analysis is still required. |
| Target 5 | At least 75 per cent of the most important areas for plant diversity of each ecological region protected with effective management in place for conserving plants and their genetic diversity. | ▪ Twenty PAs have been established or proposed in the most plant-diverse areas of Myanmar. These include sites in Kachin State, Sagaing Region and Taninthayi Region. These parks cover 5.86 % of country's area and 86.23% of the total area of established and proposed PAs. |
| Target 6 | At least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity. | ▪ Up to 2013, 812 reserved forests and 326 public protected forests were established for sustainable production, covering 25.01% of the country's area and more than 50% of the total forest area. |
| Target 7 | At least 75 per cent of known threatened plant species conserved in situ. | ▪ All threatened plant species of Myanmar, 14 CR, 13 EN and 19 VU, are legally protected in their |

| Targets | | Implementation |
|---|---|---|
| | | habitats including in protected areas. |
| Target 8 | At least 75 per cent of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes. | ▪ All threatened plant species of Myanmar are conserved in the National Kandawgyi Garden (formerly Pyin Oo Lwin Botanical Garden), the National Herbal Park, and in medicinal plant gardens located across the country. |
| Target 9 | 70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge. | ▪ 11,916 accessions (i.e., samples) of 24 crops have been conserved in the Myanmar seed bank.<br>▪ 2,233 specimens of 14 crops are conserved in international gene banks.<br>▪ Germplasm of rice varieties is being conserved using biotechnology and biochemical analysis. |
| Target 10 | Effective management plans in place to prevent new biological invasions and to manage important areas for plant diversity that are invaded. | ▪ An action plan for controlling invasive species is included in Myanmar's NBSAP.<br>▪ Protection measures for invasive species are being developed.<br>▪ Experiments underway on controlling *Mimosa diplotricha*.<br>▪ Research underway on the effect of *Prosopis juliflora* on the environment and local communities in central Myanmar.<br>▪ Strengthening capacity for development of management plan for invasive species. |
| ***Objective III: Plant diversity is used in a sustainable and equitable manner*** | | |
| Target 11 | No species of wild flora endangered by international trade. | ▪ Being a member country of CITES, Myanmar only allows the export of plants and their products that are extracted following sustainable methods. |
| Target 12 | All wild harvested plant-based products sourced sustainably. | ▪ All wild harvested plant-based products are based on the Myanmar Selection System, Annual Allowable Cut and other sustainable |

| Targets | | Implementation |
|---|---|---|
| | | management systems.<br>▪ Sustainable forest products produced in accordance with the Myanmar Forest Policy, Forest Law and Forest Rules. |
| Target 13 | Indigenous and local knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care. | ▪ A comprehensive nationwide survey on indigenous and local knowledge and practices associated with plant resources has not been conducted, though individual studies are available.<br>▪ Myanmar needs technical and financial assistance for this target. |
| ***Objective IV: Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted*** | | |
| Target 14 | The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes (CEPA). | ▪ CEPA is being promoted by setting up environmental education centres at select PAs, conducting education campaigns at pagoda festivals, and conducting mobile education in communities surrounding PAs.<br>▪ Visitors to medicinal plant gardens are being educated with signs, pamphlets and outreach.<br>▪ Public education programmes are being conducted via TV channels and weekly published journals to enhance public participation in plant diversity conservation. |
| ***Objective V: The capacities and public engagement necessary to implement the Strategy have been developed*** | | |
| Target 15 | The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy. | ▪ Strengthening capacity of staff of the Myanmar Seed Bank through PGR conservation and effective utilization trainings.<br>▪ Participating in PGR and effective utilization trainings abroad.<br>▪ In collaboration with international organizations, the capacities of staff are strengthened for taxonomy, plant survey and herbarium work. |

| Targets | | Implementation |
|---|---|---|
| Target 16 | Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy | ▪ Networks have been established between several Ministries (MOECAF, MOAI, MOH, MOEdu), and with the Myanmar Florist Association, the Flora of Myanmar Institutional Consortium, the National Institute of Biological Resources, the US Smithsonian Institute, Singapore Botanic Gardens, Queen Sirikit Botanical Garden (Thailand), the UK Royal Botanical Gardens in Edinburgh and Kew, the Kunming Institute of Botany in China, the Institute of Botany-Chinese Academy of sciences, and Xishuangbanna Tropical Botanical Garden. |

## Implementing the Cartagena Protocol on Biosafety

Myanmar signed the Cartagena Protocol on Biosafety on 11 May 2001 and adopted and became a member country of the protocol on 13 February 2008.

The Myanmar Agricultural Planning Department has prepared the National Biosafety Framework (draft) and Biosafety Law (draft) in consultation with multiple stakeholders. Myanmar has achieved very limited implementation of the Cartagena Protocol on Biosafety, and the present activities regarding the protocol are capacity building of staff and limited public awareness. However, recognizing the importance of biosafety for public health and environmental stability, the Environmental Conservation Department under MOECAF and the Agricultural Planning Department recently started collaborating to finalize both documents andconduct other related activities.

## Implementing the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization

The Government of the Republic of the Union of Myanmar approved participation in the Nagoya Protocol on 31 December 2013 at government meeting No. (32/2013) on 28 November 2013, and became a signatory member to the Nagoya Protocol on 9 January 2014. On behalf of the Republic of the Union of Myanmar, MOECAF is the focal point for the Nagoya Protocol.

Recently, Myanmar participated in the ASEAN Centre for Biodiversity's (ACB) regional programme on Access to Genetic Resources and Fair and Equitable Sharing of Benefits (ABS), implemented from 26$^{th}$ February 2013 to 31$^{st}$ March 2014. This regional plan will assist Myanmar to develop a National ABS Framework, to strengthen the capacity of relevant stakeholders, and to raise the public awareness on ABS. However, Myanmar needs to prepare several things for effective implementation of Nagoya Protocol, particularly documentation of genetic resources and traditional knowledge on sustainable resource utilization and legislation on the protection of traditional or indigenous knowledge on natural resources and sustainable utilization.

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## Glossary

| | | |
|---|---|---|
| **Closed Forest** | **:** | Under forestry or no land use, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of more than 40 percent, or trees able to reach these thresholds in situ. |
| **Open Forest** | **:** | Normally degraded forests, under forestry or no land use, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover between 10 and 40 percent, or trees able to reach these thresholds in situ. |
| **Other Wooded lands (scrub and grass land)** | **:** | Areas mostly covered by grassland and stunted trees, shrub forests; lower that 10% crown density, shifting cultivation. |
| **Others** | **:** | Other areas (snow, rock, bare land, sandbanks, agriculture). |
| **Water** | | Inland water bodies, lakes, reservoirs, large streams and rivers. |
| **Protected Area** | **:** | Means the area determined under this law for the purpose of Protection and Conservation of wildlife, ecosystem or significant landscape for their sustainment. |
| **Ecosystem Services** | **:** | Functional attributes of the forest with value to the society (Daily 1997).<br>The Millennium Ecosystem Assessment (MEA) defines four broad categories of ecosystem services, which are supporting services, provisioning services, regulating services, and cultural services (MEA 2005). |