

**The Republic of the Union of Myanmar**  
**Ministry of Natural Resources and Environmental Conservation**  
**Forest Department**



**Biodiversity Conservation in Myanmar**  
**An overview**



**Nature and Wildlife Conservation Division**  
**February 2017**

# Contents

Summary .....	i
1. Introduction.....	1
2. Overview of biodiversity of Myanmar.....	2
2.1 Ecosystem diversity .....	2
2.2 Species diversity.....	8
3. Threats to biodiversity.....	14
3.1 Land uses.....	14
<b>3.2</b> Illegal wildlife hunting and trade .....	14
3.3 Invasive alien species .....	15
3.4 Threats to agro-biodiversity .....	15
3.5 Underlying factors of threats to biodiversity.....	15
3.6 Climate change vulnerability.....	17
4. Biodiversity conservation.....	17
4.1 Historical information .....	17
4.2 National target on protected areas and current progress.....	18
4.3 Policy, law and national strategy.....	20
4.4 Management and conservation.....	20
4.5 Communication, education and public awareness (CEPA).....	21
4.6 Combating illegal wildlife crime.....	21
4.7 Research and monitoring.....	21
4.8 Community development .....	22
4.9 Designation of internationally and regionally recognized conservation areas .....	22
5. Biodiversity related international conventions and treaties .....	22
6. Priority activities for biodiversity conservation and protected areas management in Myanmar ..	23
7. Conclusion .....	24

## Summary

### 1. Background

- Myanmar is one of the biodiversity hotspots of the world (Myers et al. 2000), and about 43 % of the country's total land is forested (FAO 2015).
- The Himalayan Mountains in the north, coral reefs and lowland forests in the south, and extensive river systems contribute to its complex network of ecosystems and high biodiversity.
- Varied forest types of Myanmar are home of several mammals, reptiles, avifauna, amphibians, fish and plant species.
- Myanmar, therefore, represents an important biodiversity reservoir in Asia. Furthermore, Myanmar possesses numerous endemic wild flora and fauna.
- Conservation on natural resources has been practiced many years ago in Myanmar.
- The first protected area was established in 1920 but modern conservation efforts have rooted in the early years of 1980s. Between 1981 and 1984, a project namely Nature Conservation National Park Project (NCNPP) was launched under the joint implementation of United Nations Development Program (UNDP) and Myanmar government.
- Since then, the establishment of PAs has increased. Up to 1996, protected areas constituted < 1 % of the total land with individuals ranging in size from 0.47 km<sup>2</sup> to 2150 km<sup>2</sup>.

### 2. National target on protected areas and current progress

- Myanmar's Forest Policy (1995) mandates an increase in protected areas to 5 % of the country's total land.
- In year 2000, this target was adjusted to 10% of total land by 30-year Forest Master Plan of Ministry of Environmental Conservation and Forestry.
- Currently, Myanmar has 39,180 km<sup>2</sup> in 40 PAs representing diverse ecosystems, which cover 5.79% of the total area.
- Other ten areas that occupy 1.37 % of the country total land have been proposed to be established as PAs.

### 3. Policy, law and national strategy

- Forest Policy, 1995
- Forest Law, 1992
- Forest Rules, 1995
- Protection of Wildlife and Protected Areas Law, 1994
- Protection of Wildlife and Protected Areas Rules, 2002

- National Forestry Sector Master Plan, 2001-02 to 2030-31
- National Biodiversity Strategy and Action Plan, 2015-2020
- Myanmar Ecotourism Policy and Management Strategy, 2015-2025

#### **4. Management and conservation**

##### *Institutional arrangement*

- Park offices have been established at twenty one PAs. Total number of staff is 612.

##### *Management plan*

- National target in Myanmar's NBSAP (2015-2020), "by 2020 at least five PAs are implementing management plans".
- Management plan has been developed and practiced for two PAs (Taninthayi Nature Reserve and Lampi Marine National Park).
- Park management plans are being developed for four PAs (Indawgyi, Alaungdawkhatha, Natmataung and Meinmahlakyun).
- Planning for developing park management plan for seven PAs (Hkakaborazi, Hukaung, Htamanthi, Chatthin, Popa, Shwestaw, Moeyungyi).
- To restore habitats and associated key species, to sustain ecosystem services, to support the implementation of NBSAP, as well as to meet comments to international convention such as CBD, Ramsar Convention, UNFCCC, UNCCD, "Habitat Restoration Programme (2017-2018 to 2026-2027)" for protected areas is being prepared.

##### *Environmental Education*

- Environmental education is also conducted for the local communities surrounding the protected areas to get local people's participation in conservation.
- Each PA with park office has mobile education team, and environmental education talks are carried out at villages and schools.
- Pagoda festivals are good opportunities for public education programs. Some PAs have education centers.
- But need to improve education materials, programs and capacity as well.

##### *Combating illegal wildlife crime*

- Illegal wildlife hunting and trade is a major threat to biodiversity. National Wildlife Law Enforcement Taskforce- composed of senior officials from law enforcement agencies- for strengthening coordination and collaborative efforts.
- Cooperating with countries in the region and also participating in global and regional initiatives and programs such as ASEAN Wildlife Enforcement Network (ASEAN-

WEN), Operation Cobra, Operation Paws, Wildlife Crimes Working Group of the INTERPOL.

- Promoting SMART (Spatial Monitoring and Reporting Tool) patrolling in protected area management.

#### *Research and monitoring*

- Research and monitoring, mainly site-based, project based and need to scale up to national level and to develop standardized monitoring protocol.
- Collaboration with international organization such as WCS, FFI, OIKOS, NIBR, XTBG, IBCAS and Marburg University.
- Ex-situ conservation- Myanmar star tortoise, Burmese roof turtle, Arakan hill turtle, Myanmar golden deer are successful, need to strengthen to other rare and endangered flora and fauna.
- Need arboretum, herbarium, and botanical garden for ex-situ plant conservation.

#### *Community development*

- Promoting modalities that favor the development and conservation in parallel to achieve co-existence between nature and human, such as community-based natural resource management (CBNRM), locally managed marine area (LMMA), Indigenous and community conserved areas (ICCAs), Buffer zone management etc.
- Promoting ecotourism. Myanmar has designated 21 ecotourism sites, and 19 are PAs. Planning for community-based ecotourism.
- REDD+ and PES have high potential for socio-economic development of communities living around the PAs, and that would lead to support and collaboration of local people in conservation and management.

### **5. Designation of internationally and regionally recognized protected areas**

- ASEAN Heritage Parks (AHPs) are recognized for their particular biodiversity value or uniqueness within ASEAN countries.
- Seven of Myanmar PAs have been recognized as AHPs, namely, Hkakaborazi National Park, Indawgyi Wildlife Sanctuary, Alaungdaw Kathapa National Park, Inlay Lake Wildlife Sanctuary, Meinmahla Kyun Wildlife Sanctuary, Lampi Marine National Park and Natmataung National Park. Some parts of the Gulf of Mottama is nominated to designate Ramsar Site.
- Myanmar has three Ramsar Sites, Moeyungi Wetland Sanctuary, Indawgyi Wildlife Sanctuary and Meinmahla Kyun Wildlife Sanctuary.
- One Man and Biosphere Reserve (MAB) of the UNESCO, Inlay Lake Wildlife Sanctuary. Indawgyi Lake Wildlife Sanctuary is nominated to include in UNESCO's MAB.

- Myanmar is preparing a nomination dossier for the inscription of Hkakaborazi Landscape to the UNESCO's World Heritage List.

## **6. Priority activities for biodiversity conservation and protected areas management in Myanmar**

- Developing park management plan
- Initiating buffer zone management
- Developing national RedList of flora and fauna
- Documenting Agro-biodiversity
- Promoting priority species conservation (Tiger, elephant, other globally threatened species)
- Developing national wetland conservation and management policy and strategy
- Valuing ecosystem services
- Enhancing communication, education and public awareness (CEPA) program
- Strengthening the capacity of park's staff for effective conservation, management and research as well.
- Community-based ecotourism
- Documenting traditional knowledge on resource utilization, management and governance
- Initiating locally managed marine protected areas
- Livelihood development program around PAs
- Community-based law enforcement
- Initiating payment for ecosystem services
- Enhancing law enforcement activities against illegal wildlife crimes
- Developing sustainable financial mechanism for park management and biodiversity conservation through REDD+ or PES
- Designating MAB, World Heritage Site, Ramsar Site and EAAFP network site
- Exploring the potential PAs with the significant biodiversity
- Extending the PAs coverage to reach the national target of 10% of total area.
- Strengthening the coordination with the relevant government organizations and local NGOs in biodiversity conservation.



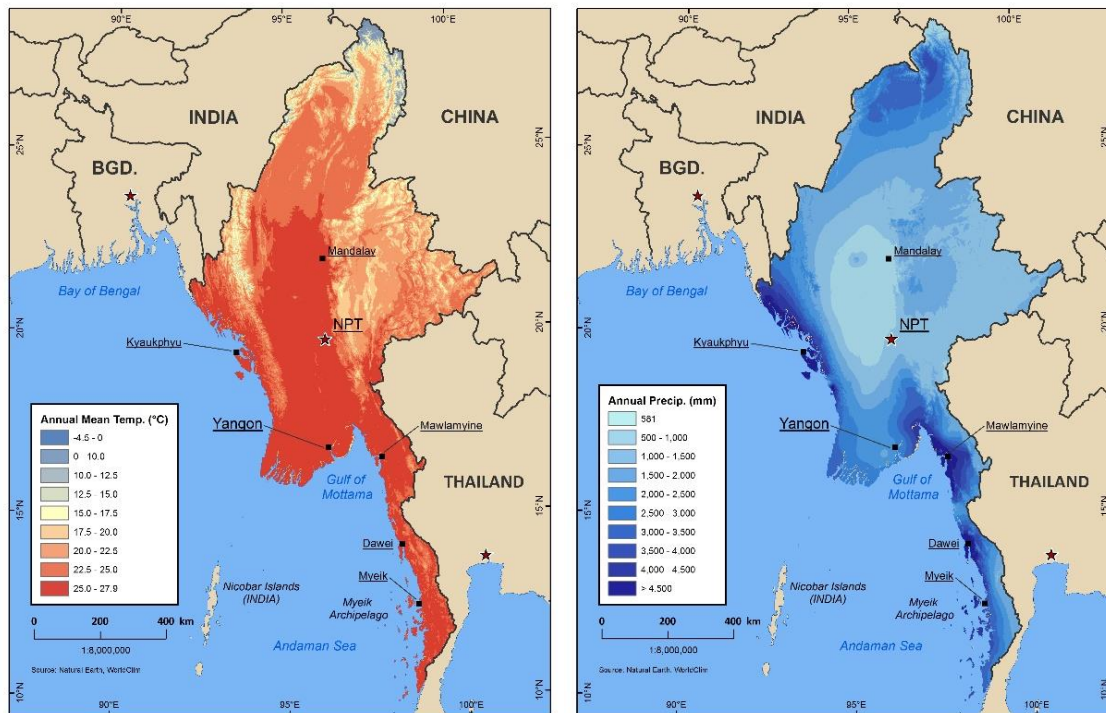
## 1. Introduction

Myanmar is the largest country in mainland Southeast Asia with a land area of 676,577 km<sup>2</sup>, bordered by Bangladesh and India to the northwest, the People's Republic of China to the northeast and the Lao PDR and Thailand to the southeast (Fig. 1). The Bay of Bengal and Andaman Sea lie to the south and west. More than 40% of Myanmar is mountainous. Prominent mountain chains include an extension of the eastern Himalaya, the Chin Hills, the Western Plateau/Rakhine Yoma, Bago Yoma, the Eastern Plateau/Shan Plateau and the Taninthayi Range. The Ayeyawady, Thanlwin/Salween, Chindwin, Sittaung and Kaladan are Myanmar's major rivers.



**Figure 1: Location of Myanmar and State and Region administrative boundaries.**

The country has three seasons: wet (from mid-May to mid-October), cold (from early November to late February) and dry (from March to mid-May). Temperature, precipitation and humidity vary greatly; from the Taninthayi coast which receives about 5,000 mm of rain annually to the arid Central Dry Zone in the central plains which receives only 500–750 mm of rain a year (Fig. 2). This diverse topography and climatic conditions create numerous different ecosystems and support an incredibly wide range of associated species.



**Figure 2: Annual Mean Temperature and Annual Precipitation in Myanmar.**

## 2. Overview of biodiversity of Myanmar

Myanmar is situated at the transition zone between different biogeographic regions: in the north, Indochina, the Indian sub-continent and Eurasia; in the south, Taninthayi forests cover the northern section of the transition between Indochina and Sundaic ecological zones. These transitional zones produce unique and diverse species assemblages. The region's most intact lowland Sundaic forests are found in Myanmar, along with patchy but regionally significant areas of dry deciduous forest. Birds that migrate on both the Central Asian and East Asian Flyways rest at globally important wetlands in the country. Myanmar contains almost 10% of global turtle and tortoise diversity, including seven endemic species. Some regions and taxa are relatively understudied, and surveys continue to identify new endemic species and range extensions of globally threatened species. Ongoing surveys are also developing a better understanding of the distribution and status of these species.

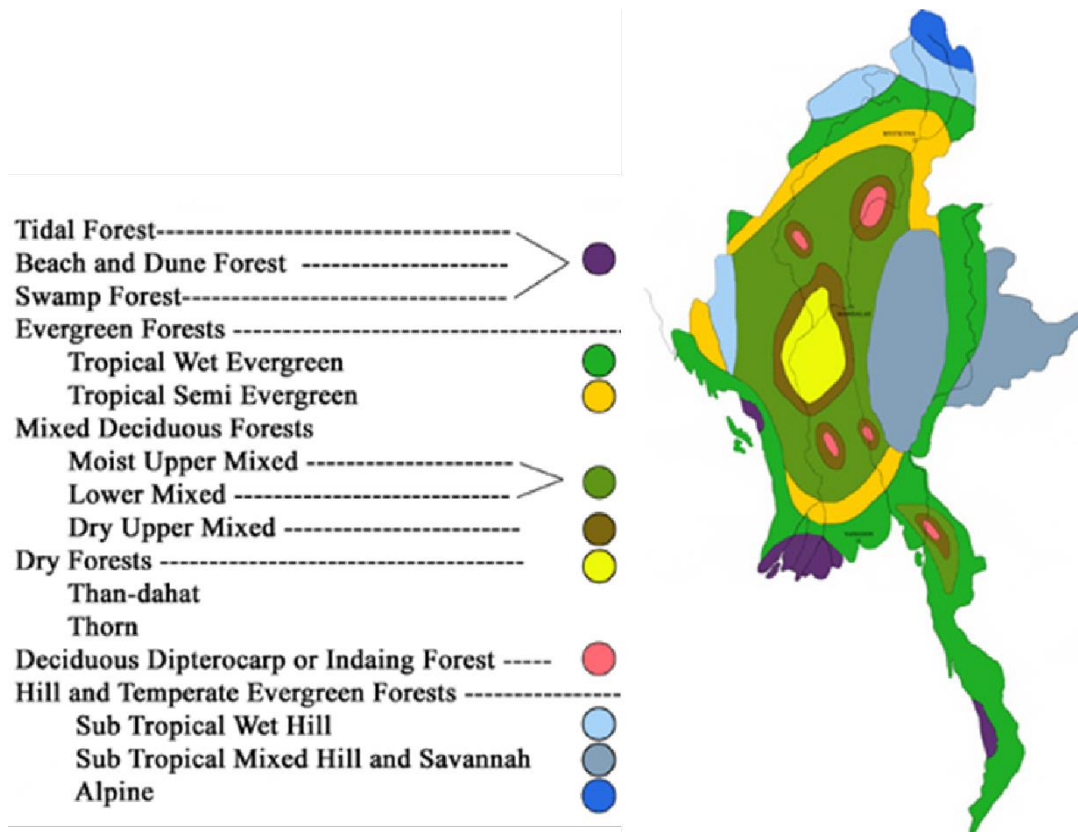
### 2.1 Ecosystem diversity

#### Forest ecosystems

Forests constitute the dominant ecosystem in Myanmar, with 45 per cent of the country ecologically classified as forest (FAO 2015). Furthermore, as a result of a wide altitudinal range, with corresponding variation in climatic conditions, the country supports a range of forest types and vegetation zones. Broadly speaking, forests in Myanmar can be categorized into the types shown in Figure 3. These include the extensive teak forests for which Myanmar



is renowned. In addition, one of the largest homogenous bamboo stands in the world is found in Rakhine State, covering an area of over 7,770 km<sup>2</sup>.



**Figure 3: Major vegetation types of Myanmar. Adopted from Kress et al. 2003.**

### **Freshwater ecosystems**

Myanmar supports a diversity of freshwater ecosystems, from fast-flowing mountain streams to wide, slow-flowing lowland rivers, as well as lakes and wetlands. These rivers, lakes, and wetlands provide enormous economic and cultural values. The Salween and the Ayeyawady Rivers are some of the most intact major rivers in Asia, providing livelihoods to the people living along their banks and rich with historical and cultural significance. The Chindwin River flows through Hukaung Valley and creates one of the largest seasonally flooded grasslands of the region. Indawgyi Lake is the largest freshwater lake in Myanmar, hosting globally significant aggregations of water birds and providing livelihoods for people who fish and grow unique varieties of rice around the lake.

### **Rivers**

Myanmar is endowed with tremendous inland water resources in the form of rivers, streams, and springs (Fig. 4). Major rivers include the 1,800 km-long Ayeyawady River which arises from the confluence of the N'mai Kha and Mali Kha Rivers. The Chindwin River, with headwaters in the north-western hills, is the main tributary of the Ayeyawady. The Sittaung River starts in the hills southeast of Mandalay, and the Thanlwin River, the last undammed

river, races through deep gorges in the Shan Plateau. The Kaladan River is formed by tributaries discharging from the Arakan Mountains.



**Figure 4: Major rivers of Myanmar.**

### *Lakes*

Myanmar contains several large lakes, which provide critical habitat for a range of species and a source of livelihood for local residents. Indawgyi Lake in Kachin State is the largest, with around 12,000 hectares of open water. The lake provides habitat for numerous endangered species and for globally significant aggregations of migratory water birds. Inlay Lake on the Shan plateau is the most famous lake in Myanmar, known for its floating gardens and the leg-rowing Intha people who live around the lake. The country also contains numerous small and medium-sized lakes, including glacial lakes in the north that are crucial sources of freshwater. Lakes within urban areas provide freshwater, flood control, and opportunities for recreation.

## Coastal and marine ecosystems

Myanmar has a large marine territory. The coastline stretches from the Naf River, the dividing line between Bangladesh and Myanmar, to Kawthaung at the border with Thailand, 2,831 km to the south (Fig. 5). Along the southern coastline the Myeik Archipelago is made up of more than 800 islands. The continental shelf covers 225,000 km<sup>2</sup>, and the Exclusive Economic Zone covers 512,000 km<sup>2</sup>. Coastal areas also include 5,000 km<sup>2</sup> of brackish and freshwater swampland that provides essential ecological habitat for spawning and as a nursery and feeding ground for fish, prawns and other aquatic fauna and flora of economic and ecological importance. Mangroves are found in many coastal regions, particularly near estuaries in Rakhine State, Taninthayi Region and Ayeyawady Region. Other coastal habitats include intertidal mud and sand flats, which are very important for migratory water birds, as well as sand dunes and beach forest. The Gulf of Mottama contains one of the largest intertidal mudflats in the world and is thought to be key for the survival of the critically endangered spoon-billed sandpiper.



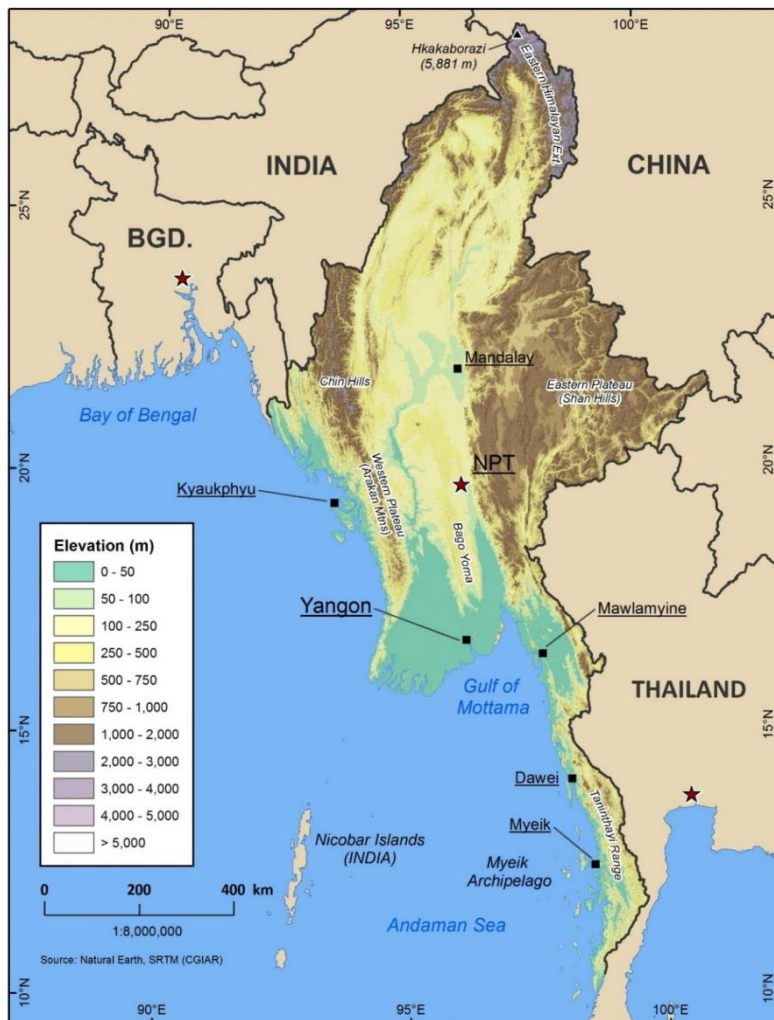
**Figure 5: Coastal areas of Myanmar.**

## Mountain ecosystems

Forty-two per cent of Myanmar is mountainous and these areas form some of the most important landscapes in terms of biological, cultural, traditional and ethnic diversity and identity (Fig. 6). Mountainous areas are also important for the country's economy, providing

most of the fresh water for the country. In addition, three-quarters of Myanmar's 132 Key Biodiversity Areas (KBAs), areas identified as being particularly important for biodiversity, are located in mountainous areas, and are home to several endemic and globally important species. Major mountain ranges in Myanmar are shown in Table 1. In the far north, with an elevation of 5,881 m, Hkakaborazi is the highest peak as well as part of the only permanently snow-capped mountain range in the Indo-Burma region. These mountain ranges are home to diverse ethnicities who practice traditional upland cultivation systems and are dotted with peaks and caves of cultural and historical importance.

Karst formations can be found in Taninthayi Region, Karin State, Shan State, and stretching along the upper Ayeyawady River in Kachin State. Karst formations are home to species with severely restricted ranges, some of which are confined to a single cave or peak. This high rate of endemism makes karst systems particularly important for biodiversity conservation. Limestone quarrying for cement production threatens karst ecosystems.



**Figure 6: Elevation gradient and major mountain ranges of Myanmar.**

**Table 1: Major mountain ranges in Myanmar.**

Mountain Range	Location	Notable Features
Eastern Himalayan Extension	Northern part of country, eastern extent of the Himalayan range	This range contains the highest peaks in Southeast Asia, unique forest habitat and rich bird biodiversity
Chin Hills	Western part of Myanmar, extending to south of India	Natmataung National Park, in the Chin Hills, is an alpine island that is home to rich plant diversity and an endemic bird species.
Western Plateau/Rakhine Yoma	Between the Ayeyawady River and Bay of Bengal	Acting as a barrier to the monsoon, western slopes of the Rakhine Yoma can receive 1 m of precipitation per month in the wet season. This range extends under water to the south and later emerges to form the Nicobar Islands
Bago Yoma	Between the Ayeyawady and Thanlwin Rivers	Largely forested, these mountains supply many reservoirs and provide habitat to a resident elephant population. The Bago Yoma is a historically important source of high-quality teak.
Eastern Plateau	North-east, bordering with China, Laos and Thailand	The Shan Hills cover mountainous Shan State with forest, karst formations, and agricultural land.
Taninthayi Range	South, bordering with Thailand	Covering the northern transition zone between Indochina and Sundaic zones, this range is home to a variety of threatened species. PAs in Thailand are connected to this forest complex across the border.

### Agricultural ecosystem

Myanmar has six major agro-ecological zones corresponding to topographical variation and climatic conditions (Table 2).

**Table 2: Major agro-ecological zones of Myanmar**

Name	Geographical description	Administrative units	Main agricultural crops
A. Bago and Kachin riparian areas and floodplains	Upper Delta, Kachin Plain, flat plains adjacent to Ayeyawady and Sittaung rivers; moderate rainfall (1,000–2,500 mm)	Ayeyawady Region, Kachin State, Sagaing Region, Mandalay Region and Bago Region	Rice, pulses, oilseeds, sugarcane, tobacco and alluvial/island cultivation
B. Central Dry Zone	Central Dry Zone, rainfall less than 1,000 mm, highest temperatures in summer, flat plains, some areas with rolling hills	Magway Region, Mandalay Region, and Sagaing Region	Upland crops, oilseeds, pulses, rice, cotton, irrigated agriculture and alluvial/island cultivation
C. Delta and Coastal Lowland	Delta, lowland and coastal river outlets and estuaries; heavy rainfall (more than 2,500 mm)	Ayeyawady Region, Yangon Region, Bago Region, Mon State, Taninthayi Region and Rakhine State	Rice, pulses, oilseeds and nipa palm
D. Kachin and Coastal Upland	Mountainous, sloping land; heavy rainfall (more than 2,500 mm)	Kachin State, Rakhine State, Taninthayi Region, Mon State, Karin State, Kayah State, Yangon Region and Bago Region	Orchards, plantation crops, and upland agriculture
E. North, East and West Hills	Hilly areas, uneven topography, moderate to heavy rainfall, sloping land	Kachin State, Chin State, and Shan State	Upland crops, shifting cultivation and fruit trees
F. Upper, Lower Myanmar and Shan Plain	Upper and lower plains outside of central dry zone, Shan Plain	Sagaing Region, Kachin State, Shan State, Bago Region, Magway Region, Mandalay Region and Yangon Region	Upland crops, oilseeds, pulses, vegetables and wheat

Source: Adopted from FAO/WFP (2009).



## 2.2 Species diversity

### Wild species diversity

#### *Plants*

Myanmar's variations in latitude, altitude and climate create a variety of habitats and support correspondingly rich plant biodiversity. To date, more than 18,000 plant species have been recorded in Myanmar. These include more than 800 orchid species, 80 bamboo species, numerous rattan species, and more than 800 medicinal plant species. However, there are large research and information gaps for several species groups. On-going collaborative botanical surveys by the Wildlife Conservation Society (WCS; USA), National Institute of Biological Resources (NIBR; Republic of Korea), Institute of Botany, Chinese Academy of Sciences (IBCAS) and Xishuangbanna Tropical Botanical Garden (XTBG) (People's Republic of China), and Makino Botanical Garden (MBK; Japan) will likely identify additional plant species, including endemic species. Enhanced coordination of these efforts is required.

There are 61 globally threatened plant species known to occur in Myanmar. Of these, 16 are assessed on the IUCN Red List of Threatened Species (hereafter referred to as the "Red List") as Critically Endangered (CR), 24 as Endangered (EN) and 21 as Vulnerable (VU). The main threats to plant species in Myanmar are overexploitation by legal and illegal logging, conversion to agriculture—especially commercial plantations, and degradation and fragmentation from road construction and small scale agriculture. Illegal logging for valuable timber species is a driver of deforestation. Rosewood species (Padauk, *Pterocarpus macrocarpus* and Tamalan, *Dalbergia oliveri*) are highly valued and increasingly sold illegally across the border as rosewood supplies are exhausted in neighbouring countries. Orchids are also threatened by unregulated collection and sale across the borders.

#### *Mammals*

Nearly 300 mammal species have been recorded in Myanmar, but a number of these have not been sighted in recent years, including the Sumatran rhinoceros (*Dicerorhinus sumatrensis*), Javan rhinoceros (*Rhinoceros sondaicus*) and Indian water buffalo (*Bubalus arnee*). Myanmar is home to the Western Hoolock gibbon (*Hoolock hoolock*), Eastern Hoolock gibbon (*Hoolock leuconedys*) and Myanmar snub-nosed monkey (*Rhinopithecus strykeri*), discovered in the mountains near the Chinese border in north-east Kachin State in 2010. There are 47 globally threatened mammal species in Myanmar; five Critically Endangered, 17 Endangered and 25.

Two large mammals, the Asian elephant (*Elephas maximus*) and tiger (*Panthera tigris*) are threatened, mainly due to illegal trafficking, and their populations are thought to be decreasing. Black musk deer (*Moschus fuscus*), sun bear (*Helarctos malayans*), Malayan pangolin (*Manis javanica*) and Chinese pangolin (*Manis pentadactyla*) are also severely



threatened by illegal trafficking. On the other hand, camera trap surveys have shown that Htamathi Wildlife Sanctuary, and the proposed Taninthayi, Lenya and Lenya (extension) National Parks are home to a considerable number of tigers and prey species, as well as the Asian elephant.

The population of the Irrawaddy dolphin (*Orcaella brevirostris*) has been decreasing, mainly due to destructive electrofishing practices. Another large aquatic mammal, the dugong (*Dugong dugon*), has been sighted in the Myeik Archipelago and off the Rakhine coast.

Myanmar is also home to at least five endemic mammal species, including: Anthony's pipistrelle (*Hypsugo anthonyi*), Joffre's pipistrelle (*Hypsugo joffrei*), Myanmar pipistrelle (*Hypsugo lophurus*) and the Popa soft-furred rat (*Millardia kathleenae*). Dry mixed deciduous forests in Myanmar are home to the largest remaining population of the endangered Eld's deer (*Rucervus eldii*).

### ***Avifauna***

Myanmar is recognized as having possibly the greatest diversity of bird species in Southeast Asia, with at least 1,096 avifauna species recorded including 6 endemic species and 46 bird species listed on the Red List. Although some of these species have not been recorded for decades they may be present in low numbers. Jerdon's babbler (*Chrysomma alirostre*), was rediscovered in grassland near Yangon in 2014, with the first recorded sighting in 73 years.

Bird species endemic to Myanmar include Jerdon's minivet (*Pericrocotus albifrons*), hooded treepie (*Crypsirina cucullata*), Burmese bush lark (*Mirafra microptera*), Burmese tit (*Aegithalos sharpie*), white-throated babbler (*Turdoides gularis*) and white-browed nuthatch (*Sitta victoriae*).

Of the 45 globally threatened bird species in Myanmar, eight are listed as Critically Endangered. Of these, five have globally significant populations which depend on the country as a critical refuge or wintering area. These include the white-bellied heron (*Ardea insignis*), spoon-billed sandpiper (*Calidris pygmaea*), white-rumped vulture (*Gyps bengalensis*), slender-billed vulture (*Gyps tenuirostris*) and red-headed vulture (*Sarcogyps calvus*). Myanmar is home to the bulk of the world's population of Gurney's pitta (*Pitta gurneyi*), an endangered species, which, outside of Myanmar, is only known from very small populations in southern Thailand.

### ***Herpetofauna***

Ongoing surveys indicate that Myanmar hosts a high diversity of reptiles and amphibians. Myanmar has exceptional turtle and tortoise diversity, with seven endemic species. A herpetofauna survey, jointly conducted between 1999 and 2010 by the Forest Department (FD) and the California Academy of Sciences (CAS), marked an initial effort to understand diversity in Myanmar and subsequent surveys have filled in gaps and discovered new species.

Twenty-one reptile species and three amphibian species endemic to Myanmar have been recorded, including the Burmese frog-faced softshell turtle (*Chitra vandijki*), Myanmar star tortoise (*Geochelone platynota*), Rakhine forest turtle (*Heosemys depressa*), Burmese roofed turtle (*Batagur trivittata*), Myanmar flapshell turtle (*Lissemys scutata*), Burmese-eyed turtle (*Morenia ocellata*) and Burmese peacock softshell turtle (*Nilssonina formosa*). Wildlife trafficking and consumption are major threats to these species. *Geochelone platynota* is considered functionally extinct in the wild, and conservation efforts focus on assurance colonies and reintroduction. The status of several species including *Manouria emys*, *Manouria impressa*, *Batagur baska*, Gharial crocodile (*Gavialis gangeticus*), *Crocodylus palustris* and *Tomistoma schlegelii* remains poorly understood.

### ***Invertebrates***

Invertebrates are one of the least studied taxa in Myanmar. A joint study by FD and Smithsonian Institution identified 1,197 butterflies in Myanmar, about 12% of the global total, which makes Myanmar the fifth richest country in the world in terms of butterfly diversity. This also includes six of the rarest known butterfly species in the world (Table 3). The diversity of other invertebrate species such as beetles, bees and spiders are largely unknown.

**Table 3: Rare butterfly species found in Myanmar.**

Scientific Name	Common Name
<i>Parnassius imperator</i>	Apollo
<i>Troides helena cerberus</i>	Common birdwing
<i>Troides aeacus praecox</i>	Golden birdwing
<i>Bhutanitis ledderdalii</i>	Bhutan glory
<i>Teinopalpus imprrialis</i>	Kaiser
<i>Euthalia phemius phemius</i> ( <i>Euthalia phemius</i> )	White edge baron, white-edged blue baron

### ***Freshwater Fish***

Freshwater fish is one of the least studied fauna in Southeast Asia. Nevertheless, Myanmar is already known to be rich in freshwater fish species, with 520 species recorded, including a number of endemic species (Fish Base 2015). Recent studies conducted by FD and Fauna & Flora International (FFI) revealed some species new to science (*Lepidocephalichthys* spp., *Acanthocobitis* spp. and *Physoschistura* spp. from Indawgyi Lake). Freshwater endemic fish species in Myanmar are presented in Table 4. Notable areas for endemic freshwater species are Inlay Lake and Indawgyi Lake.

**Table 4: Endemic freshwater fish species in Myanmar.**

No.	Species	No.	Species	No.	Species
1	<i>Akysis pictus</i>	21	<i>Garra poecilura</i>	41	<i>Neolissochilus blythii</i>
2	<i>Akysis prashadi</i>	22	<i>Garra propulvinus</i>	42	<i>Neolissochilus compressus</i>
3	<i>Caragobius burmanicus</i>	23	<i>Garra rakhinica</i>	43	<i>Neolissochilus stevensonii</i>
4	<i>Chaca burmensis</i>	24	<i>Garra pilota</i>	44	<i>Olyra burmanica</i>
5	<i>Channa harcourtbutleri</i>	25	<i>Garra vittatula</i>	45	<i>Osteochilus sondhii</i>
6	<i>Clupisoma prateri</i>	26	<i>Gonialosa modesta</i>	46	<i>Parasphaerichthys ocellatus</i>

No.	Species	No.	Species	No.	Species
7	<i>Cyprinus intha</i>	27	<i>Gonialosa whiteheadi</i>	47	<i>Physoschistura brunneana</i>
8	<i>Danio choprae</i>	28	<i>Gudusia variegata</i>	48	<i>Physoschistura rivulicola</i>
9	<i>Danio erythromicron</i>	29	<i>Hemibagrus peguensis</i>	49	<i>Physoschistura shanensis</i>
10	<i>Danio nigrofasciatus</i>	30	<i>Hemibagrus variegatus</i>	50	<i>Proeutropiichthys macrophthalmos</i>
11	<i>Devario auropurpureus</i>	31	<i>Homaloptera rupicola</i>	51	<i>Pseudolaguvia tuberculata</i>
12	<i>Devario sondhii</i>	32	<i>Ilisha novacula</i>	52	<i>Puntius burmanicus</i>
13	<i>Devario spinosus</i>	33	<i>Labeo stolizkae</i>	53	<i>Sawbwa resplendens</i>
14	<i>Esomus ahli</i>	34	<i>Macrognathus caudicellatus</i>	54	<i>Schistura acuticephalus</i>
15	<i>Esomus altus</i>	35	<i>Mastacembelus oatesii</i>	55	<i>Sicamugil hamiltonii</i>
16	<i>Exostoma berdmorei</i>	36	<i>Microdevario gatesi</i>	56	<i>Toxotes blythii</i>
17	<i>Exostoma stuarti</i>	37	<i>Microphis dunckeri</i>	57	<i>Trichogaster labiosa</i>
18	<i>Garra flavatra</i>	38	<i>Microrasbora rubescens</i>	58	<i>Yunnanilus brevis</i>
19	<i>Garra gravelyi</i>	39	<i>Mystus leucophasis</i>		
20	<i>Garra nigricollis</i>	40	<i>Mystus rufescens</i>		

### Marine fauna

Myanmar has a long coastline and large marine territory. Its marine resources play an important role in the country's development. A growing understanding of coral reef resilience and species composition is helping to identify key areas for conservation. The initial result of a marine ecosystem survey by the Research Vessel RV Fridtj of Nansen conducted November–December 2013 indicated that the maximum sustained yield (MSY) in Myanmar's marine territory has been significantly reduced compared to the MSY calculated in the early 1980s. With the exception of marine fish species, the majority of the data is collected from the Myeik Archipelago.

In total, 17,043 species are recorded in Myanmar (Table 5), and comprehensive survey will discover more new species for the world or new record for the country.

**Table 5: Recorded species of Myanmar.**

Group	Total no. of species	Threatened			
		Critically endangered	Endangered	Vulnerable	Total
Plants	11,824	16	24	23	63
Mammals	252	5	17	25	47
Birds	1096	8	12	25	45
Reptiles	291	-	-	-	-
Amphibians	119	-	-	-	-
Butterflies	1197	-	-	-	-
Freshwater fishes	525	-	-	-	-
Marine fishes	578	-	-	-	-
Phytoplankton	136	-	-	-	-
Zooplankton	150	-	-	-	-
Meroplankton	47	-	-	-	-
Seagrass	12	-	-	-	-
Seaweed	38	-	-	-	-
Gastropods (molluscs)	50	-	-	-	-
Bivalves (molluscs)	41	-	-	-	-
Crab (crustacean)	42	-	-	-	-

Group	Total no. of species	Threatened			
		Critically endangered	Endangered	Vulnerable	Total
Coral	287	-	-	-	-
Marine invertebrates	230	-	-	-	-
Sharks	57	-	-	-	-
Rays	71	-	-	-	-
Total	17,043	29	53	73	155

## Domesticated biodiversity

### *Crops*

Plants play a vital role for the survival of human society. Plant Genetic Resources (PGR) provide enormous potential for food security, biofuel and biopharmaceutical production and play a critical role in adaptation to climate change. More than 60 different crops are grown in the country and they can be grouped into seven categories as follows:

- Cereals: Rice, wheat, maize and millet.
- Oil seeds: Groundnut, sesame, sunflower and mustard.
- Pulses: Black gram, green gram, butter bean, red bean, pigeon pea, chickpea, cowpea and soybean, etc.
- Industrial crops: Cotton, sugar cane, tobacco, rubber and jute.
- Culinary crops: Potato, onion, chilli, vegetables and spices.
- Plantation crops: Tea, coffee, coconut, banana, oil palm, toddy palm and other fruits.
- Other crops: other crops that are not listed in the above groups.

Inter- and intraspecific genetic variations are also observed among crops sown nationwide, especially for rice, maize, sorghum, millet, sesame, groundnut, ginger, turmeric, custard apple, okra, chilli, pepper, tomato, citrus, water melon, mango, jack-fruit, banana and medicinal plants.

Myanmar is also home to important crop species such as rice, mango, banana and sugarcane. Wild relatives and local landraces (varieties developed through traditional breeding methods and adapted to local conditions) of these cultivated crops are also found in Myanmar. According to genetic, geographical and molecular studies, Myanmar is believed to be in the centre of diversity of cultivated rice, *O. sativa indica*. Several wild legume species related to cultivated mung bean, black gram and azuki bean are distributed in different ecosystems of Myanmar, including coastal sandy soils, lime stone hills and high lands of Shan state. These wild legume species could provide useful genes for legume crop improvement. Moreover, several lesser used plant species are grown and used by diverse ethnic groups in Myanmar.

Recognizing the great value of PGR and the increasing threat of the loss of plant genetic diversity from natural habitats and farm lands, the seed bank of the Ministry of Agriculture and Irrigation (MOAI) has made efforts to collect and conserve the agro-biodiversity of

Myanmar. Currently, the seed bank is conserving more than 12,000 accessions of important crops in Myanmar (Table 6).

**Table 6: Plant genetic resources conserved by Myanmar seed bank.**

Crop species	Number of accessions	Crop species	Number of accessions
Rice	7,367	Maize	100
Wild rice	184	Wheat	1,607
Black gram	128	Sorghum	219
Chick pea	617	Millets	123
Pigeon pea	143	Sesame	37
Green gram	189	Groundnut	665
Cow pea	181	Niger	1
Soybean	80	Safflower	1
Lima bean	66	Jute	42
Kidney bean	69	Vegetables	109
Wild Vigna spp.	101	<b>Total</b>	12,029

### **Livestock**

The genetic variations of livestock in Myanmar are still largely unknown. Some livestock breeds are common across the country but some are much more localized. For example, mithun (*Bos frontalis*) are bred only in Chin State. Mithun are semi-domesticated cattle that play an important role in the day to day socio-economic life of the local tribal population. The Department of Animal Biotechnology of Kyauk Se Technical University has initiated systematic mithun breeding to maintain the declining population. Myanmar Myin (horse) and Inbinwa chicken are considered at risk because of a population decrease nationwide. The major livestock breeds in Myanmar are presented in Table 7.

**Table 7: Major livestock breeds in Myanmar.**

Species	Scientific Name	Local Name	Region/Location
Cattle	<i>Bos indicus</i>	Pya Sein, Shwe Ni, Shan Nwa, Katonwa, Kyaukphyu	Mandalay, Magway, Sagaing, Shan, Kayin, Rakhine
Mythun	<i>Bos frontalis</i>	Nwa Nauk	Chin
Buffalo	<i>Bubals bubals</i>	Myanmar Kywe, Shan Kywe	Ayeyawady, Sagaing, Shan
Horse	<i>Equus caballus</i>	Myanmar Myin, Shan Myin	Magway, Mandalay, Sagaing, Shan
Ass	<i>Equus asinus</i>	Myanmar Mye	Shan
Pig	<i>Sus domesticus</i>	Bo cake, Chin wet	Badoung, Akhar, Wet taung Magway, Mandalay, Sagaing, Shan
Sheep	<i>Ovis aries</i>	Myanmar Thoe, Karla Thoe	Magway, Mandalay, Sagaing
Goat	<i>Capra hircus</i>	Seik Ni, Jade Ni, Nyaung Oo, Htain San, Hkway Seik	Magway, Mandalay, Sagaing, Rakhine
Chicken	<i>Gallus gallus</i>	Taik Kyet, Tainyin Kyet, Kyet Lada, Inbinwa Kyet	Widespread
Turkey	<i>Meleagris gallopavo</i>	Kyet Sin	Widespread
Duck	<i>Anas platyrbynchos</i>	Khayan Be, Taw Be	Widespread
Duck, Muscovy	<i>Cairina Maschata</i>	Mandarli	Widespread
Goose	<i>Anser cygnoides</i>	Ngan	Widespread
Quail	<i>Coturnix spp</i>	Ngown	Widespread

### **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 country. 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.

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*).

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.

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.

#### **3.2 Illegal wildlife hunting and trade**

The trade in endangered wildlife is one of the greatest threats to biodiversity in Myanmar. As commercially valuable wildlife species have been wiped out in neighbouring countries, Myanmar has increasingly become a source of wildlife products. Particularly vulnerable are the country's endemic species, especially freshwater turtles and tortoises. By monitoring wildlife products in Mong La in Shan State since 2006, TRAFFIC has documented the significant trade in elephants, Asiatic bears, sun bears, tigers, leopards, snow leopards, cloud leopards, turtles, tortoises, and pangolins from Myanmar to its neighbours.



### **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. Trans-boundary 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 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 agro-biodiversity**

A variety of human activities threaten the agro-biodiversity 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 agro-biodiversity 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 eco-geographic studies of PGRs are also major constraints to surveying and inventorying agro-biodiversity 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 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 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.

### 3.5.6 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:

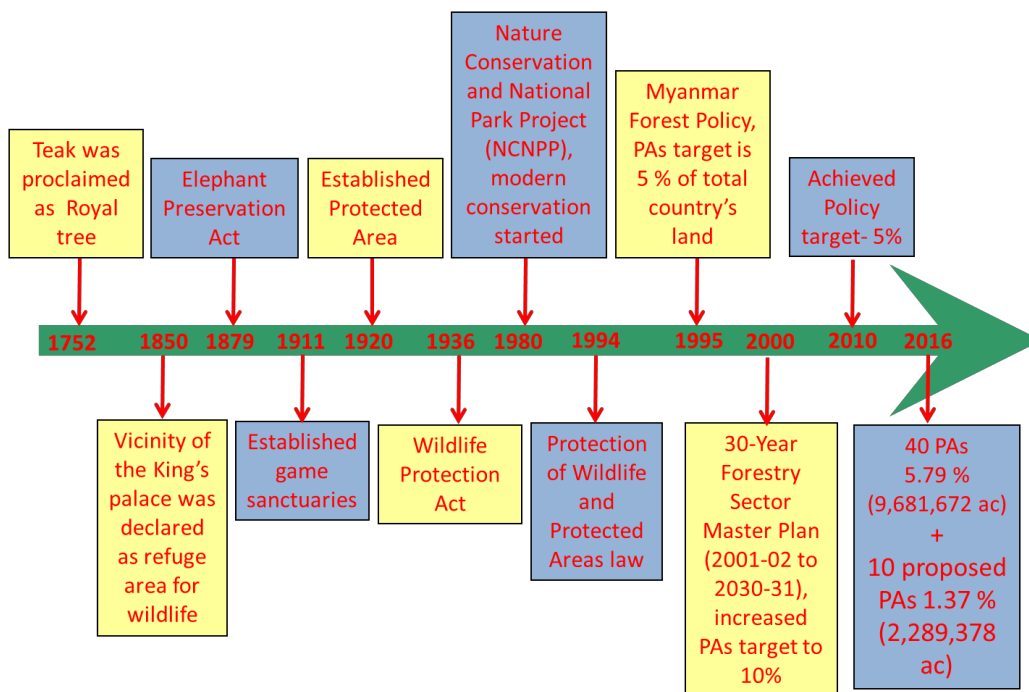
- A general increase in temperature across the country, particularly from December to May, with the Central and Northern regions experiencing the greatest increases;
- An increase in clear sky days, exacerbating drought periods;
- An increase in rainfall variability during the rainy season including 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.

## **4. Biodiversity conservation**

### **4.1 Historical information**

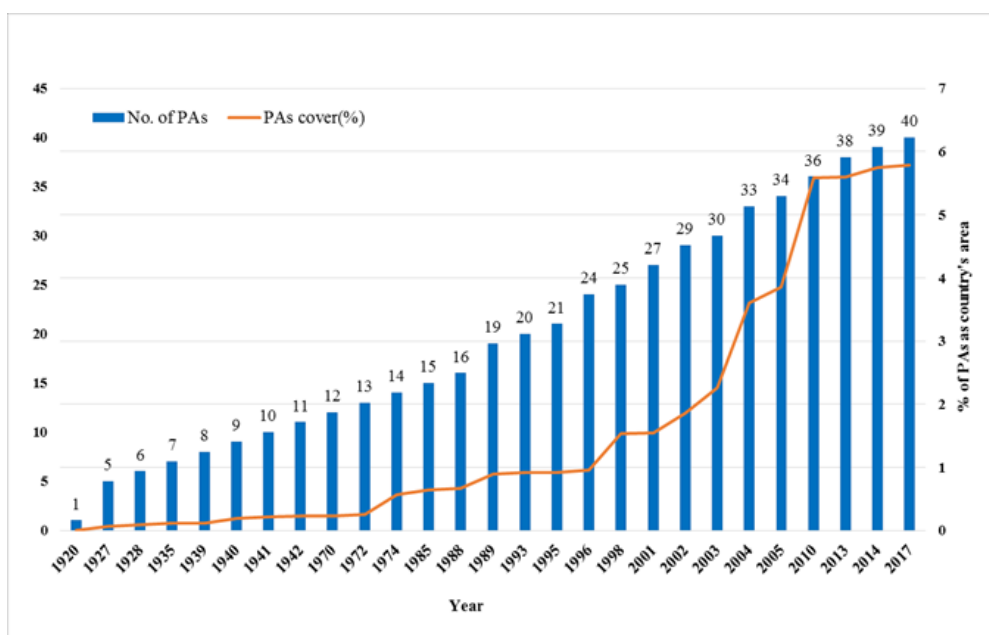
In Myanmar, the Kings initiated biodiversity conservation as early as 1752 when teak was proclaimed a Royal Tree. The vicinity of the King's palace was declared a refuge area for the wild animals in the city of Yadanapon (now Mandalay) in 1850. The Elephant Preservation Act was enacted in 1879, and amended in 1883. The first Game Sanctuaries were established in 1911, but ratified protected areas were not set up until 1920. The Burma Wildlife Protection Act was imposed in 1936. Nature and Wildlife Conservation Division (NWCD) was created within the FD when the "Nature Conservation and National Parks Project (NCNPP)" was implemented from 1981 to 1984. Protected Area System (PAS) management was introduced since then and the Protection of Wildlife and Protected Areas Law was enacted in 1994 by replacing the Burma Wildlife Protection Act 1936.



**Figure 7: History of Biodiversity Conservation in Myanmar.**

**4.2 National target on protected areas and current progress**

Myanmar's Forest Policy (1995) mandates an increase in protected areas to 5 % of the country's total land. In year 2000, this target was adjusted to 10% of total land by 30-year Forest Master Plan of Ministry of Environmental Conservation and Forestry. Currently, Myanmar has 39,180 km<sup>2</sup> in 40 PAs representing diverse ecosystems, which cover 5.79% of the total area. Other ten areas that occupy 1.37 % of the country total land have been proposed to be established as PAs.



**Figure 8: Progress of Protected Areas in Myanmar**

### Protected Areas in Myanmar

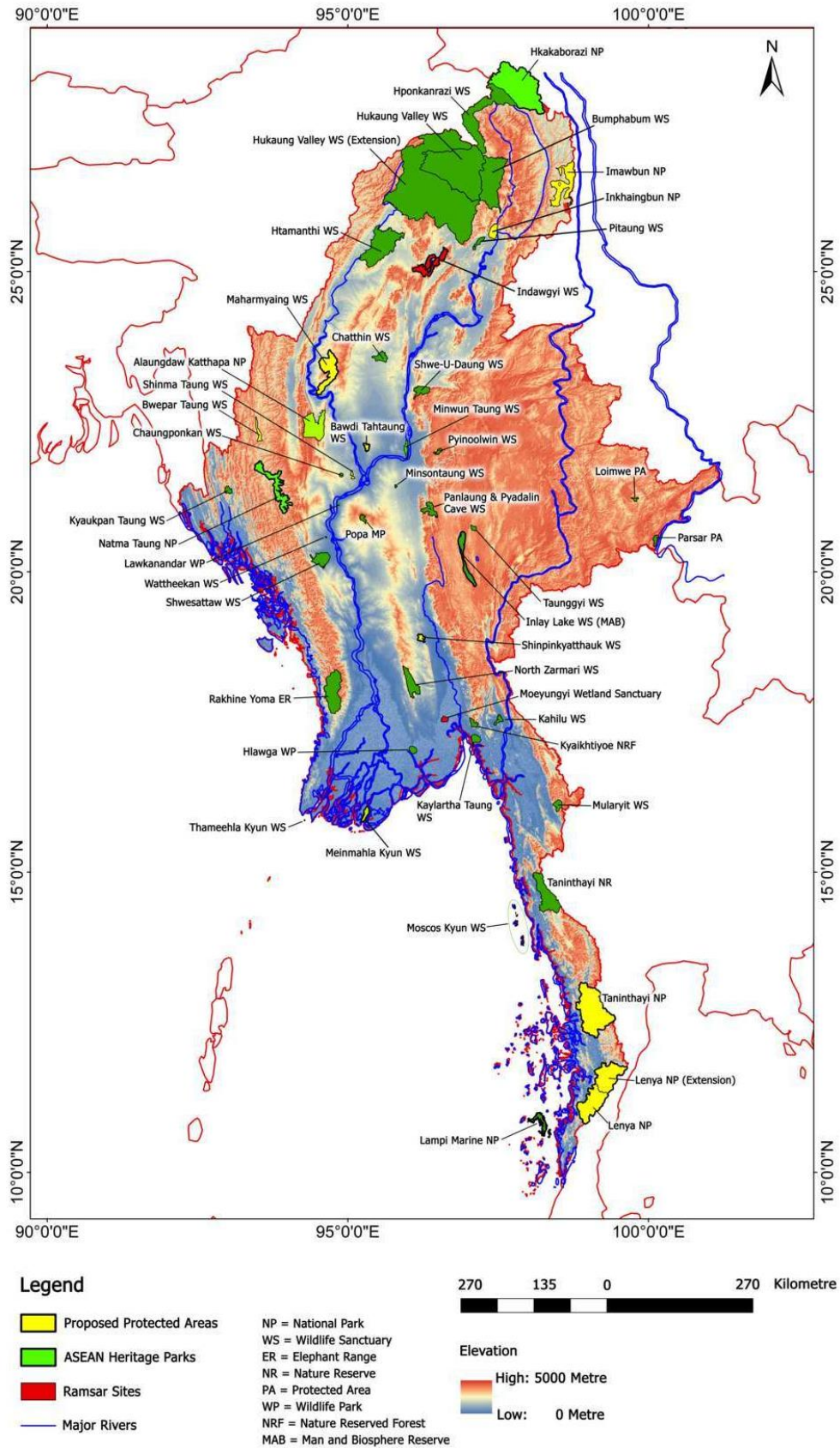


Figure 9: Location of Established and Proposed Protected Areas in Myanmar.

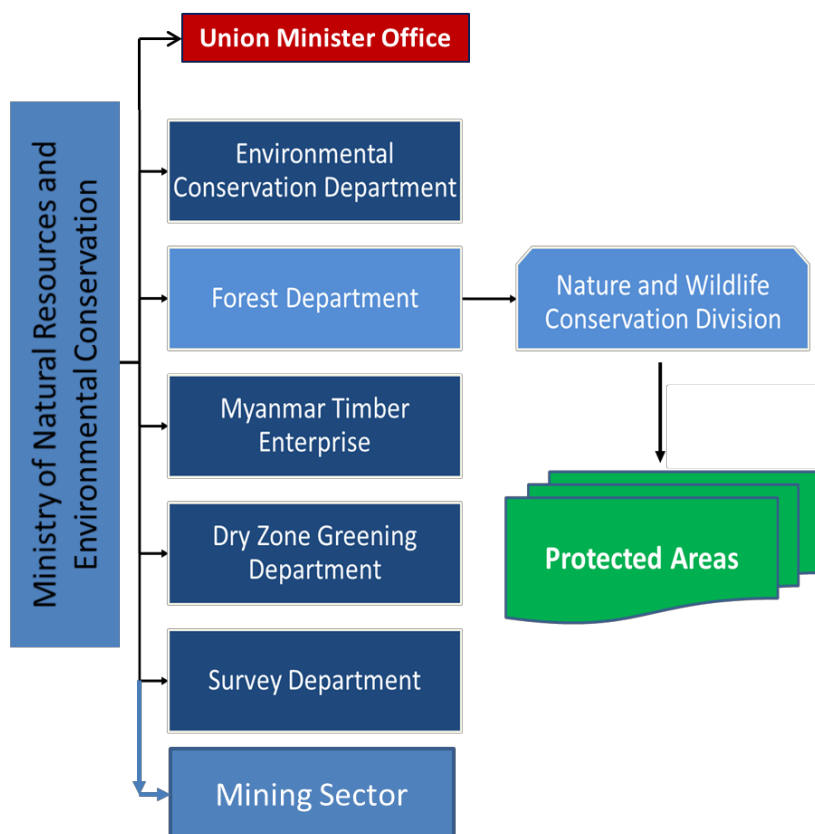
### 4.3 Policy, law and national strategy

The followings are national policy, strategy and legal backbone for biodiversity conservation and protected area management:

- Forest Policy, 1995
- Forest Law, 1992
- Forest Rules, 1995
- Protection of Wildlife and Protected Areas Law, 1994
- Protection of Wildlife and Protected Areas Rules, 2002
- National Forestry Sector Master Plan, 2001-02 to 2030-31
- National Biodiversity Strategy and Action Plan, 2015-2020
- Myanmar Ecotourism Policy and Management Strategy, 2015-2025

### 4.4 Management and conservation

Institutional arrangement for the management of protected areas in Myanmar is presented as below:



Park offices have been established at twenty one PAs. Total number of staff is 612. National target in Myanmar's NBSAP (2015-2020) is "by 2020 at least five PAs are implementing management plans". Management plan has been developed and practiced for two PAs



(Taninthayi Nature Reserve and Lampi Marine National Park). Park management plans are being developed for four PAs (Indawgyi, Alaungdawkathapa, Natmataung and Meinmahlakyun). Planning for developing park management plan for seven PAs (Hkakaborazi, Hukaung, Htamanthi, Chatthin, Popa, Shwesttaw, Moeyungyi).

To restore habitats and associated key species, to sustain ecosystem services, to support the implementation of NBSAP, as well as to meet comments to international convention such as CBD, Ramsar Convention, UNFCCC, UNCCD, “Habitat Restoration Programme (2017-2018 to 2026-2027)” for protected areas is being prepared.

In collaboration partner organizations such as WCS, ex-situ conservation are being conducted for Myanmar star tortoise, Burmese roof turtle, Arakan hill turtle, Myanmar golden deer. The activities are very successful. However, Myanmar still needs to strengthen to other rare and endangered flora and fauna, particularly for flora, by establishing arboretum, herbarium, and botanical garden for ex-situ plant conservation.

#### **4.5 Communication, education and public awareness (CEPA)**

Environmental education is also conducted for the local communities surrounding the protected areas to get local people’s participation in conservation. Each PA with park office has mobile education team, and environmental education talks are carried out at villages and schools. Pagoda festivals are good opportunities for public education programs. Some PAs have education centers. But need to improve education materials, programs and capacity as well.

#### **4.6 Combating illegal wildlife crime**

Illegal wildlife hunting and trade is a major threat to biodiversity. National Wildlife Law Enforcement Taskforce- composed of senior officials from law enforcement agencies- for strengthening coordination and collaborative efforts.

Cooperating with countries in the region and also participating in global and regional initiatives and programs such as ASEAN Wildlife Enforcement Network (ASEAN-WEN), Operation Cobra, Operation Paws, Wildlife Crimes Working Group of the INTERPOL.

The use of SMART (Spatial Monitoring and Reporting Tool) tool is strengthened in protected area management.

#### **4.7 Research and monitoring**

Research and monitoring are mainly site-based or project based, and need to scale up to national level and to develop standardized monitoring protocol. Currently, Forest Department is cooperating with Wildlife Conservation Society from USA, Fauna & Flora International from UK and Istituto OIKOS from Italy in PA management, and monitoring. Furthermore, research on flora and fauna are being conducted in cooperation with academic and research

institutes including National Institute of Biological Resources from Republic of China, Makino Botanical Garden from Japan, Chinese Academic of Sciences from People's Republic of China, Marburg University from Germany, Smithsonian Conservation Biological Institute from USA, Worldwide Fund for Nature from Switzerland etc.

#### **4.8 Community development**

Myanmar is promoting modalities that favor the development and conservation in parallel to achieve co-existence between nature and human, such as community-based natural resource management (CBNRM), locally managed marine area (LMMA), Indigenous and community conserved areas (ICCAs), Buffer zone management etc.

As an option for sustainable finance for conservation and community development, ecotourism is being promoted, mainly based on protected areas. Myanmar has designated 21 ecotourism sites, and 19 are PAs. Forest Department is preparing for the development of community-based ecotourism.

REDD+ and PES have high potential for socio-economic development of communities living around the PAs, and that would lead to support and collaboration of local people in conservation and management.

#### **4.9 Designation of internationally and regionally recognized conservation areas**

ASEAN Heritage Parks (AHPs) are recognized for their particular biodiversity value or uniqueness within ASEAN countries.

Seven of Myanmar PAs have been recognized as AHPs, namely, Hkakaborazi National Park, Indawgyi Wildlife Sanctuary, Alaungdaw Kathapa National Park, Inlay Lake Wildlife Sanctuary, Meinmahla Kyun Wildlife Sanctuary, Lampi Marine National Park and Natmataung National Park.

Myanmar has three Ramsar Sites, Moeyungi Wetland Sanctuary, Indawgyi Wildlife Sanctuary and Meinmahla Kyun Wildlife Sanctuary. Some parts of the Gulf of Mottama is nominated to designate Ramsar Site.

Myanmar has one man and biosphere Reserve (MAB) of the UNESCO, Inlay Lake Wildlife Sanctuary. Indawgyi Lake Wildlife Sanctuary is nominated to include in UNESCO's MAB.

Myanmar is preparing a nomination dossier for the inscription of Hkakaborazi Landscape to the UNESCO's World Heritage List.

### **5. Biodiversity related international conventions and treaties**

There are seven biodiversity related international conventions and treaties as mentioned below:

- Convention on Biological Diversity (CBD)

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR)
- Convention Concerning the Protection of the World Cultural and Natural Heritage (also known as the World Heritage Convention, WHC)
- International Plant Protection Convention (IPPC)

Forest Department is the focal department for implementing CBD, CITES and Ramsar Convention in Myanmar, and also supporting to the respective departments in implementing remaining conventions and treaties.

## **6. Priority activities for biodiversity conservation and protected areas management in Myanmar**

Myanmar needs a lot of capacity and activities for the effective conservation, management and sustainable use of biodiversity. The followings are Priority activities for biodiversity conservation and protected areas management in Myanmar:

- Developing park management plan
- Initiating buffer zone management
- Developing national RedList of flora and fauna
- Documenting Agro-biodiversity
- Promoting priority species conservation (Tiger, elephant, other globally threatened species)
- Developing national wetland conservation and management policy and strategy
- Valuing ecosystem services
- Enhancing communication, education and public awareness (CEPA) program
- Strengthening the capacity of park's staff for effective conservation, management and research as well
- Community-based ecotourism
- Documenting traditional knowledge on resource utilization, management and governance
- Initiating locally managed marine protected areas
- Livelihood development program around PAs
- Community-based law enforcement
- Initiating payment for ecosystem services
- Enhancing law enforcement activities against illegal wildlife crimes

- Developing sustainable financial mechanism for park management and biodiversity conservation through REDD+ or PES
- Designating AHP, MAB, World Heritage Site, Ramsar Site and EAAFP network site
- Exploring potential PAs with the significant biodiversity
- Extending the PAs coverage to reach the national target of 10% of total area.
- Strengthening the coordination with the relevant government organizations and local NGOs in biodiversity conservation.

## 7. Conclusion

Myanmar's PAs are vital to sustaining the biodiversity and ecosystem services that underpin sustainable development, poverty reduction, climate stability, and natural disaster reduction. Despite their importance, there are still many challenges to managing these areas. In particular, the PA network has insufficient funding to ensure its effective management. This is starting to change.

Over the past few years, both government and international funding for PAs has increased significantly. However, adequate funding remains a key constraint. Though PAs cannot offer full achievement for the biodiversity conservation mainly due to the numerous constraints that have to be addressed immediately, some studies revealed that forests within the PAs has been more effectively conserved than forests outside the PAs (Htun et al. 2010; Songer et al. 2009). These findings indicate that Myanmar's PAs are not merely 'Paper Park' as claimed by others (Aung 2007; Rao et al. 2002), and Myanmar's PAs achieve a degree of forest and its diversity conservation though they are managing in the given inadequate resources.

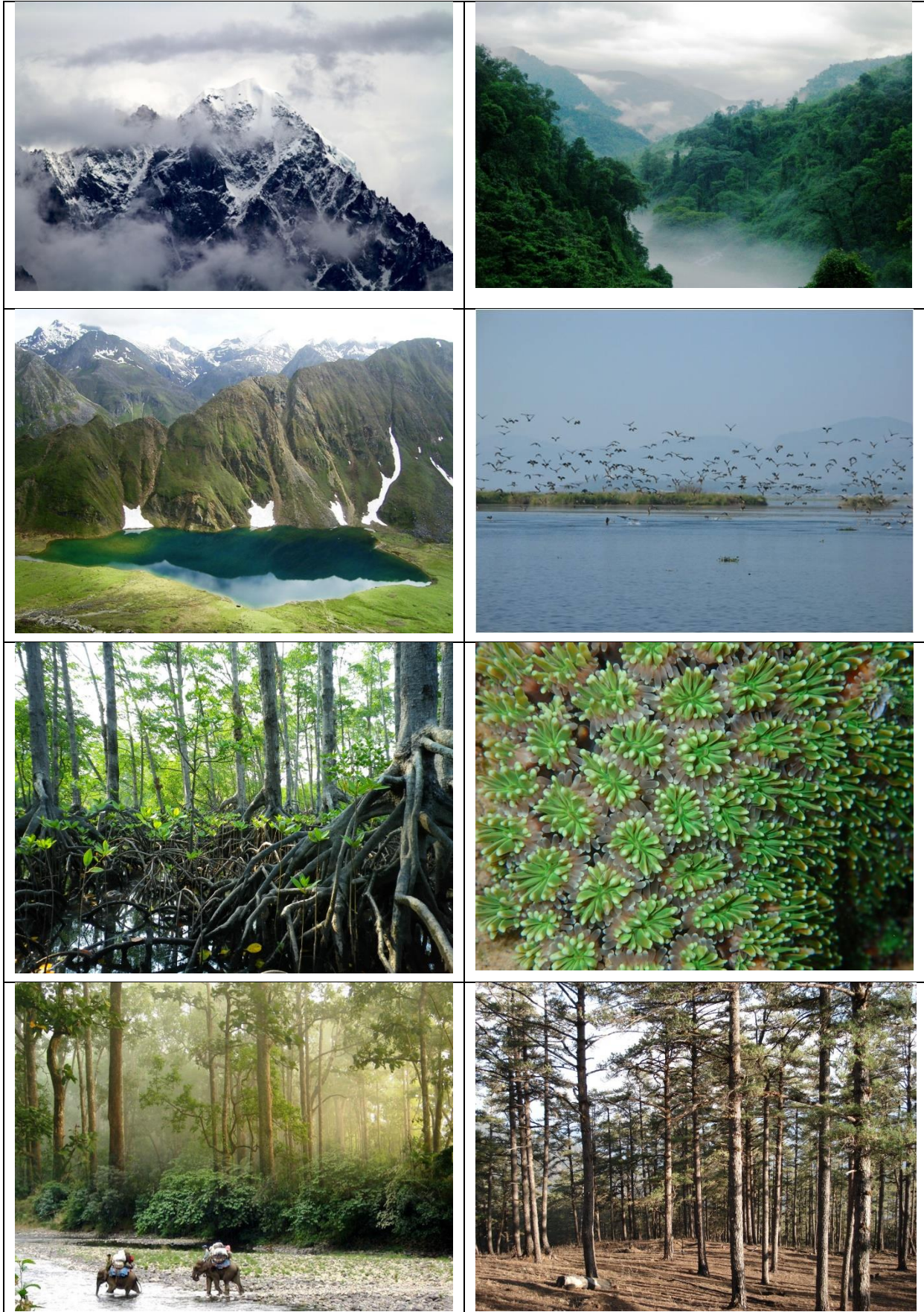
Limited funding for protected area management and biodiversity is the major constraints. The practising of payment for ecosystem services (PES) will be one of the best solutions for achieving sustainable financial mechanism in nature and biodiversity conservation.

## References

- Aung, U.M. 2007. Policy and practice in Myanmar's protected area system. *Journal of Environmental Management* 84(2): 188–203.
- Bryant, R.L. 1996. *The Political Ecology of Forestry in Burma*. University of Hawaii Press, Honolulu.
- CBD. 2010. A new era of living in harmony with Nature is born at the Nagoya Biodiversity Summit. Available online at: <http://www.cbd.int/doc/press/2010/pr-2010-10-29-cop-10-en.pdf>.
- FAO. 2010. *Global Forest Resources Assessment 2010, country report: Myanmar*. FRA2010/141, Rome, Italy. Available online at: <http://www.fao.org/docrep/013/a1576E/a1576E.pdf>.
- FishBase. 2015. Retrieved from <http://www.fishbase.org/search.php>.

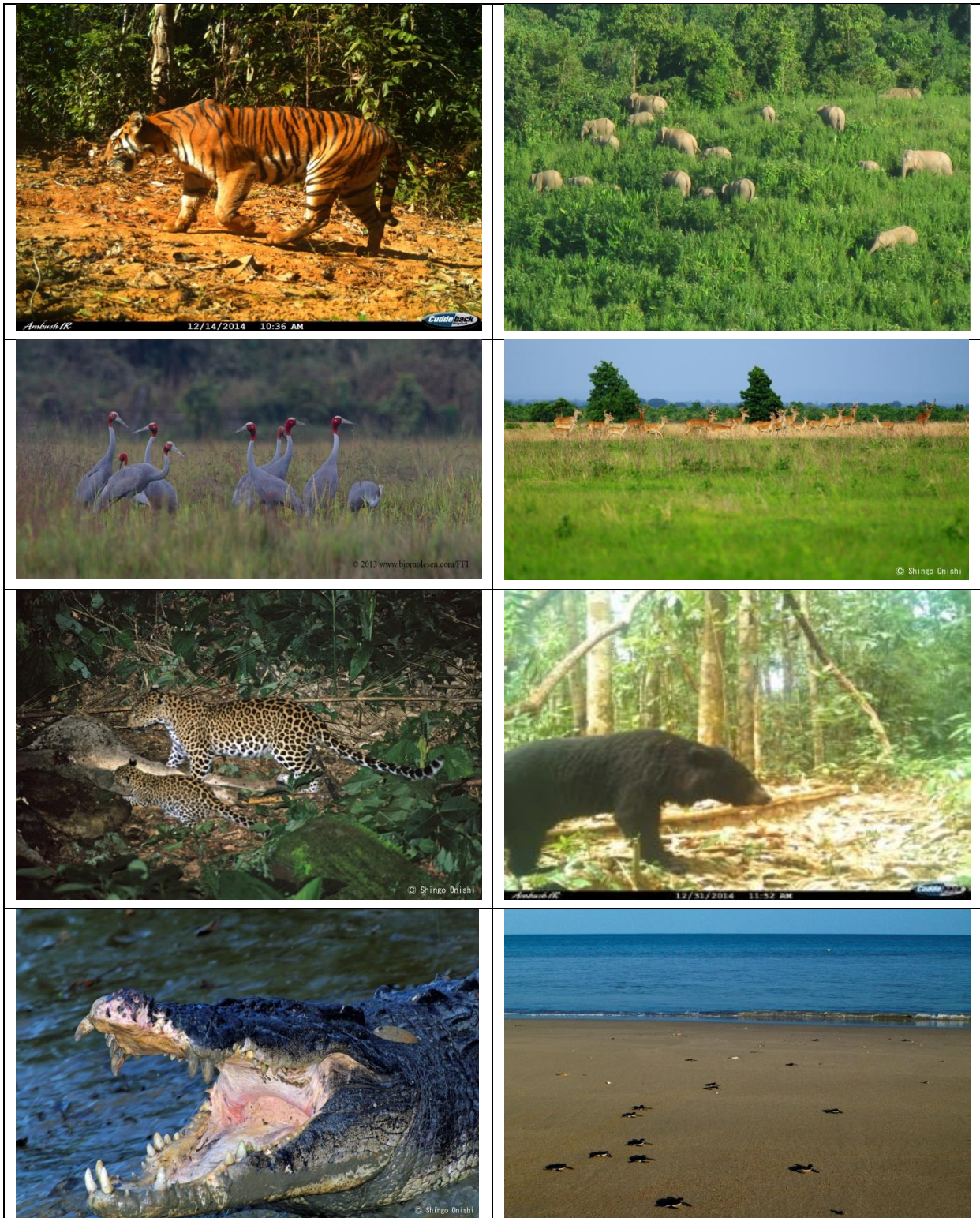
- Htun, N. Z., N. Mizoue, T. Kajisa, and S. Yosida. 2010. Deforestation and forest degradation as measures of Popa Mountain Park (Myanmar) effectiveness. *Environmental Conservation*. 36: 218–224.
- Ministry of National Planning and Economic Development. 2013. Millennium Development Goals Report. Republic of the Union of Myanmar, Nay Pyi Taw.
- Myanmar's Fifth National Report to the Convention on Biological Diversity. 2013. Available online at: <https://www.cbd.int/countries/?country=mm>.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G. and Fonseca, G.A.B., Kent, J. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858.
- Rao, M., Rabinowitz, A. and Khaing, S.T. 2002. Status review of the protected area system in Myanmar, with recommendations for conservation planning. *Conservation Biology* 16: 360–368.
- Myanmar's National Biodiversity Strategy and Action Plan (2015-2020). 2015. Available online at: <https://www.cbd.int/countries/?country=mm>.
- Songer, M., Aung, M., Senior, B., DeFries, R. and Leimgruber, P. 2009. Spatial and temporal deforestation dynamics in protected and unprotected dry forests: a case study from Myanmar. (Burma). *Biodiversity Conservation*. 18: 1001–1018.
- UN-REDD Programme. 2010. The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries. Available online at: <http://www.un-redd.org/AboutREDD/tabid/582/language/en-US/Default.aspx>.
- WCMC. 2011. World Conservation Monitoring Centre. Protected areas database in 2011.





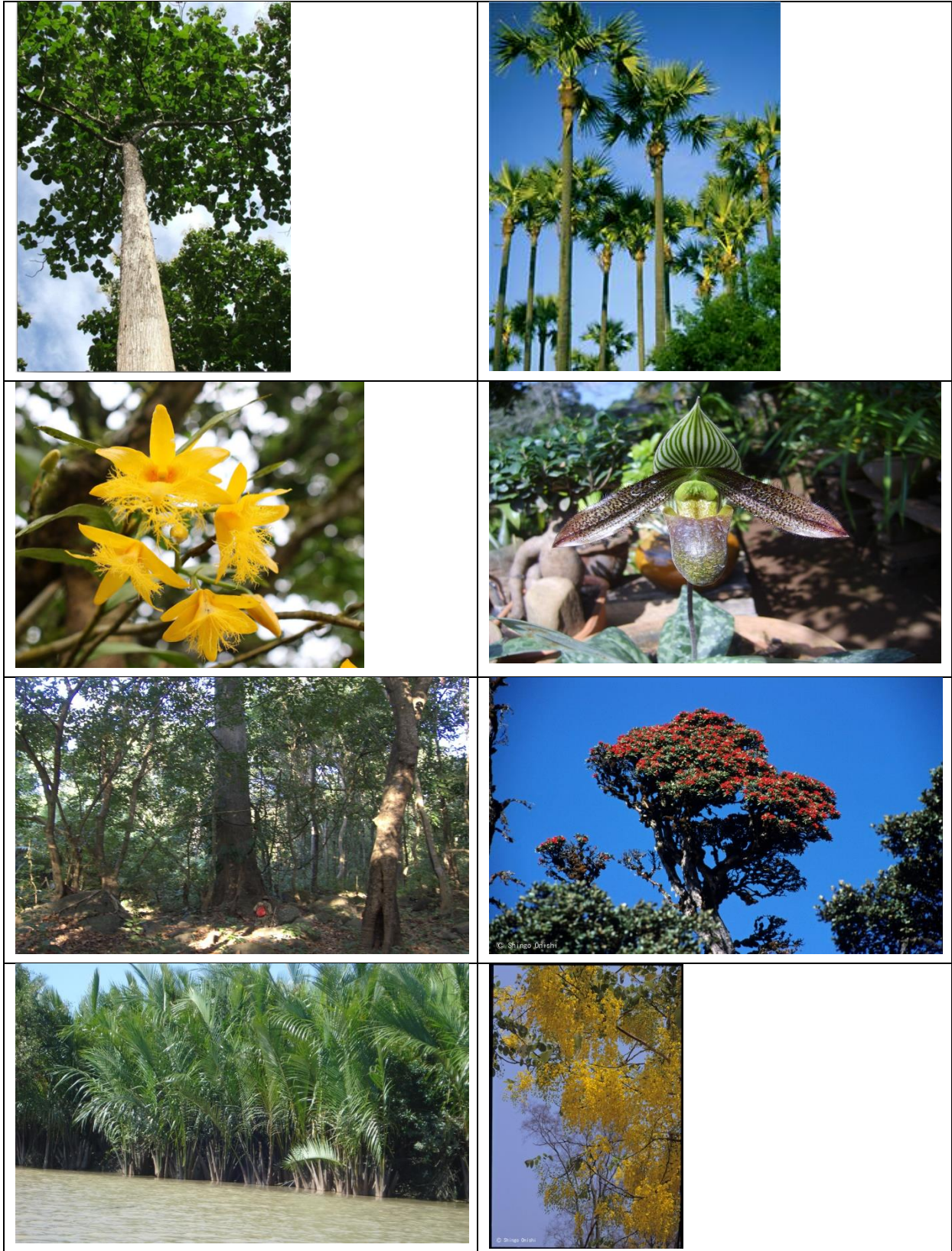
Ecosystem diversity in Myanmar; from top left to bottom right: Mountain glacier; Hill forest; Mountain lake; Wetland; Mangrove; Coral; Mixed deciduous forest and Pine forest. (Photo credits: Shijo Onishi; Forest Department; WCS; FFI; OIKOS)





Wildlife diversity in Myanmar; from top left to bottom right: Tiger (*Panthera tigris*); Asian elephant (*Elephas maximus*); Surus crane (*Grus antigones*); Myanmar golden deer (*Cervus eldi thamin*); Leopard (*Panthera pardus*); Asiatic black bear (*Selenarctos thibetanus*); Estuarine crocodile (*Crocodylus porosus*) and Sea turtles. (Photo credits: Shingo Onishi; Forest Department; FFI; WCS)





Plant diversity in Myanmar; from top left to bottom right: Teak (*Tectona grandis*); Htan (*Borassus flabellifer*); Orchid (*Dendrobium fimbriatum*); Black Orchid (*Paphiopedilum wardii* Summerh); Kanyin-byu (*Dipterocarpus alatus*); Taung-zalat-ni (*Rhododendron arboretum*); Dani (*Nypa fruticans*) and Pan-padauk (*Pterocarpus indicus*). (Photo credits: Forest Department; Saw Lwin; Kyaw Win Maung; ZENG Xiang-Le, XTBG; Naing Zaw Htun; Shijo Onishi).





Major causes of biodiversity loss in Myanmar; from top left to bottom right: Habitat loss; Shifting cultivation; Illegal poaching; Wildlife trafficking; Illegal logging; Fuelwood collection; Forest fire and Clearing for plantation and (Photo credits: Forest Department; WCS; Naing Zaw Htun).

**Annex I. General Information of established and proposed protected areas in Myanmar up to February 2017.**

No.	Established Year	Name	Areas		General Location	Key species protected	Remark
			Sq. km	Sq. mile			
<b>Established Protected Areas</b>							
1	1920	Taunggyi Bird Sanctuary	16.06	6.20	Shan State	Avifauna	- / -
2	1927	Pidaung Wildlife Sanctuary	122.07	47.13	Kachin State	Barking deer, Wildboar, Avifauna, Reptiles	Protected Area Notification No. 243/1927 (1-11-1927)
3	1927	Shwe-U-Daung Wildlife Sanctuary	58.04	22.41	Mandalay Region	Elephant, Gaur, Banteng, Sambar, Serow, Macaque, Avifauna	Protected Area Notification No. 243/1927 (1-11-1927)
	1927	Shwe-U-Daung Wildlife Sanctuary	117.97	45.55	Shan State		
4	1927	Pyin-O-Lwin Bird Sanctuary	127.25	49.13	Mandalay Region	Barking deer, Avifauna	Protected Area Notification No. 243/1927 (1-11-1927)
5	1927	Moscós Islands Wildlife Sanctuary	49.18	18.99	Taninthayi Region	Barking deer, Sambar, Water birds	Protected Area Notification No. 243/1927 (1-11-1927)
6	1928	Kahilu Wildlife Sanctuary	160.55	61.99	Karen State	Serow, Mouse deer, Hog deer	Protected Area Notification No. 241/1928 (1-9-1928)
7	1939	Mulayit Wildlife Sanctuary	138.54	53.49	Karen State	Barking deer, Wildboar, Macaque, Avifauna	Protected Areas; Notification No. 275/1939 (1-9-1939)
8	1939	Wethikan Bird Sanctuary	4.40	1.70	Magwe Region	Water birds	Protected Areas; Notification No. 275/1939 (1-9-1939)
9	1940	Shwesettaw Wildlife Sanctuary	464.28	179.26	Magwe Region	Eld's deer, Sambar, Barking deer, Wild dog, Wildboar, Macaque, Avifauna	Protected Areas; Notification No. 210/1940 (29-6-1940)
10	1941	Chatthin Wildlife Sanctuary	269.36	104.00	Sagaing Region	Eld's deer, Sambar, Barking deer	Protected Areas; Notification No.

No.	Established Year	Name	Areas		General Location	Key species protected	Remark
			Sq. km	Sq. mile			
							177/1941 (19-6-1941)
11	1942	Kelatha Wildlife Sanctuary	23.93	9.24	Mon State	Sambar, Barking deer, Wildboar, Avifauna	- / -
12	1970	Thamihla Kyun Wildlife Sanctuary	0.88	0.34	Ayeyar-wady Region	Marine turtle, Water birds	Protected Areas; Notification No. 289/1970 (1-12-1970)
13	1972	Minwuntaung Wildlife Sanctuary	205.88	79.49	Sagaing Region	Barking deer, Hog deer, Avifauna	Protected Areas; Notification No. 259/1972 (1-1-1972)
14	1974	Htamanthi Wildlife Sanctuary	2150.73	830.40	Sagaing Region	Tiger, Leopard, Elephant, Gaur, Sambar, Wildboar, Barking deer, Bear, Macaque, Avifauna	Protected Areas; Notification No. 31/1974 (1-5-1974)
15	1985	Inlay Wetland Bird Sanctuary	640.91	247.46	Shan State	Water birds, Migratory birds, Crane	Protected Areas; Notification No. 15/1985 (30-1-1985)
16	1988	Moeyongyi Wetland Bird Sanctuary	103.60	40.00	Bago Region	Migratory birds	Protected Areas; Notification No. 93/1988 (22-4-1988)
17	1989	Hlawga Park	6.24	2.41	Yangon Region	Sambar, Barking deer, Hog deer, Eld's deer, Macaque, Migratory birds	Enclosed wildlife park. (1-6-1989)
18	1989	Alaungdaw Kathapa National Park	1402.79	541.62	Sagaing Region	Tiger, Leopard, Elephant, Gaur, Sambar, Serow, Bear, Wildboar	Protected Areas; Notification No. 31/1989 (1-1-1989)
19	1989	Popa Mountain	128.54	49.63	Mandalay Region	Barking deer,	Protected Areas;



No.	Established Year	Name	Areas		General Location	Key species protected	Remark
			Sq. km	Sq. mile			
		Park				Wildboar, Dusk leaf monkey, Avifuna	Notification No. 385/1989 (24-8-1989)
20	1993	Meinmahla Kyun Wildlife Sanctuary	136.70	52.78	Ayeyarwady Region	Crocodiles, Sea birds	Protected Areas; Notification No. 91/1993 (5-1-1993)
21	1995	Lawkananda Wildlife Sanctuary	0.47	0.18	Mandalay Region	Myanmar star tortoise, Eld's deer, Avifauna	Protected Areas; Notification No. 33/1995 (16-2-1995)
22	1996	Lampi Island Marine National Park	204.84	79.09	Taninthary Region	Elephant, Pangolin, Macque, Water birds, Coral reefs, Lesser mouse deer, Marine biotics	Protected Areas; Notification No. 40/1996 (28-2-1996)
23	1996	Loimwe Protected Area	42.84	16.54	Shan State	Bear, Pangolin, Avifaun	Protected Areas; Notification No. 2/1996 (30-1-1996)
24	1996	Parsar Protected Area	77.03	29.74	Shan State	Jungle fowl, Chinese pangolin, Avifauna	Protected Areas; Notification No.4/1996(31-3-1996)
25	1998	Hkakaborazi National Park	3812.46	1472.00	Kachin State	Takin, Musk deer, Red panda, Red goral, Leaf deer	Protected Areas; Notification No. 793/1998 (10-11-1998)
26	2001	Kyaikhtiyoe Wildlife Sanctuary	156.23	60.32	Mon State	Goral, Gaur, Sambar, Barking deer, Macque, Wildboar, Avifauna	Protected Areas; Notification No. 37/2001 (6-7-2001)
27	2001	Minsontaung Wildlife Sanctuary	22.61	8.73	Mandalay Region	Barking deer, Rabbit, Myanmar star tortoise, Jackal, Wild cat, Snakes	Protected Areas; Notification No. 14/2001(22-3-2001)
28	2002	Rakhine Yoma	1755.70	677.88	Rakhine State	Elephant, Gaur,	Protected Areas;

No.	Established Year	Name	Areas		General Location	Key species protected	Remark
			Sq. km	Sq. mile			
		Elephant Range				Leopard, Sambar, Barking deer, Jackal, Bear, Wildboar, Macque, Avifauna	Notification No. 21/2002 (5-2-2002)
29	2002	Panlaung-Pyadalin Cave Wildlife Sanctuary	333.80	128.88	Shan State	Elephant, Leopard, Golden cat, Clouded leopard, Serow, Gibbon, Avifauna	Protected Areas; Notification No. 20/2002(18-3-2002)
30	2003	Hponkanrazi Wildlife Sanctuary	2703.95	1044.00	Kachin State	Barking deer, Avifauna, Red Goral, Gibbon, Wild dogs, Mangooses	Protected Areas; Notification No. 53/2003(1-12-2003)
31	2004	Indawgyi Wetland Wildlife Sanctuary	814.99	314.67	Kachin State	Sambar, Serow, Goral, Water birds	Protected Areas; Notification No. 39/2004 (9-8-2004)
32	2004	Hukaung Valley Wildlife Sanctuary	6371.37	2460.00	Kachin State	Tiger, Elephant, Leopard, Gaur, Sambar, Bear, Wildboar, Serow	Protected Areas; Notification No. 34/2004 (3-6-2004)
33	2004	Bumhpabum Wildlife Sanctuary	1854.43	716.00	Kachin State	Elephant, Leopard, Gaur, Serow, Clouded leopard, Jackal, Avifauna	Protected Areas; Notification No. 40/2004 (9-8-2004)
34	2005	Taninthayi Nature Reserve	1699.99	656.37	Taninthayi Region	Tiger, Elephant, Tapir, Gurney's Pitta, Bear, Leopard, Avifauna	Protected Areas; Notification No.18/ 2005 (30-3-2005)
35	2010	Natmataung National Park	713.54	275.50	Chin State	Gaur, Serow, Goral, Barking deer, Leopard, Clouded leopard, Wildboar, White-browed Nuthatch, Avifauna	Protected Areas; Notification No. 164/2010 (2-12-2010)



No.	Established Year	Name	Areas		General Location	Key species protected	Remark
			Sq. km	Sq. mile			
36	2010	Hukaung Valley Wildlife Sanctuary (extension)	4333.05	1673.00	Kachin State	Tiger, Elephant, Leopard, Gaur, Sambar, Bear, Wildboar, Serow	Protected Areas; Notification No. 719/2010 (27-5-2010)
	2010	Hukaung Valley Wildlife Sanctuary (extension)	6669.22	2575.00	Sagaing Region		
37	2013	Kyauk Pan Taung Wildlife Sanctuary	130.61	50.43	Chin State	Seraw, Goral, Sambar, Lepoard, Clouded leopard, Wild cats, Barking deer, Wildboar	Protected Areas; Notification No. 55/2013 (17-6-2013)
38	2013	Chungponkan Wildlife Sanctuary	2.20	0.85	Magwe Refion	Myanmar golden deer, Rabbit, Wildcat, Jackal, Avifauna	Protected Areas; Notification No. 191/2013 (9-10-2013)
39	2014	North Zamrari Wildlife Sanctuary	983.21	379.59	Bago Region	Elephant, Leopard, Clouded leopard, Guar, Bear, Banteng, Avifauna	Protected Areas; Notification No. 43/2014 (22-5-2014)
40	2017	Inkhaingbum National Park	300.52	116.03	Kackin State	Leopard, Gaur, Barking deer, Hog deer, Pangolin, Leaf deer, Red goral, Wild dog, Wild cats, Wild Boar, Bear, Avifauna, Snakes	Proposed Protected Areas; Notification No. 52/2014 (1-7-2014)
<b>Grand Total</b>			<b>39180.59</b>	<b>15137.84</b>			
<b>Proposed Protected Areas</b>							
1	2002	Maharmyaing Wildlife Sanctuary	1180.39	455.75	Sagaing Region	Sambar, Wildboar, Banteng, Feline,	Proposed ; Protected Areas; Notification No.

No.	Established Year	Name	Areas		General Location	Key species protected	Remark
			Sq. km	Sq. mile			
						Gibbon, Jackal, Mongoose, Wild cat	18/2002 (15-3-2002)
2	2002	Taninthary National Park	2589.99	1000.00	Taninthary Region	Tiger, Elephant, Leopard, Tapir, Sambar, Serow, Goral, Barking deer, Avifauna	Proposed Protected Areas; Notification No. 19/2002 (18-3-2002)
3	2002	Lenya National Park	1766.37	682.00	Taninthary Region	Tapir, Elephant, Macque, Barking deer, Sambar, Wildboar, Bear, Mouse deer, Wild cats, Pangolin, Avifauna	Proposed Protected Areas; Notification No. 21/2002 (18-3-2002)
4	2004	Lenya National Park (extension)	1398.59	540.00	Taninthary Region	Elephant, Tapir, Gaur, Banteng, Sambar, Gurney's Pitta	Proposed Protected Areas; Notification No. 43/2004 (14-10-2004)
5	2006	Shinpin Kyatthaut Wildlife Sanctuary	71.90	27.76	Bago Region	Barking deer, Hog deer, Wildboar, Pangolin, Jackal, Reptiles	Proposed Protected Areas; Notification No. 49/2006 (13-7-2006)
6	2008	Bawditahtaung Nature Reserve	72.52	28.00	Sagaing Region	Wild cat, Avifauna	Proposed Protected Areas; Notification No. 29/2008 (26-3-2008)
7	2015	Shinmataung Wildlife Sanctuary	13174.735	20.59	Magwe Region	Eld's deer Rabbit, Wild cots, Wild dogs, Monkey, Birds	Proposed Protected Areas; Notification No. 52/2014 (1-7-2014)
8	2016	Bwaipartaung National Park	30000.00	46.875	Chin State	Serow, Goral, Leopard, Bear, Wild Boar, Bar- king	Proposed Protected Areas; Notification No. 52/2014 (1-7-2014)

No.	Established Year	Name	Areas		General Location	Key species protected	Remark
			Sq. km	Sq. mile			
						Deer, Sambur deer, Monkey,	
9	2016	Eimawbon National Park	386176.00	603.40	Kachin State	Monkeys, Red Panda, Musk Deer, Bear, Clouded Leopard, Sambur, Takin, Red Goral, Wild Cats, Birds	Proposed Protected Areas; Notification No. 52/2014 (1-7-2014)
10	2016	Saytaung Wildlife Sanctuary	63227.00	98.79	Kayin State	Elephant, Sambur, Barking deer, Wildboar, Wild Cats, Reptiles, Snakes, Birds	Proposed Protected Areas; Notification No. 52/2014 (1-7-2014)
<b>Grand Total</b>			<b>9264.84</b>	<b>3577.16</b>			

## Annex II. List of status of protected wildlife species in Myanmar.

### (1) Completely Protected Wildlife

#### a) Mammals

No.	Scientific Name	Common Name
1.	<i>Rhinoceros sondaicus</i>	Javan Rhinoceros
2.	<i>Didermocerus sumatrensis</i>	Sumatran Rhinoceros
3.	<i>Tapirus indicus</i>	Tapir
4.	<i>Budorcas taxicolor</i>	Takin
5.	<i>Cervus eldi thamin</i>	Brow antlered Deer
6.	<i>Cervus eldi eldi</i>	Brow antlered Deer
7.	<i>Elephas maximus</i>	Asian Elephant
8.	<i>Moschus moschiferus</i>	Musk Deer
9.	<i>Muntiacus feae</i>	Fea's Barking Deer
10.	<i>Naemorhedus cranbrooki</i>	Red Goral
11.	<i>Neofelis nebulosa</i>	Clouded Leopard
12.	<i>Felis temminckii</i>	Golden Cat
13.	<i>Panthera tigris tigris</i>	Bengal or Indian Tiger
14.	<i>Panthera tigris corbetti</i>	Indochinese Tiger
15.	<i>Panthera pardus</i>	Leopard
16.	<i>Felis marmorata</i>	Marbled Cat
17.	<i>Prionodon pardicolor</i>	Spotted Linsang
18.	<i>Prionodon Linsang</i>	Banded Linsang
19.	<i>Ailurus fulgens</i>	Red panda
20.	<i>Orcaella brevirostris</i>	Irrawaddy Dolphin
21.	<i>Dugong dugong</i>	Dugong
22.	<i>Canis lupus</i>	Wolf
23.	<i>Hylobates hoolock</i>	Hoolock Gibbon
24.	<i>Hylobates Lar</i>	Lar Gibbon/ White-handed Gibbon
25.	<i>Symphalangus syndactylus</i>	Siamang Gibbon
26.	<i>Presbytis obscurus</i>	Dusky Leaf Monkey
27.	<i>Presbytis phayrei</i>	Phayre's Leaf Monkey
28.	<i>Capricornis summatrensis</i>	Serow
29.	<i>Naemorhedus goral</i>	Goral
30.	<i>Lutra lutra</i>	The Common otter
31.	<i>Lutra perspicillata</i>	The smooth-coatrd Indian Otter
32.	<i>Anoyx cinera</i>	The small-clawed otter
33.	<i>Helarctos malayanus</i>	The Malayan Sun Bear
34.	<i>Manis pantadactyla</i>	The Chinese pangolin
35.	<i>Manis javanicu</i>	The Malayan
36.	<i>Bos gaurus</i>	Gaur
37.	<i>Bos banteng</i>	Banteng or Wild Cow
38.	<i>Viverricula Indian Civel</i>	Small Indian Civel
39.	<i>Tragulus napu</i>	Chebrotain or Larger Mouse Deer
40.	<i>Tragulus javanicus</i>	Lesser Mouse Deer

#### Annex II.

### (1) Completely Protected Wildlife (Cont'd).

**b) Birds**

No.	Scientific Name	Common Name
1.	Family - <i>Phasianidae</i>	Peafowl/ pheasant
2.	<i>Heliopais personata</i>	Masked finfoot
3.	<i>Cairina scutulata</i>	White-winged Wood Duck
4.	<i>Leptoptilos dubius</i>	Greater Adjutant Stork
5.	<i>Leptoptilos javanicus</i>	Lesser Adjutant Stork
6.	<i>Sarkidiornis melanotos</i>	Comb Duck
7.	<i>Anser indicus</i>	Bar-headed Duck
8.	<i>Aix galericulata</i>	Mandarin Duck
9.	<i>Rhodonessa caryophyllaceae</i>	Pin-headed Duck
10.	<i>Aythya nyroca</i>	Ferruginous Duck
11.	<i>A. baeri</i>	Baer's pochard
12.	<i>Tringa guttifer</i>	Nordamnn's Green shank
13.	<i>Gallinago nemoricola</i>	Wood Snipe
14.	<i>Ardea insignis</i>	White-bellied Heron
15.	<i>Anhinga melanogaster</i>	Oriental Darter
16.	<i>Pelecanus philippensis</i>	Spot-billed Pelican
17.	<i>P. onocrotalus</i>	Eastern whiten Pelican
18.	<i>Pseudibis davisoni</i>	White-shoulder Ibis
19.	<i>Phynchoc albicollis</i>	Indian Skimmer
20.	<i>Grus antigone</i>	Sarus Crane
21.	<i>Grus grus</i>	Common Crane
22.	<i>Anthropoides virgo</i>	Demoiselle
23.	Family - <i>Bucerotidae</i>	Hornbill
24.	Family - <i>Accipitridae</i>	Eagle, Kite, Falcon, Hawk, Vulture (Birds of Prey)
25.	<i>Pitta gurneyi</i>	Gurney's Pitta
26.	<i>Turdoides gularis</i>	White-throated Babbler
27.	<i>Crycrina cucullata</i>	Hooded treepie
28.	<i>Yuhina humilis</i>	Myanmar Yuhina
29.	<i>Sitta Vicoriae</i>	White-browed Nuthatch
30.	Family - <i>Rallidae</i>	Rails, crakes
31.	<i>Gallicrex cinerea</i>	Water Cock
32.	<i>Phalacrocorax carbo</i>	Great Cormorant
33.	Family - <i>Ardeidae</i> (all species)	Bitterns
34.	<i>Upupa epoc</i>	Hoopoe
35.	Family - <i>Trogonidae</i> (all species)	Trongos
36.	Family - <i>Picidae</i> (all species)	Woodpeckers
37.	<i>Otis tarda</i>	Great Bustard
38.	Family - <i>Falconidae</i> (all species)	Falcon
39.	<i>Pandion haliaetus</i>	Osprey
40.	Family - <i>Strigiformes</i> (all species)	Owls, Fish Owls, Barn Owl
41.	<i>Caloenas nicobarica</i>	Nicobar Pigeon
42.	<i>Phalacrocorax fuscicollis</i>	Indian shag
43.	<i>Sula Leucogaster plotus</i>	Brown Gannet
44.	<i>Gracula religiosa</i>	Grackle (Hill Myna)

**Annex II.****(1) Completely Protected Wildlife (Cont'd).**

**(b) Birds**

No.	Scientific Name	Common Name
45.	Family - <i>Ciconiidae</i> (all species)	Storks
46.	Family - <i>Threskiomthidae</i> (all species)	Ibises, Spoonbills
47.	Family - <i>Anatidae</i> (all species)	Geese, Ducks
48.	Family - <i>Jacanidae</i> (all species)	Jacanas
49.	<i>All Shore Birds Species</i>	Plover, Avocet, Panctincole, Lapwing, Curlew, Shank, Sandpiper, Snipe
50	Family - <i>Laridae</i> (all species)	Gulls, Terns

**c) Reptiles**

No.	Scientific Name	Common Name
1.	<i>Garvialis gangeticus</i>	Gharial or Garvial Crocodile
2.	<i>Caretta caretta</i>	Loggerhead turtle
3.	<i>Lebidochelys olivacea</i>	Sea turtle
4.	<i>Chelonia mydas</i>	Green turtle
5.	<i>Eretmochelys imbriacta</i>	Hawksbill turtle
6.	<i>Demochelys coriacea</i>	Leathery turtle
7.	<i>Platysternon meagacephalum</i>	Big-headed turtle
8.	<i>Geochelone platynota</i>	Spider Tortoises
9.	<i>Python reticulates</i>	Reticulated Python

**(2) Normally Protected Wildlife****a) Mammals**

No.	Scientific Name	Common Name
1.	<i>Cervus unicolour</i>	Sambhur
2.	<i>Bubalus bubalis</i>	Wild buffalo
3.	<i>Viverridae species</i>	Wild Cats/Civets
4.	<i>Canidae species</i>	Wild dogs
5.	<i>Herpestiae species</i>	Mangooses
6.	<i>Presbytis species</i>	Leaf-Monkeys
7.	<i>Macaca species</i>	Mancaques/Old Word Monkeys
8.	<i>Tupaia slis</i>	Tree Shrew
9.	<i>Nycticebus caucang</i>	Slow Loris
10.	<i>Selenarctos thibetanus</i>	Asiatic black Bear
11.	<i>Martes flavigula</i>	Yellow-throated Marten
12.	<i>Cynocephalus variegates</i>	Flying Lemur or Colugo



**Annex II.****(2) Normally Protected Wildlife (Cont'd).****b) Birds**

No.	Scientific Name	Common Name
1.	Family - <i>Corvidae</i>	Magpie
2.	Family - <i>Corvidae</i>	Treepie
3.	Family - <i>Corvidae</i>	Jay
4.	Family- <i>Paridae</i>	Tit
5.	<i>Garrulax species</i>	Laughing Trush
6.	<i>Yuhina species</i>	Yuhina
7.	Family - <i>Sittidae</i>	Nuthatch
8.	<i>Heterophasia species</i>	Sibia
9.	<i>Irena puella</i>	Fairy Bluebird
10.	<i>Troglodytes troglodytes</i>	European Wren
11.	<i>Cinclus species</i>	Dipper
12.	Family - <i>Certhidae</i>	Tree creeper
13.	<i>Prunella species</i>	Accentor
14.	<i>Oriolus species</i>	Oriole
15.	<i>Apolonis panayensis</i>	Glossy starling
16.	<i>Sturnus species</i>	European Starling
17.	<i>Ploceus philippinus</i>	Baya Weaverbird
18.	Family - <i>Fringillidae</i> /sub Family - <i>Carduelinae</i>	Finch
19.	Family - <i>Alaudide</i>	Skylark
20.	Family - <i>Zosteropidae</i>	White eye
21.	Family - <i>Eurylai</i>	
22.	Family - <i>Capitonidae</i>	Barbed bill
23.	<i>Phoenicophaeus species</i>	Malkoha
24.	<i>Nyctyornis amicta</i>	Red-bearded Bee-eater
25.	<i>Indicator xanthonotus fulvus</i>	Yellow-backed Honey guide
26.	Family - <i>Psittacidae</i>	Parakeet / Parrot
27.	<i>Alcedinidae species</i>	Kingfisher
28.	<i>Collocalia fuciphaga</i>	Edible-nest Swiftlet
29.	<i>Collocalia maxima</i>	Black-nest Swiftlet
30.	<i>Ardea purpurea</i>	Purple Heron
31.	<i>Ardea cinerea</i>	Grey Heron
32.	<i>Ardea species</i>	Heron
33.	<i>Egretta alba</i>	Great Egret
34.	<i>Egretta sacra</i>	Reef Egret
35.	<i>Ardeola bacchus</i>	Chinese Pond Heron
36.	<i>Ardeola speciosa continentalis</i>	Javan Pond Heron
37.	<i>Butorides species</i>	Little Green Heron
38.	Family - <i>Podargide</i>	Frogmouth
39.	Family - <i>Nectarinidae</i>	Sunbird
40.	Family - <i>Dicaeidae</i>	Flowerpecker
41.	Family - <i>Pittidae</i>	Pittas
42.	Family - <i>Columbidae</i>	Green Pigeon
43.	Family - <i>Campephagidae</i>	Minivets

**Annex II.**

**(2) Normally Protected Wildlife (Cont'd).****c) Reptiles**

No.	Scientific Name	Common Name
1.	<i>Crocodylus species Siamese</i>	Estuarine or Saltwater Crocodiles / Mugger or Marsh Crocodiles / Siamese / Crocodiles
2.	<i>Emydidae species</i>	Fresh water Turtles
3.	<i>Testudinidae species</i>	Land Tortoise
4.	<i>Trionychidae species</i>	Soft-shelled Turtles
5.	<i>Varanus species</i>	Monitor Lizards
6.	<i>Python molurus</i>	Asiatic Rock Python

**(3) Seasonally Protected Wildlife****a) From June 15 to September****Mammals**

No.	Scientific Name	Common Name
1.	<i>Axis porcinus</i>	Hog Deer
2.	<i>Muntiacus muntjak</i>	Baking Deer

**b) From March 15 to September****Birds**

No.	Scientific Name	Common Name
1.	Family - <i>Phasianidae</i> Sub Family - <i>Perdicinae</i>	Partridge / francolin
2.	<i>Turnix species</i>	Quails
3.	<i>Aegithina tiphia</i>	Iora
4.	<i>Chlorocis species</i>	Leaf Birds
5.	Family - <i>Columbidae</i>	Doves
6.	<i>Gallinula chloropus</i>	Common Moorhen
7.	<i>Porphyrio porphyrio</i>	Purple Swamphen
8.	Family - <i>Pycnonotidae</i>	Bulbul
9.	Family - <i>Turdidae</i>	Pobins & Red stars & Chats & Forktails
10.	Family - <i>Mucicapidae</i>	Paradise Flycatcher
11.	Family - <i>Cuculidae</i> Sub Family - <i>Cuculinae</i>	Cuckoo&Koel
12.	Family - <i>Caprimulgidae</i>	Nightjars
13.	Family - <i>Dicruridae</i>	Drongos