Strengthening Regional Co-operation for Wildlife Protection Project

Action Plan for the Management of Herpetofauna in Bangladesh

2015 - 2025

Bangladesh Forest Department
Ministry of Environment and Forests

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Government of the People's Republic of Bangladesh
Bangladesh Forest Department
Ministry of Environment and Forests

ACTION PLAN FOR THE MANAGEMENT OF HERPETOFAUNA IN BANGLADESH

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ABBREVIATIONS USED IN THE TEXT

BFD	Bangladesh Forest Department
BFRI	Bangladesh Forest Research Institute
ACF	Assistant Conservator of Forests
CCF	Chief Conservator of Forests
CF	Conservator of Forests
CITES	Convention of International Trade in Endangered Species of Wild Fauna and Flora
CREL	Climate-Resilient Ecosystems and Livelihoods
DFO	Divisional Forest Officer
DoE	Department of Environment
DOF	Department of Fisheries
IPAC	Integrated Protected Area Co-Management
MoEF	Ministry of Environment and Forests
NGO	Non Government Organization
GO	Government Order
PA	Protected Area
WCCU	Wildlife Crime Control Unit
WNCC	Wildlife and Nature Conservation Circle
BBS	Bangladesh Bureau of Statistics
CFSD	The Center for Sustainable Development
WS	Wildlife Sanctuary
NP	National Park
NFP	National Forest Policy
ECA	Ecologically Critical Area
CBD	Convention on Biological Diversity
IUCN	International Union for Conservation of Nature
UNESCO	United Nations Educational, Scientific and Cultural Organization
NSP	Nishorgo Support Project
BGB	Border Guard of Bangladesh
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
DD	Data Deficient

Executive Summary

The Herpetofauna Management Strategy focuses on the present status of herpetofauna and their habitats in Bangladesh, their threats, conservation needs and present conservation frameworks. This strategy provides guidelines for the conservation and management of herpetofauna in the country.

Bangladesh supports 49 species of amphibians under the order Anura and Gymnophiona. The order Anura is the largest order having 6 families and 48 species. Among these amphibian species a total of 19 species have been identified as rare, 11 species uncommon, 13 species common and 6 species are very common (Hasan *et al.* 2014).

A total of 137 species of reptiles have been recorded from Bangladesh. The order Serpents (snakes) has 76 species, Squamata (lizards) has 30 species, Testudines (turtles) has 29 species Crocodylia (crocodiles) has 2 species. Among these reptiles a total of 82 species are rare, 20 species uncommon, 26 species common and 9 species are very common (Hasan *et al.* 2014).

Habitat degradation and fragmentation due to various anthropogenic factors, hunting and poaching for local consumption, and demand of herpetofauna in national and international illegal markets are the major threats in the country.

Though, several laws safeguard amphibians and reptiles in the country but the practice for the implementation of these laws is very poor. Forest Department's capability for preventing wildlife crime is not sufficient. Shortage of skilled manpower, and insufficient logistic in FD, political influence, lack of inter-agency coordination are some of the major reasons for the improper enforcement of law.

Following strategies are suggested for the management of herpetofauna in the country-

Institutional development

The Bangladesh Forest Department (BFD) under the Ministry of Environment and Forests is responsible for preservation, conservation and management of Wildlife in the country. Wildlife Management and Nature Conservation Circle (WNCC) of BFD focuses to provide safeguard to wildlife, primarily in protected areas. BFD needs to overcome a lot of limitations including shortage of skilled staff, logistics, and field level facilities. Wildlife Crime Control Unit was formed in 2012 with the objectives to stop hunting and poaching of wild animals, to conduct legal operation and to aware mass people to stop illegal trading. Though, this unit rescued a huge number of wild animals and released them in suitable habitats, this unit needs to be strengthened. There should be a central coordination wing to coordinate with all the regional WCCU. A skilled wildlife rescue team should be formed under the supervision of this unit.

Species / species group management

Amphibians

Forest Department must have to take initiatives for the protection of amphibian habitats. As water is must during the breeding season of amphibians, FD must be aware of ensuring the availability of amphibian breeding pools in PAs. Inter departmental collaboration is necessary to prevent water pollution.

Tortoises and Turtles

Forest Department must have to take initiatives to assess habitat viability and population status of threatened turtles and tortoises in the country. Critical habitats for survival and breeding must be protected. Enforcement of law is necessary to prevent hunting, poaching and also for the prevention of local and international trading. Breeding ground for marine turtles must be protected in priority basis.

Gharial and Crocodile

Nesting ground of Gharials in the Padma and Jamuna Riverine system must be protected in priority basis. Awareness program is also necessary among the fishermen in their breeding grounds.

Snakes

Law enforcement is essential to prevent illegal trade of alive snakes, snake venom and snake skins. Awareness raising among the mass people is necessary to minimize retribution killing of snakes.

Lizards

WCCU of the Forest Department must be strengthened to control illegal trading of monitor lizard skin and geckos. FD must take initiatives for awareness raising among mass people to break down their misconceptions on lizards.

Habitat Protection and Restoration

Protection of exiting habitats for herpetofauna throughout the country must get the first priority. Restoration of critical habitat for threatened keystone species should also be considered carefully.

Reduction in Demand for Herpetofauna

Though the wildlife pet is not popular in Bangladesh but it is found in some extent. Turtles are the most popular wild pets after birds. The internal demand for herpetofauna in the country seems to be limited to pets and meat for consumption and traditional medicine preparation. Some of the tribal communities in the northeast, southeast and northern part of

the country and the Hindu people traditionally hunt and consume turtle meat. There is a huge demand turtles in international black markets. Demand for snake skin and venom are also evident. The Governments and international conservation organizations across the globe should work together for the reduction of wildlife demand globally.

Promote non-consumptive use of Resources

One of the non-consumptive uses of the natural resources is the ecotourism. Bangladesh has huge prospects of developing sustainable ecotourism. Bangladesh forest Department through the co-management organizations have been initiated ecotourism in protected forest areas. Herpetofauna could be a great attraction to the tourists.

Raise awareness

Most of the people in the country are not aware of wild animals and the existing law. Centuries old tradition of enemy-attitude towards wild animals is also one of the vital reasons for wildlife depletion. Many people in rural areas curiously kill wild animals without any reason. Awareness rising can play a vital role in changing knowledge, attitudes and behavior of the stakeholders to achieve conservation objectives.

Promote captive breeding and farming

Captive breeding program must be undertaken to save the Critically Endangered species from extinction. Elongated tortoise (*Indotestudo elongata*), Asian Giant tortoise (*Manouria emys*), River Terrapin (*Batagur baska*), Peacock Softshell Turtle (*Nilssonia hurum*), Ganges Softshell Turtle (*N. gangetica*), Asiatic Softshell Turtle (*Chitra indica*), Gharial (*Gavialis gangeticus*) and Saltwater Crocodile (*Crocodylus porosus*) must be included in this program. Captive breed animals must be reintroduced to suitable habitats through the reintroduction programs.

Reptile farming is necessity to be encouraged due to the growing demands in local and international markets. Saltwater crocodile, Bengal monitor and turtles are recommended for farming.

Promote research and monitoring

Baseline information on habit, habitat, ecological requirements and the position of the species in the ecosystem is very important for the development of any management and conservation strategy. Baseline information on the status, distribution, habit, habitat, ecology is lacking for most of the amphibians and reptiles. Independent researchers from different research organizations should be encouraged by providing research facilities. Basic field facilities should be developed and maintained to facilitate field research. Practice of long-term monitoring of biodiversity or any species group is very rare in Bangladesh. Proper monitoring could gather the knowledge on status, present trend and conservation needs of any species.

1. Introduction

1.1 Background

Bangladesh enjoys a rich biological diversity (Stanford 1991). Bangladesh supports 50 species of amphibians and 137 species of reptiles (Hasan *et al.* 2014) of which many of them are ecologically significant. Some of the important amphibians are Indian Bull Frog (*Hoplobatrachus tigerinus*), Green Frog (*Euphlyctis hexadactylus*), Broad-headed Frog (*Limnonectes laticeps*), Smith's Litter Frog (*Leptobrachium smithii*), Crown Frog (*Xenophrys parva*), Marbled Cascade Frog (*Amolops marmoratus*), Giant Tree Frog (*Rhacophorus maximus*) and Twin-spotted Tree Frog (*rhacophorus bipunctatus*).

Among important reptiles turtles include River Terrapin (*Batagur baska*), Three-striped Roof Turtle (*Pangshura dhongoka*), Halud Pahari Kasim (*Indotestudo elongata*), Asian Giant Tortoise (*Manouria emys*), Bostami Kasim (*Nilssonia nigricans*). The notable lizard species are the Flying lizard (*Draco blanfordi*) of the mixed evergreen forests, Monitor lizard (*Varanus salvator*), Bengal monitor (*V. bengalensis*), Yellow monitor (*V. flavescens*), Gecko (*Gekko gecko*), Garden lizards (*Calotes rouxii*, *C. jerdoni*, *C. versicolor*), stripped skink (*Mabuya dissimilis*), and house lizards (*Hemidactylus bowringii*, *H. brooki*, *H. flaviviridis*, *H. frenatus).* Some of the common snakes include Rock python (*Python molurus*), Common vine snake (*Ahaetulla nasutus*), Stripped keelback (*Amphiesma stolata*), Rat snake (*Coluber mucosus*, *C. nigromarginatus*), Common Trinket snake (*Elaphe helena*), Wolf snake (*Lycodon aulicus*, *L. fasciatus*, *L. jara*), Checkered Keelback (*Xenochrophis piscator*), Krait (*Bungarus caeruleus*, *B. fasciatus*, *B. niger*, *B. lividus*), Cobras (*Naja kaouthia*, *N. naja* and *Ophiophagus hannah*), Pit vipers (*Trimeresurus* spp.), and Russell's viper (*Vipera russellii).*

Though Bangladesh is rich in floral and faunal diversity but due to immense population pressures, over-exploitation of natural resources, deforestation, degradation, habitat loss, pollution, indiscriminate killing, hunting and poaching of wild animals, environmental and ecological balance of Bangladesh is under severe threat. Several studies indicated that 4% to 5% of faunal species and about 10% of floral diversity have become extinct in the last century. As an example, saltwater crocodiles, *Crocodilus porosus*, were found Tecknaf to Sundarbans, the total beach of Bay of Bangal, now they are confind within Sundarbans' mangrove forest areas (6000km^2). And tigers once widespread in Bangladesh, in 1930s in 11 out of 17 districts have dwindled in range and numbers. Today, the largest remaining population of tigers is in the Sundarbans. There is little known about the national demand for tiger parts, although 1997 survey reported substantial trade in tiger skins, teeth and claws (Nowell 2000). Same situation happened in case of snakes, monitor lizards, crocodiles Gakko and other reptiles. Most of them are environmental pressure. So, proper management plan is inevitable for sustainability of herpetofauna in Bangladesh.

The Herpetofauna Management Strategy focuses on the present status of herpetofauna and their habitats in Bangladesh, their threats, conservation needs and present conservation frameworks. This strategy provides guidelines for the conservation and management of herpetofauna in the country.

1.2 Location of Bangladesh

The People's Republic of Bangladesh is a country in South Asia. It is bordered by India to its west, north and east; Myanmar to its southeast and separated from Nepal and Bhutan by the chicken's neck corridor. To its south, it faces the Bay of Bengal. Bangladesh is the world's eighth-most populous country, with over 160 million people, and among the most densely populated countries. It forms part of the ethno-linguistic region of Bengal, along with the neighbouring Indian states of West Bengal and Tripura. The country is divided into seven administrative divisions, which are further subdivided into 64 districts. The districts are further divided into 593 subdistricts or upazila. The country is located in the north-eastern part of South Asia, Bangladesh lies between 20°34' and 26°36' north latitude and 88°0I' and 92°41' east longitudes. The mighty Himalayas are to the north, while the southern frontier is guarded by the Bay of Bengal. To the west lies the expansive Gangetic plains (West Bengal) of India and on the eastern frontier lay the forest of Myanmar and India (Tripura & Assam Hills). These picturesque geographical boundaries delineate a low lying plain of about 1,47,570 sq. km. criss-crossed by innumerable brooks, rivulets and streams and rivers like the Padma (Ganges), the Brahmaputra Jamuna, the Meghna, the Karnaphuli.

1.3 Physical Characters

Much of the country's land area has been built up from alluvial deposits brought down by the major rivers. The country is mostly flat except for a range of hills in the south-east. It is characterized by wooded marshy lands and jungles with deep forest regions in Sylhet, Rangamati, Khagrachhari and Bandarban Hill Districts, Sundarbans (the world Heritage site), Mymensingh and Tangail.

The country is a low-lying, riverine country located in South Asia with a marshy coastline of 710 km (441 mi) on the northern littoral of the Bay of Bengal, formed by a delta plain at the confluence of the Ganges, Brahmaputra and Meghna rivers and their tributaries. Bangladesh's alluvial soil is highly fertile, but vulnerable to flood and drought. Hills rise above the plain only in the Chittagang Hill Tracts in the far southeast and the Sylhet division in the northeast. Straddling the Tropic of Cancer, Bangladesh has a tropical monsoon climate characterized by heavy seasonal rainfall, high temperatures, and high humidity. Natural disasters, such as floods, tornedo and tidal bores affect the country yearly. Bangladesh also is affected by major cyclones, on average 16 times a decade.

Bangladesh lies in the active delta of three major rivers viz Padma, Meghna and Jamuna and their numerous tributaries. The coastal part of Bangladesh includes the famous Sundarbans Mangrove Forest. A number of depressed basins are found in the district of greater Mymensingh and Sylhet which are inundated by fresh water during the monsoon that gradually dry out during the dry winter season. These depressed basins are known as 'Haor'.

1.4 Climate

Bangladesh has a tropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures, and high humidity. Regional climatic differences in this flat country are minor. Three seasons are generally recognized: a hot, muggy summer from March to June; a hot, humid and rainy monsoon season from June to November; and a warm-hot, dry winter from December to February. In general, maximum summer temperatures range between 38 and 41 °C (100.4 and 105.8 °F). April is the hottest month in most parts of the country. January is the coolest month, when the average temperature for most of the country is 16–20 °C (61–68 °F) during the day and around 10 °C (50 °F) at night.

About 80% of Bangladesh's rain falls during the monsoon season. The monsoons result from the contrasts between low and high air pressure areas that result from differential heating of land and water. During the hot months in April and May hot air raises over the Indian subcontinent, creating low-pressure areas into which rush cooler, moisture-bearing winds from the Indian Ocean.

Bangladesh is noted for its estuarine environment, yet less than 10% of its total water flow originates from its own catchments and rest comes from India, Nepal and Bhutan. Normally, 20% of the country gets flooded during the monsoon period.

1.5 Herpetofaunal Habitats in Bangladesh

1.5.1 Forests

About one-tenth (9.8 % or 1.45 million ha) of the surface area of Bangladesh covered with forest, but the actual coverage of natural forest is lower than this (Khan 2008). Currently, natural forests cover only 5.9% of the country's area (Sharma *et al.* 2005; WRI 2009). Natural forests of the country are basically three types, mixed-evergreen forest, deciduous forest and mangrove forest.

Most of the forests in the north-east (191 km^2 natural forest in Sylhet region) and south-east (2130 km^2 natural forest in Chittagong and Chittagong Hill Tracts) are semi-evergreen (Feeroz *et al.* 2011). Some of the relatively large patches of mixed-evergreen forests still exist in the Chittagong Hill Tracts in the southeast (Khan 2008). Major plant species are *Dipterocarpus* spp.(Garjan), *Artocarpus chaplasha* (Chapalish)*.,Swintonia floribunda* (Civit), *Ficus* spp*.* (Dumur)*, Bombax* spp. (Shimul), *Dillenia pentagyna* (Hargoza/Azuli), *Syzygium* spp. (Jam), *Mangifera longipes* (Ury-aam), *Tectona grandis* (Segun) etc (Feeroz *et al.* 2012, Khan 2008).

The deciduous Sal forest is situated mainly in the district of Gazipur, Tangail, Mymensingh, Sherpur, Jamalpur, Netrokona, Naoga, Rangpur, Dinajpur and Panchagar. The total area of Sal Forest is 120,000 hectare which accounts for 0.81% of total area of Bangladesh and 7.89% of total area managed by the Forest Department. The Madhupur Tract (in the central part of the country) is the largest single mass of moist deciduous Sal forest in Bangladesh, with an area of about 187 km^2 of undisturbed forest (Gittins and Akonda, 1982). The most dominant tree of this forest is *Shorea robusta* (Sal) which covers about 80 percent of the forest.

The mangrove forests (including coastal plantations) cover an area of 0.71 million hectors along the coast. Sundarban, the world's largest contiguous natural mangrove forest in Bangladesh covers an area of 6,017 sq. km which accounts for 4.07% of total area of Bangladesh and 40% of total area managed by the Forest Department. The area covered by the three wildlife sanctuaries in the Sundarban is 1,39,700 hectares. Generally this forest includes fairly dense evergreen plant species of about 10-15m height, which are adapted for life under saline conditions and frequent inundation by the tides. Common plant species are *Heritiera fomes* (Sundari), *Exocaria agallocha* (Gewa), *Sonneratia apetala* (Keora) *Sonneratia caseolaris* (Choila), *Avicennia* spp. (Baen), *Nypa fruticans* (Golpata), *Phoenix paludosa* (Hental), *Acanthus ilicifolius* (Hargoza).

Many of the amphibian species such as Northern Tickle Frog (*Occidozyga borealis*), Puddle Frog (*Occidozyga lima*), Broad-headed Frog (*Limnonectes laticeps*), Torrent Frog (*Amolops marmoratus*), Point-nosed Frog (*Clinotarsus alticola),* Nicobarese Frog (*Pterorana khare*), Red Microhylid Frog (*Microhyla rubra*), Berdmore's Microhylid Frog (*Microhyla berdmorei*), Painted Bull Frog (*Kalaula pulchara*), Crown Frog (*Xenophrys parva*), Smith's Litter Frog (*Leptobrachium smithi*), Twin-spotted Tree Frog (*Rhacophorus bipunctata*), Large Tree Frog (*Rhacophorus maximus*) are restricted to forest habitats.

Many turtleand tortoise species such as Elongated Tortoise (*Indotestudo elongata*), Asian Brown Tortoise (*Manouria emys*), Indian Leaf Turtle (*Cyclemys gemeli*) and lizards such as Emma Gray's Forest Lizard (*Calotes emma*), Green Fan-throated Lizard (*Ptyctolaemus gularis*), Spotted Flying Lizard (*Draco maculatus*), Flat-tailed Gecko (*Hemidactylus platyurus*), Ayeyarwady Bow-fingered Gecko (*Cyrtodactylus ayeyarwadyensis*), Khasi Hills Long-tailed Lizard (*Takydromus khasiensis*) are confined to forest habitats. Snakes such as Reticulated Python (*Python reticulatus*), Venning's Keelback (*Amphiesma venningi*), Cherrapunji Keelback (*Amphiesma xenura*), Cat snakes (*Boiga cyanea, B. ochracea, B. gokool, B. siamensis*), Green Bronzeback Tree Snake (*Dendrelaphis cyanochloris*), Painted Bronzeback Tree Snake (*Dendrelaphis tristis*), Indo-Chinese Rat Snake (*Ptyas korros*), Spot-tailed Pit Viper (*Trimeresurus erythrurus*), White-lipped Pit Viper (*Trimeresurus albolabris*), Pope's Pit Viper (*Trimeresurus popeiorum*) are confined to forest habitats.

1.5.2 Wetlands

Bangladesh is a land of wetlands and nearly 50% (eight million hectares) of the total land surface of the country are considered as wetland which includes rivers, natural lakes, freshwater marshes, baors (oxbow lakes), beels (foodplain depressions), ponds, one large water reservoir (Kaptai lake), estuarine areas, mangrove forests and extensive seasonally inundated floodplains (Feeroz 2013). Wetlands of the country are significant for many of the herpetofauna. Moreover, the Bay of Bangle provides habitats for marine turtles and snakes.

Skipper Frog (*Euphlyctis cyanophlyctis),* Yellow-stripped Frog (*Hylarana tytleri*), Green Frog (*Euphlyctis hexadactylus)* etc. and reptiles like Indian Roofed Turtle (*Pangshura tecta*), Median Roofed Turtle (*Pangshura tentoria),* Three-striped Roofed Turtle (*Kachuga dhongoca),* Yellow Turtle (*Morenia petersi),* Spotted Flapshell Turtle (*Lissemys punctata*), Dark-bellied Marsh Snake (*Xenochrophis cerasogaster),* Checkered Keelback (*Xenochrophis piscator*), Common smooth water snake (*Enhydris enhydris*) *etc.* are dependent on wetlands.

1.5.3 Bushy, Grassy and Bamboo-covered Areas

The hilly areas of the country particularly in the Chittagong and Chittagong Hill Tracts and hills in the northeast have huge areas covered by dwarf vegetation. The common bushy plants of these areas are *Lantana camara, Eupatorium* sp., *Clerodendrum* spp. *Melastoma* spp., many species of bamboo (*Melocanna bambusoides, Bambusa* spp. *Oxytenanthera* spp. etc.). These areas are also good habitats for herpetofauna (Khan 2008).

Tree frogs, different species of lizards and skinks and some many species of snakes are mostly dependent on this type of habitats.

1.5.4 Coastal areas

Coastal areas of the country including coasts of major rivers and the vast areas of marine coasts provide suitable habitats for many of the herpetofauna. The river coast is characterized by a vast network of rivers (24,000 km in length) covering an area of 9380 km^2.

Marine turtles are dependent on this habitat for their breeding. Some species of mud snakes inhabits in this habitat.

1.5.5 Flood plains

The flood plain areas provide an excellent aquatic for many herpetofauna in the country. This consists of roughly 80% of the landmass which is made up of fertile alluvial lowland. The plain is part of the larger Plain of Bengal, which is sometimes called the Lower Gangetic Plain. Although altitudes up to 105 meters above sea level occur in the northern part of the plain, most elevations are less than 10 meters above sea level; elevations decrease in the coastal south. About 10,000 sq. km of the country is permanently covered with water and a larger portion of the country is routinely flooded during the monsoon.

1.5.6 Riparian Habitats

Riparian habitats are those adjacent to rivers and streams or occurring on nearby floodplains and terraces. Riparian habitats are shaped and maintained through seasonal flooding, scour, and soil deposition. Floods replenish nutrients, recharge groundwater, and reset succession processes. Riparian habitats occur along rivers and streams at all elevations, from valley bottom floodplains. Riparian habitats support a good number of herpetofauna in the country especially snakes and lizards. Many species of frogs, lizards and snakes inhabit here.

1.5.6 Agricultural lands

Agricltural lands in the country supports a large variety of amphibians and reptiles. The total area of agricultural lands in the country is about 94,000 km^2. Most of these lands become occupied with variety of seasonal crops.

Frog species such as Cricket frogs (*Fejervarya* spp.), Microhylids (*Microhyla* spp.), Bull frogs (*Hoplobatrachus* spp.) and many species of skinks and snakes inhabit in agricultural lands.

1.5.7 Homestead Vegetation

The backyards of village homes often have dense planted and natural vegetations. The common vegetation of the village include Mango (*mangifera indica*), Jackfruit (*Artocarpus heterophylus*), Jaam (*Syzygium* spp.), Litchi (*Litchi chinensis*), Plum (*Zizyphus mauritiana*), Persimmon (*Dyospyros peregrine*), Tamarind (*Tamarindus indica*), Silk Cotton (*Bombax ceiba*), different species of bamboo, Date palm (*Phoenix sylvestris*), fig (*Ficus* spp.), Coconut (*Cocos nucifera*). Recently a major portion of the homestead vegetations have been replaced by *Acacia* spp. and *Eucalyptus* spp.

Homestead vegetations also support a significant number of frogs, lizards and snake species.

2. Amphibians and Reptiles of Bangladesh

2.1 Overall Status and Distribution

In Bangladesh a total of 49 species of amphibians have been recorded under the order Anura and Gymnophiona. The order Anura is the largest order having families Bufonidae (2 spp.), Dicroglossidae (14 spp.), Ranidae (10 spp.), Microhylidae (9 spp.), Megophryidae (2 spp.) and Rhacophoridae (10 spp.). The order Gymnophiona has two families Ichthyophiidae (1 sp.) and Caecillidae (1 sp.). Among these amphibian species a total of 19 species have been identified as rare, 11 species uncommon, 13 species common and 6 species are very common (Hasan *et al.* 2014) (Fig. 1).

A total of 137 species of reptiles have been recorded from Bangladesh. The order Serpents (snakes) has 76 species, Squamata (lizards) has 30 species, Testudines (turtles) has 29 species Crocodylia (crocodiles) has 2 species. Among these reptiles a total of 82 species are rare, 20 species uncommon, 26 species common and 9 species are very common (Hasan *et al.* 2014) (Fig. 2).

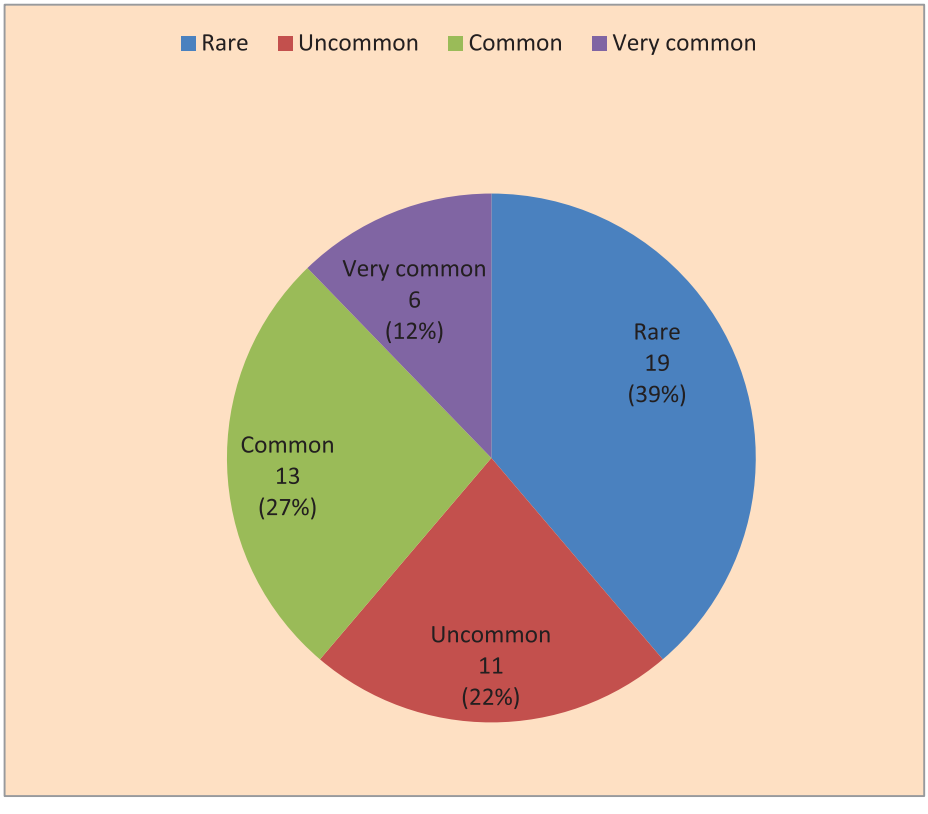


Fig.1 Relative abundance of amphibians in Bangladesh.

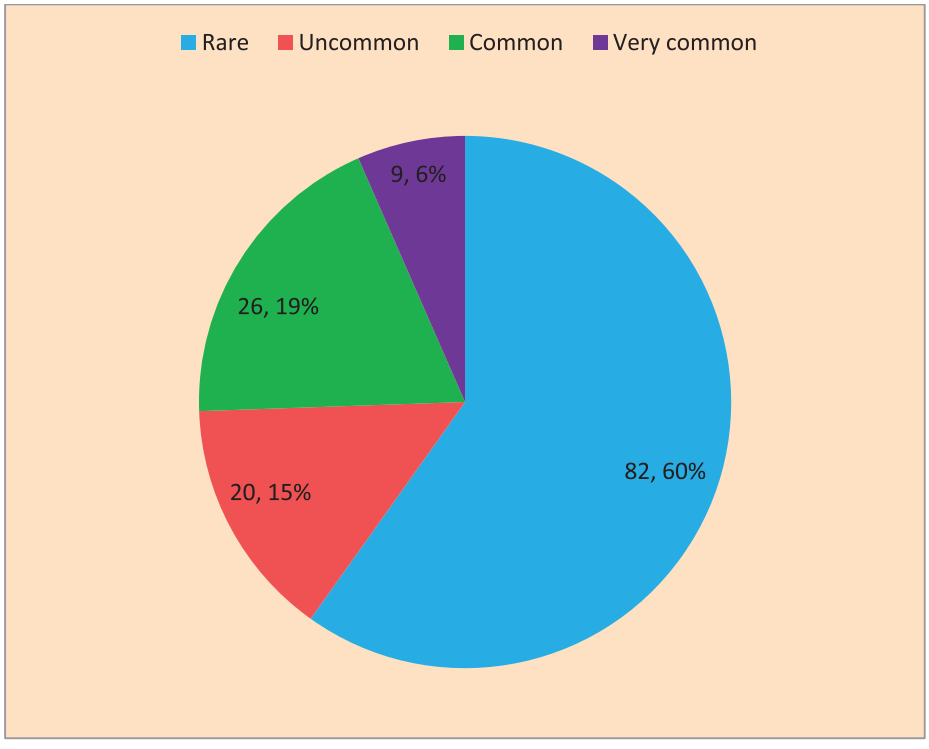


Fig. 2 Relative abundance of reptiles in Bangladesh.

2.1.1 Crocodile and Gharial

Estuarine crocodile, *Crocodylus porosus* occurs in and around the Sundarbans of the country. Gharial, *Gavialis gangeticus* inhabits in the Padma and Jamuna River but the population assumed to be very low. Both of the species are categorized as Critically Endangered in Bangladesh (IUCN 2000).

2.1.2 Turtle and Tortoise

Bangladesh supports 2 species of tortoises and 27 species of turtles. Tortoise species are confiened to mixed evergreen foests in the northeastern and southeastern parts of the country. Most of the freshwater turtles inhabit ponds, lakes, haors, beels, hilly streams and riverine system of the country. Bangladesh supports 5 species of marine turtles of which three are rare, one uncommon and one common (Hasan *et al.* 2014).

2.1.3 Lizards

Bangladesh is the home of 30 species of lizards of which 6 are agamids, 8 geckos, 1 lacertid, 11 skinks, 1 grass lizard and 3 monitor lizards. Among these lizards, 10 species are rare, 7 uncommon, 9 common and 4 very common (Hasan *et al.* 2014).

2.1.4 Snakes

In Bangladesh 76 species of snakes have been recorded of which 65 species are inland and 11 species are marine. Among these snakes 26 (including marine) are venomous and 50 are non-venomous. Some of the common non-venomous snakes are Checkered Keelback (*Xenochropis piscator),* Striped Keelback (*Amphiesma stolata),* Banded Wolf Snake (*Lycodon aulicus),* Black-barred Kukri Snake (*Oligodon cinereus),* Copperhead (*Colelognatha radiates),* Eastern Cat Snake (*Boiga gokool),* Smooth Water Snake (*Enhydris enhydris),* Rat Snake (*Ptyas* spp.), Python (*Python* spp.). Common venomous snakes include Binocellate Cobra (*Naja* naja), Monocellate Cobra (*Naja kaouthia*), King cobra (*Ophiophagus hannah*), Kraits (*Bungarus* spp.) and Sea Snakes (*Hydrophis* spp.).

2.2 Threatened Amphibians

Eight species of amphibians in Bangladesh are threatened in different categories of which 3 species are Endangered and 5 are Vulnerable (Table 1) (IUCN 2000).

Table 1 List of Threatened Amphibians in Bangladesh

Sl. No.	Family	English Name	Scientific Name	National Status (IUCN 2000)	Global Status (IUCN ver. 3.1)
1	Microhylidae	Painted Bull Frog	*Kaloula pulchra*	VU	LC
2		Ornate Microhylid Frog	*Microhyla ornata*	VU	LC
3		Red Microhylid Frog	*Microhyla rubra*	VU	LC
4		Ballon Frog	Uperodon globulosus	EN	LC
5	Dicroglossidae	Green Frog	*Euphlyctis hexadactylus*	EN	LC
6	Ranidae	Point-nosed Frog	*Clinotarsus alticola*	VU	LC
7		Two-striped Grass Frog	*Hylarana taipehensis*	EN	LC
8	Rhacophoridae	Large Tree Frog	*Rhacophorus maximus*	VU	LC

Status code: EN - Endangered; VU – Vulnerable.

2.3 Threatened Reptiles

A total of 58 species of reptiles have been categorized as threatened in different categories. Among these threatened species 12 (21%) are Critically Endangered, 25 (43%) are Endangered and 21 (36%) are Vulnerable (Appendix 1).

Presently most of the species of turtles and tortoises are threatened. Bostami Turtle, *Nilssonia nigricans,* River Terrapin, *Batagur baska* and Bibron's Softshell turtle, *Pelochelys bibroni* are Critically Endangered and occurs in brakish water near Sundarbans and large water bodies of Bangladesh. Assam Roofed Turtle, *Pangshura sylhetensis* confined in wetlands of Sylhet district. Elongated tortoise, *Indotestudo elongata* and Asian Giant tortoise, *Manouria emys* are found in the hilly areas, both are Critically Endangered. Asiatic softshell turtle, Chitra indica found in deep water of big rivers and haor of Sylhet and Kishoreganj, it is also Critically Endangered. All the five species of marine turtles are threatened of which Hawksbill Turtle (*Eretmochelys imbricata*) is Critically Endangered and the remaining four are Endangered (IUCN 2000).

Two species of crocodile and Gharial are Critically Endangered. Among the eight threatened lizards 1 species is Critically Endangered, 2 Endangered and 5 Vulnerable. Among snakes 3 are Critically Endangered, 11 Endangered and 15 Vulnerable. All the venomous snakes are threatened in different categories (IUCN 2000).

2.4 Nationally and Globally significant Herpetofauna

Most of the turtles and tortoises found in Bangladesh are globally significant. The marine shores and off shore islands of the country act as critical breeding habitats for marine turtles. All the marine turtles found in Bangladesh territory breed here. Freshwater turtle such as River Terrapin (*Batagur baska*) is a globally Critically Endangered species. Many of the globally Endangered turtles and tortoises such as Painted Roof Turtle (*Batagur dhongoka*), Asiatic Softshell Turtle (*Chitra indica*), Elongated Tortoise (*Indotestudo elongata*), Asian Brown Tortoise (*Manouria emys*) are found here. Other globally threatened species include Indian Black Turtle (*Melanochelys trijuga*), Tricarinate Hill Turtle (*Melanochelys tricarinata*), Ganges Softshell Turtle (*Nilssonia gangetica*), Bostami Turtle (*Nilssonia nigricans*), Peacock Softshell Turtle (*Nilssonia hurum*) are significant.

Gangetic Gharial (*Gavialis gangeticus*) is a globally Critically Endangered species which is still surving in the major riverine system of Bangladesh. Most of the venomous snakes are threatened globally and Bangladesh is not an exception. King Cobra (*Ophiophagus hannah*) is a globally threatened species but a healthy population of this species exists in Sundarbans of Bangladesh.

The habitats of these threatened species have been squizzing globally. Many of these species have been locally wipped out from many parts of the globe. As Bangladesh is still supporting these species, it could play a vital role for the conservation of these species.

3. Threats to Herpetofauna

3.1 Hunting and poaching

3.1.1 Consumption

Most of the the ethnic community in Bangladesh used to consume protein from wild sources. They traditionally hunt wild animals for consumption. Most of the ethnic communities inhabit in the southeastern and northeastern part of the country but some ethnic communities also found in other parts of the country. Along with mammals, ethnic communities also hunt amphibians and reptiles such as any large sized frog, monitor lizards, turtles and tortoises, and snakes.

Hunting and poaching has a tremendous effect for the survival of threatened herpetofaune of the country. Two species of tortoises found in the country are facing tremendous hunting pressure for their survival and now are at the brink of extinction. Other turtles are being regularly hunted for consumption. Though, pythons, cobras and rat snakes are frequently consumed by the ethnic community but other snake species are also consumed.

3.1.2 Poachers

Literally poaching means the illegal hunting, shooting or capturing wild animals or any other resources from private or public property. Among the herpetofaunal species in the country, turtles and snakes are the main target to the poachers.

Collection of turtles for commercial purposes is virtually started from 70's and subsequently it has become a professional activity for a lot of people in Bangladesh. Fishermen also collect turtle from the water when turtles fall under their feet while fishing and catch them by diving. Moreover, they catch them with fishing hooks, harpoons, with fish bait or molluscs bait. Large numbers of baited hooks called "*hazari barshi*" hang vertically by short threads from a thick strong nylon thread arranged longitudinally. Turtle collectors and fishermen usually sell turtles to the local market.

3.1.3 Alive animal utilization

Frogs are not popular as a pet in Bangladesh but turtles have a great demand for this purpose. Indian Roofed Turtle (*Pangshura tecta*), Indian Tent Turtle (*Pangshra tentoria*), Spotted Pond Turtle (*Geoclemys hamiltonii*), Elongated Tortoise (*Indotestudo elongata*) are usually found inillegal pet market. Different species of snakes including Burmese Python (*Python molurus*), Indian Rat Snake (*Ptyas mucosa*), Spectacled Cobra (*Naja naja*), Banded Krait (*Bungarus fasciatus*) are often found in Zoos. Bengal monitor (*Varanus bengalensis*), Gharial (*Gavialis gangeticus*) and Salt Water Crocodile (*Crocodylus porosus*) also have great demand in Zoos and Safaries.

Live snakes are also used for snake charming. A vast community of snake charmers is dependent on this profession for their livelihood.

3.2 Retribution Killing

Mass populations of the country are not aware of wild animals particularly for reptiles. General thinking is that reptiles are harmful and all the snakes are venomous. Even for Common Garden Lizard mass thinking is that this lizard can suck blood from a distant place. Retributional killing is very common for any snake, skinks and Garden Lizards.

3.3 Local and International Trade

Indian Bull Frog has a great demand for frog leg in local illegal market. Large sized frogs are traded in local markets in Chittagong Hill Tracts. Tribal communities locally hunt and trade turtles among themselves. In addition to the tribal communities, Hindu community also consume turtles. There is a great demand for freshwater turtles in local market. In many places of the country including Dhaka city turtles are sold in open markets. Tokey Gecko has been traded nationally and internationally for traditional medicine preparation. Venomous snakes especially cobras has a great demand in illegal market probably for venom extraction. Pyhon and other snake skin have demand in local and international black markets. The involvement of turtles in local and international trade through Bangladesh is evident through the following reports.

1. Bangladesh border police seized more than **120 kilograms (270 pounds) of dead turtles**; their largest ever haul of the animal, which is also used in traditional medicine. It came just weeks after Thai customs discovered hundreds of **live turtles, including 35 rare star tortoises** and other endangered animals in a suitcase from Bangladesh at Bangkok's main airport.

2. **Daily Sun, April 28, 2012:** Wildlife Smuggling, Bangladesh used as transit: Sources said the forest department on Friday seized **155 turtles smuggled in fruit baskets** into Bangladesh from India through Benapole border. Chief forest conservator Tapan Kumar Dey told daily sun 87 of the turtles are called **Shila Turtles and rest 68 are from Kali Kaitta species.**

3. Earlier on Apr 17 and March 28 another two consignments of **smuggled turtles numbering 606,** were apprehended at Hazrat Shahjalal International Airport and Putkhali of Jessor. Dey said, they **smuggle these rare turtles to Bangladesh** from India and then send them to Thailand, Taiwan or China. He added that these **Shila Turtles and Kali Kaitta species are also on the list of endangered species in Bangladesh**. They are mostly seen in the hill tracts adjacent to the rivers Ganges and Bhrahmaputra.

4. **Priyodesk, 09/09/2012:** Available data show that since 2010, about **1,000 endangered turtles and tortoises** were seized in drives at Hazrat Shahjalal International Airport from outgoing passengers, who were arrested after they got security clearance for boarding flights. They were scheduled to leave Dhaka for Southeast Asian countries, said airport official.

5. **On August 7, 108 endangered Three Keeled Asian Turtles** kept in the suitcases of two Bangkok bound passengers were seized at Hazrat Shahjalal International Airport. The two passengers—an Indian citizen, Sheikh Kibria, and Bangladeshi Khayrul Alam Bhuiyan, were arrested as they were ready to board a Bangkok-bound flight after crossing the scanners, said Airport Armed Police Battalion officials.

6. **On September 28, 2010**, the police at Suvarnabhumi Airport in Bangkok arrested a passenger from Bangladesh with **four suitcases with 1,140 live Indian star tortoises**. On June, 10 2011, **400 Indian and Burmese star tortoises** were found in unclaimed bags at Bangkok's Suvarnabhumi International Airport.

7. The **Times of India, Sept 3, 2013:** Kolkata: The **Border Security Force (BSF) seized 952 highly-endangered star tortoises** that were being smuggled across the international border into Bangladesh on Sunday night.

8. **AFP, Bangkok, Nov. 9. 2013**: Smuggled from Bangladesh, Pakistan, say Thai police: Thai customs have found over a **thousand turtles and tortoises in airport luggage in a week**, including a haul of 470 creatures yesterday as conservationists warn of "skyrocketing" smuggling for the pet trade. Officials at Suvarnabhumi Airport said a 25-year-old Pakistani man had been arrested on suspicion of wildlife trafficking after **four suitcases on a flight from Lahore were found to contain the protected black pond turtles.**

   The discovery came after authorities found **423 protected tortoises and 52 black pond turtles** stashed in unclaimed bags on Wednesday after arriving on a flight from Bangladesh. On Sunday, customs at the same airport found **80 more protected turtles on luggage also from Bangladesh.**

9. **The Times of India, Dec. 09, 2013:** Bengal, a transit route for wildlife trafficking, KOLKATA: In the last three months, BSF, Kolkata Police and the Customs have arrested more than **45 people and seized a huge number of turtles, tokay geckos** – an elusive lizard –from the bordering areas.

10. "**On November 21,** the **BSF officials seized 10 tokay geckos -** which has high demand in the international markets – from Haridaspur on Bangaon border and arrested two persons – Md. Roken and Md. Soriful. The **40th battalion of BSF also seized several star tortoises** worth more than Rs. 4 crore four crore from the border area a month back.

    Last week, Bidhanagar police arrested three persons and **seized 70 sacks of turtles and star tortoises** from a truck coming from Uttar Pradesh. **Not only geckos, Indian flapshell turtles (*Lissemys punctata*) are also being smuggled to West Bengal from Uttar Pradesh before being sent to international markets.**

    "In the last couple of years nearly 5000 turtles are smuggled to West Bengal from Uttar Pradesh. The smuggling racket surfaced when RPF, acting on a tip off, arrested seven women from West Bengal from Delhi-Howrah bound Janata express at Kanpur Central station and seized 400 live turtles.

11. **The Times of India, 3 February 2014**: Five thousand turtles seized in Bengal near Bangladesh border; About 5000 Indian softshell turtles, listed vulnerable on the IUCN Red List, were seized on Monday from Bongaon on the Bangladesh border.

12. **The Times of India, 26 May 2014: Kolkata**: Illegal trafficking syndicates of wild animals in Dum Dum, Baguiati and Rajarhat areas have resurfaced once again after the traffickers lied low for some time following the arrest of a trader from Baguiati in January. Only two days back around thousand Hamilton turtles, listed vulnerable by IUCN, were seized by the police at Keshtopur Ghoshpara area.

13. **UNB Benapole, Aug 23 2014** – Members of Border Guard Bangladesh (BGB) arrested a young man in possession of cobra venom worth Tk 100 crore in Amrakhali areas here on Friday night. Acting on secret information, a team of BGB-26 intercepted a Jessore-bound private car around 9.00 pm and recovered 12 pounds and two ounces of the snake venom, kept in seven jars, from the backside of the vehicle, said commanding officer of BGB-26 Lieutenant Colonel Mohammad Jahangir Hossain, adding value of the seized venom would be Tk 100 crore.

14. **IBN Live, August 25, 2014**: The Border Security Force (BSF) has seized 360 Indian Star Tortoises worth over Rs. 2 crore from West Bengal's North 24 Parganas district, while they were being smuggled to Bangladesh, an official said Monday. They were seized Sunday from Gunrajpur border outpost in North 24 Pargana by the troopers of the BSF 40th battalion. The BSF had seized 952 such tortoises in September 2013.

International trading of snakes and geckos are evident from the seized animals by the Bangladesh Forest Department during April 2010 to February 2014. Snake venom worth TK 100 crores seized by customs at Dhaka airport, Bangladesh.

3.4 Habitat Degradation

Habitat is an ecological area where live animals, plants or other types organisms. It is the natural environment in which an organism lives, just like humans, wild animals have specific requirements. Wildlife habitat must provide (i) cover (shelter) from weather and predators (ii) food and water for nutrition and (iii) breeding facilities.

The biggest threat to wildlife is from the habitat loss and degradation due to different anthropogenic effects. Environmental pollution due to various regions including excessive use of agrochemicals and pesticides has been increasing day by day. As the amphibian fertilization is external, and sperms and ovum are highly sensitive to any pollutants, fertilization will not be successful in polluted water.

3.5 Road Killing

There is an adverse relationship between roads and wildlife. Four ways roads and traffic detrimentally impact wildlife populations: (1) they decrease habitat amount and quality, (2) they increase mortality due to wildlife-vehicle collisions (road kill) (3) they prevent access to resources on the other side of the road and (4) they subdivide wildlife populations into smaller and more vulnerable sub-populations. Different amphibian species including Common Toad, Indian Bull Frog, Skipper Frog, Cricket frogs, Cope's Frog and among reptiles, different species of snakes and lizards are the main victim of road killing particularly during their breeding season in monsoon.

3.6 Human-herpetofauna Conflict

According to WWF Human–wildlife conflict is "any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations or on the environment." Reptiles have been hunted and traded by humans throughout history, particularly as food. Some reptiles are even used in

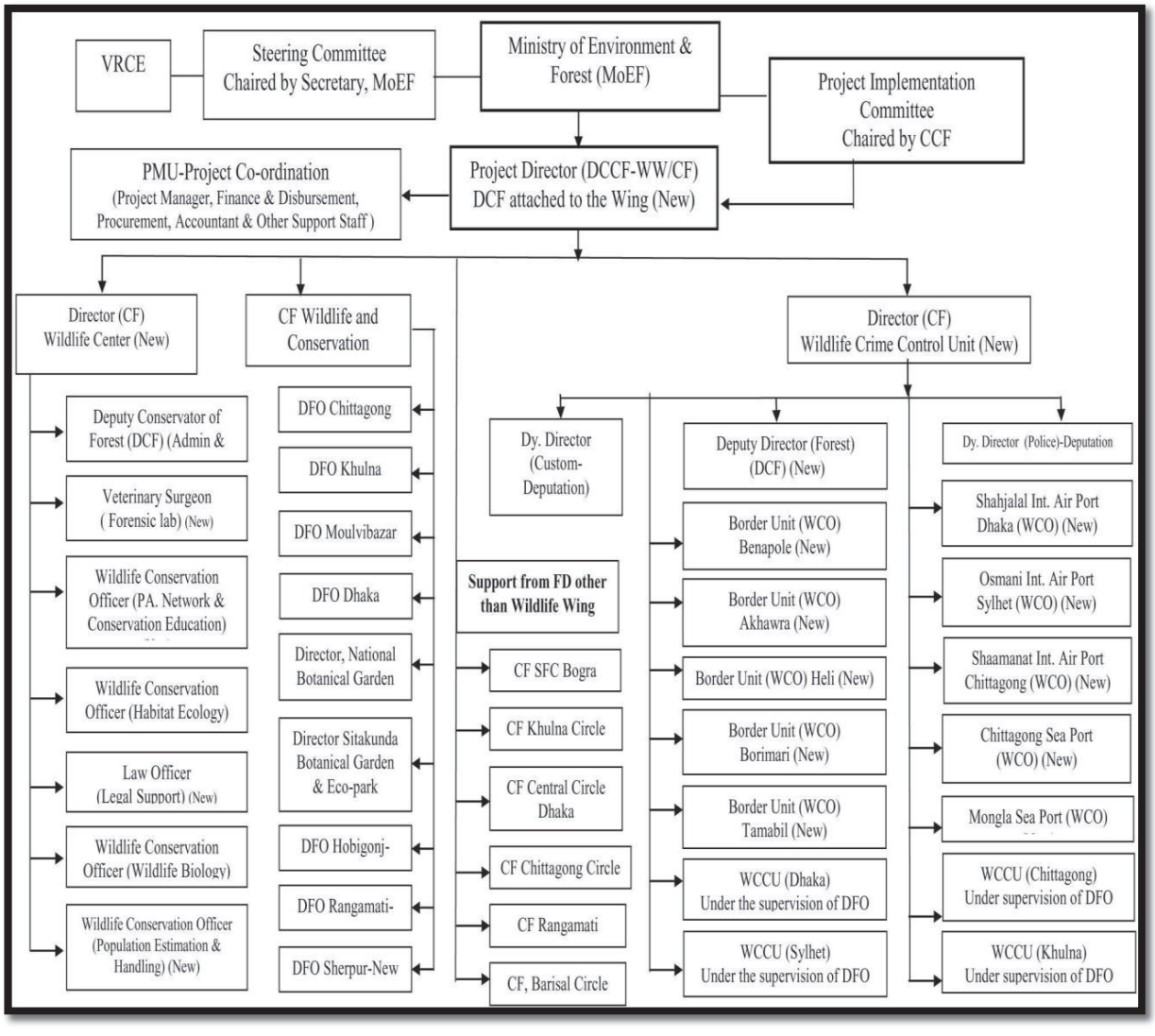
traditional medicines. Crocodie and snake skin are used for shoes, handbags and belts, and tortoise shell has become a popular material for jewellery and decoration.

Some problem animals like Skipper Frog (*Euphlyctis cyanophlyctis)*, Bull frog (*Hoplobatrachus tigerinus)* are mainly insectivore but occasionally feed on fish fry; Some water snakes like Checkered Keelback (*Xenochrophis piscator)*, Dark bellied Marsh snake (*X. cerasogaster)*, Monocellate Cobra (*Naja kaouthia)*, Common smooth water snake (*Enhydris enhydris*), monitor lizards (*Varanus* spp.), Crocodiles (*C. porosus)* eat fishes from nature that makes negative impact on the economy of fish farmers. Monitor lizards also eats eggs, chicks and ducklings from household. In Bangladesh around 8000 snake bite incidents occur per year with the 22% mortality (Huq *et al.* 1995). In a study it was evident that about 65% snake bites are from non-venomous snakes and about 95% of the mortality caused by the non-venomous bite (Miah *et al.*2009) because of the panic and stress to the victim.

4. Current Conservation policy and Management Practices

4.1 Institutional Framework

Bangladesh Forest Department is the custodian of forest resources and wildlife in the country. The Chief Conservator of Forests is the Chief Wildlife Warden. The territorial divisions of BFD are responsible for the prevention of illegal activities, regulation of legal extraction, permit issuance, and revenue collection. There is a Circle named Wildlife Management and Nature Conservation Circle (WNCC) administered by an officer in the rank of Conservator of Forest was established in 2001. The main focus of WNCC is to provide safeguard to wildlife, primarily in protected areas. There are Seven Wildlife Management and Nature Conservation Divisions under this Circle. The layout of the institutional setup BFD is as follows:



4.2 National Forestry Policy

The overall objective of the National Forestry Policy (NFP- 1994) is prepared to meet the basic needs of the present and future generations and to ensure greater contribution of the forestry sector in economic development. The overall NFP goal is to bring about 20% of the country's land under the aforestation programs of the government and private sector by year 2015. The NFP realizes the need for large scale planning for tree plantation, maintenance and preservation in the coastal areas to reduce the velocity and intensity of cyclones, tornados and tidal bores. Private initiatives for tree plantation and aforestation on fallow and hinterland, homestead land have been encouraged under this program. Massive afforestation on either side of land surrounding road, rail, dam and khas tank through the partnership of the local people and the NGOs have been commenced. This program also attempts to increase the amount of this protected area by 10% of the reserved forest land by the year 2015.

4.3 Bangladesh Environment Conservation Act, 1995

This Act focuses on the improvement of the qualitative and quantitative characteristics of different components of environment as well as prevention of degradation of those components. The Director General of the Department of Environment may declare Ecologically Critical Area (ECA) through this Act in certain cases where the ecosystem is considered to be threatened or near a critical state. In 1999, several areas of Bangladesh were declared 'Ecologically Critical Areas' (ECAs) which are in fact administrated by the Department of Environment (DoE), not the Forest Department. All activities that may deteriorate the environment further are prohibited in these areas (DoE 2002). The primary focus of the ECA is to conserve the ecological health of the area which will ultimately conserve biological diversity of the area. Presently nine areas have been declared as ECA in Bangladesh.

4.4 Wildlife (Conservation and Security) Act, 2012

Wildlife Act includes the constitution of Bangladesh Wildlife Advisory Board, Scientific Committee and authorized officers, protection of wild animals and plants, protected areas, License for captive animals, wild animals and trophies, import export and re-export of wild animals and plants, investigation and seizure, offence and penalties. The Act prohibits hunting of any wild animals without any permit. This Act also provides lists of wild animals in four schedules based on their status and existing threats. In this Act the chief warden may issue permit for education, scientific research and for scientific management. The constitution for the declaration and management of Wildlife Sanctuary and National Park includes here. The Government may, by notification in the official Gazette, in the light of national forest policy and forest master plan, and considering natural, geomorphological features, biodiversity and environmental significance, declare any Government forests or part of such forests or any Government land or wetland or any specified area as sanctuary or national park, specifying the demarcation, for the conservation of forest and habitat of wildlife.

Under this Act, if any person desires to cultivate, extract, manufacture, rear, export or import any wild animal or part of its body, meat, trophy, uncured trophy or any plant mentioned in schedule IV, or hunt any wild animal, he shall obtain licence from the Chief Warden or any authorized officers. No person shall export or import any animals except the custom port of entry and exit. In addition to these, the Act has introduced core zone (protected), buffer zone, community conservation area, landscape zone, in-situ and ex-situ conservation, national parks and gardens, eco- tourism, safari park, bird and elephant sanctuaries, marine protected area, co-management of sanctuary with local people, and protection of rare and endangered species.

Wildlife Act, 2012 has some severe limitations which makes its enforcement difficult. Those include the lack of power to investigate offences, arrest suspects, issue search warrants, and compel the attendance of witnesses and power to compel production of evidence before forest officers during investigations.

4.5 International Conventions

4.5.1 CITES

The trade of many herps and their body parts are prohibited under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Trade of many of the mega faunas of Bangladesh such as Tiger, Elephant, monkeys, langurs, loris, gibbons, deer, beer, otter etc. are prohibited under CITES. Bangladesh acceded to CITES in 1982.

4.5.2 CBD

Bangladesh signed in Convention on Biological Diversity (CBD) in 1992. Biodiversity conservation is being essential for the socio-economic development. Thus the main objective of this treaty is to conserve the biodiversity. The herpetofaunal management strategy will contribute to socio-economic development by conserving overall biodiversity.

4.5.3 Ramsar Convention

Bangladesh ratified in Ramsar Convention in 1992. Three wetlands *viz.* Hakaluki Haor, Tanguar Haor and Sundarbans have been declared as Ramsar sites due to their international importance for water fowl conservation. This convention provides a framework for the conservation and sustainable use of wetland resources. As a large group of herpetofaunal species are dependent on wetlands, Ramsar Convention will help to conserve herpetofaunal diversity by conserving important wetlands.

4.5.4 UNESCO

The three wildlife sanctuaries of Sundarbans have been declared as World Heritage Sites by UNESCO in 1997 due to its unique ecosystem.

4.5.5 Kyoto Protocol

Bangladesh ratified Kyoto protocol in 2001 which aims to reduce green house gases contributing to climate change. The natural forests of the country represents as an important carbon sequestration sites.

4.6 Protected Area Management System

Bangladesh has a long history of non formal forest management. Forests were brought under the government's jurisdiction and parts of the forests were declared as Reserves where logging was not permitted during the British Colonial era. In 1793, the Government of British India officially took control of the forests and in 1865 the Forest Department was created and the first Forest Act was promulgated (Khan 2008). The existing Sundarbans was notified and declared as "Reserved Forest" during 1875-76. The existing 'Reserved Forests' in the greater Sylhet district were declared under a similar Act, "Assam Forest Regulation" during the British Rule while the forests of Chittagong and Chittagong Hill Tracts were also declared "Reserved Forests" in early 20th century during the British rule (Feeroz *et al.* 2011, 2012).

The first declaration of PAs was under the provision of the Forest Act 1927 and Modhupur National Park was the first PA established in 1962, extended in 1982. Legal status of the PAs improved considerably after the independence of Bangladesh through the formulation and implementation of Bangladesh Wildlife Act in 1974 and several new Protected Areas were declared after the signing of Rio Convention in 1992 (United Nations Conference on Environment and Development, also known as the Rio Summit or Earth Summit). According to Wildlife Act 1974, there are three types of clearly defined Protected Areas: National Parks, Wildlife Sanctuaries and Game Reserves which eventually corresponded with the IUCN categories II, IV and VI respectively. Article 23 of the Wildlife Act 1974 had provisions for declaration of Protected Areas and also has regulations prohibiting certain activities in the Protected Areas. Under this Act a total of 39 Protected Areas were established, of which 17 were National Parks and 21 Wildlife Sanctuaries and one Marine Protected area.

All these PAs are under Forest Department's jurisdiction. Apart from these 39 PAs, two Botanical Gardens (Baldha Garden and National Botanical Garden in Dhaka), two Safari Parks (Dulahazra SP at Cox's Bazar and Bangabandhu SP at Gazipur) and eight Eco-parks were established and are managed by the Forest Department, but these have not been declared under any legal provision (Appendices 4-7) (Map 1). These conservation sites are mostly used for recreational purposes. However, these also support a considerable wildlife diversity of the country.

Map 1. Protected areas of Bangladesh.

Three wildlife sanctuaries of the Sundarbans (East, West and South), along with surrounding areas of about 1400sq km, are designated as “World Heritage Site” by UNESCO in 1997. On the other hand, the Sundarbans, along with Tanguar Haor, have also become designated as RAMSAR sites of international importance to preserve the ecosystems and to provide facilities for research, education and recreation (Feeroz 2013).

4.7 Co-management System

Co-management is usually applicable to the peripheral areas of reserved forests or protected areas for the conservation of habitats and wildlife. It was initiated under the project IPAC which focuses on building a foundation of sustainable co-management. People are expected to be involved in different activities including raising plantations for income generation and to protect the biodiversity.

The new Wildlife Act includes provisions for the participation of local stakeholders in the management and benefits of protected areas. The Nishorgo Support Project (NSP) and the Integrated Protected Area Co-management Project (IPAC) have developed a consistent approach over a longer period with regard to engaging stakeholders in sustainable natural resources management and the development of co-management of protected areas.

In the beginning of 2014, co-management of the park is being developed by BFD with support of the CREL project (Climate-Resilient Ecosystems and Livelihoods). This initiative will result in the establishment of a Co-Management Organization, which will involve the local stakeholders in management decisions and benefit sharing.

5. Challenges for Herpetofauna Management

5.1 Institutional Development

Although, in recent years Forest Department has been realized the necessity for the conservation of wildlife, but the poor institutional capability for the conservation is the main obstacle for this. Development of skilled manpower and sufficient logistics for conservation is major challenges for the Forest Department. Development of skilled manpower and sufficient logistics for conservation is major challenges for the Forest Department.

The limitations of the Forest Department include poor institutional capacity, insufficient manpower and logistics. Wildlife Crime Control Unit (WCCU) also has shortage of manpower. Currently WCCU is heading by a director. There is one Assistant Conservator of Forest (ACF), one Veterinarian Surgeon (Vet. Sgn.), one Wildlife Biodiversity Conservation Officer (WBCO), four Wildlife Inspectors (WI) and one Junior Wildlife Scout (JWS) in charge of this unit. Forest officials are engaged in this unit are very much insufficient in terms of the extent of work. Although the government order also provides for the posting of staff from police and customs departments, it has no representation from other agencies.

In most of the cases, animals poached from the forest but their consumption, transport and trade take place outside. These areas are not generally under the jurisdiction of Forest Department and not under their regular monitoring. Wildlife divisions must be strengthened to play role for the conservation of wildlife in the country.

5.2 Protected Area Management System

The main objectives of the protected area management system of the country are to protect the wildanimals and their habitats. Although, several protected areas have been declared under the legal provision but their management system is still very poor. Several issues need to be overcome for the proper management of PAs.

- Most of the PAs in the country have been declared in paper but practically there is no differentiation between PAs and Non-PAs in the field.
- Core areas for most of the PAs have not been demarcated.
- Most of the PAs has no buffer zone to minimize pressure on core area.
- Fragmentation and degradation of habitats are going on in an alarming rate.

5.3 Affected populations

Convincing affected human populations due to conservation initiatives is the one of the main challenges for the implementation of herpetofaunal management strategy. A mass community in and around the PAs are dependent on PAs for their livelihood. This is not an easy job to keep people out of the forest for conservation initiatives. Although, there are 40

different protected areas have been declared in the country by limiting human activities in those areas, but practical scenario is different.

Most of the tribal communities in the country traditionally hunt and consume wild animals. For many of the tribal communities hunting is also a part of their cultural and religious rituals. In many remote parts of the Hill Tracts, bush meat is the only source of protein for the community. It is very difficult and in some extent next to impossible to stop hunting.

Snake bite is still a great problem in rural areas of the country. It is very common and general practice to the victims of snake bites and their family members to kill any type snakes. Usually all the snake species living in the vicinity to human habitation are the victim of human retribution. Crocodile attack is another problem particularly in Sundarbans area. Most of the victims are fishermen. This is another challenge to the BFD to mitigate human-herpetofauna conflict. Centuries old misconception among the mass people about the harm of wildlife is another challenge for the conservation of reptiles. Most of the people are not aware of the beneficial role amphibians and reptiles in their surroundings. To stop the retribution killing of reptiles is another challenge.

5.4 Changing resource use pattern

To meet the increasing demand of human population unsustainable way of using resources have been increasing. Forest lands are being converting in to agricultural lands, establishment of households and industry. Jhum cultivation is going on in Hill forests and abandoning mass areas every year. Collection of leaves from the forest floor particularly in Sal forests causes vital changes in microhabitats. As amphibians and reptiles go for hibernation during winter, leaf litter on the forest floor makes it easy for them. Intentional forest fire in winter causes death of a large number of amphibians and reptiles. Industrial wastes are polluting soil, water and air. Amphibians, turtles and other water dependent reptiles are the main victims of water pollution. Marine resources are being overharvested using different types of unsustainable fishing gears. As a result marine turtles and sea snakes populations are facing threats for their extinction. A major portion of marine turtle's breeding grounds in the sea shore are now occupied by different anthropogenic activities. In this situation, it would be a great challenge to change people's attitude towards land use pattern.

5.5 Public Relations and Conflict management

In most of the PAs local people do not own forest areas in their vicinity. As the Forest Department is the custodian of forest and wildlife in the country, people feel that it is Government property and they are not a part of this. The relationship between local people and the FD officials are not friendly in many areas. As local people do not own the forest, unsustainable way of using forest resources is very common. Forest department needs to improve public relations focusing on following areas.

Wildlife trade

Destination of poached animals and their body parts are mostly to foreign illegal markets because of their huge demand. International relations of Bangladesh Government with the destination countries such as China, Hong Kong, Korea, Singapore, Malaysia and other countries are important to mitigate the wildlife demand in illegal international market. It is a big challenge to the Government to convince the respective countries to take necessary action for this.

Climate change

Climate change is being recognized as a global crisis threatening the survival of human being and biological resources. There is growing evidence that climate change, particularly increasing temperatures, is already having significant impacts on the world's physical, biological and human systems, and it is expected that these impacts will become more severe in the future (Gitay *et al.* 2002, Balmford *et al.* 2003). As the sex determination of many reptiles particularly in turtles is temperature depandant, any changes in the environmental temperature would lead to imbalance in natural sex ration. It is a big challenge to face climate change issues.

Water management

Another big chellange for herpetofaunal conservation is the management of water resources. Water management system in the country is still in a poor condition. Most of the rivers are being filled up due to the reduction in water flow from the upstream and siltation. Due the construction of dam in the upstream of Indian part, most of the major rivers such as the Padma, Jamuna and Teesta are not getting enough flow of water during dry season. Gharial population in these rivers are facing problem due to the reduction of water flow and fish production in river. It is a big challenge for the Government to revive proper water flow in these rivers from India.

Prevention of inland water pollution due to the industrial pollutions, excessive use of agrochemicals and pesticides is another chellange. Natural fish production in open water has been drastically reduced in last few decades. Indiscriminate use of unsustainable fishing gears is also responsible for the reduction of fish production. The connectivity of wetlands with the major rivers are also become reduced in most part of the country causing the decline of fish population. As a result, the distribution and abundance of fish dependant reptiles such as Crocodiles, Gharials, Turtles and snakes have been restricted. It will be a great challenge to the Forest Department to collaborate and convince all the respective stakeholders for the mitigation of this problem.

5.6 Co-management

Co-management approach has been working in many of the PAs of the country. Although the co-management approach involves local stakeholders in management process with the objectives of sustainable natural resource management, the formation and operation of co-management must be followed carefully. Current co-management experiences from different protected areas of the country rise following issues of concern:

- The selection of committee members is not always fair. Local politics and individual interests may strongly influence the functioning of co-management organizations and play an important role in the selection of its members.

- There is an internal conflict between the members of co-management committee and the FD officials for practicing power. FD is the custodian of forests and traditionally they have been managing forests.

- Co-management organizations and the motivation of its members appear usually dependent on external financial resources rather than self-sustenance and intrinsic motivation.

5.7 Management Outside Forest Area

Another big chellange to the FD is to manage herpetofaunal habitats outside of forest areas. Many of the amphibians and reptiles species are found in different habitats outside of the forest areas. Management of these habitats is not under the juricdiction of the Forest Department but they are responsible for the protection of these wild animals. It is another big challenge to protect amphibians and reptiles in private lands. A big chellange is to involve mass population towards conservation.

6. Evaluation of Values

6.1 Cultural Values

Amphibians have been playing an important role in tales, drawings, paintings and sculptures in many countries including Bangladesh. In India, the frog is usually seen as a symbol of good fortune associated with magical powers. Now days, there are several frog festivals around the world. Photographs and drawings of frogs are also used in many countries for advertisements, books, and video games.

The diverse colors and attrative body shapes of amphibians are remarkable. Ornate microhylid, *Microhyla ornate*, Red microhylid, *M. rubra*, Balloon Frog, *Uperodon globulosus*, Green pond frog, *Euphlyctis hexadactylus* and Painted bullfrog, *Kaloula pulchra* are very colourful. They are a great source of amusement to nature lovers. Breeding calls of amphibians are also a great attraction to the nature lovers.

Reptiles have been popularly used in symbology and myth. Snakes have been used as a symbol of power and sometimes as evil things. Turtles on the other hand usually represent longevity and stability and are also often associated with creation stories. Turtles are frequently depicted in popular culture as easygoing, patient and wise creatures. Due to their long lifespan, slow movement, sturdiness and wrinkled appearance, they are an emblem of longevity and stability in many cultures around the world. The tortoise is a symbol of wisdom, and is able to defend itself on its own.

6.2 Ecological Values

Adult amphibians are the best biological pest controllers. Amphibians and reptiles control insect pests in homes, gardens and agricultural fields. Snakes are major predators of rodents. Amphibians play a pivotal role in ecosystem as secondary consumers in many food chains. Tadpoles have significant impact in nutritional cycling. Because of their vital role in the ecosystem, decline or extinction of their population has a significant impact on the ecosystem.

From the ecological perspective, amphibians are regarded as good ecological indicators. Due to their high degree of sensitivity to any change in the environment, they have been used to indicate habitat fragmentation, ecosystem stress, impact of pesticides, and other anthropogenic activities.

Snakes play a significant role in any ecosystem. Their presence or absence in any ecosystem directly impacts on the subsequent food chain.

6.3 Economic importance

Herpetofauna have contributed significantly to a variety of biomedical and basic biological research programs. Snake venom studies contributed greatly to the care of heart-attack patients in the 1960s and 1970s and are widely studied in the development of pain-management drugs.

Frogs, lizards and other reptiles have provided experimental models for examining physiological mechanisms, especially those associated with body heat.

Reptiles are kept as pets and are great crowd pullers in any zoological gardens.

As reptiles have a great demand for their meat, skin and shell, farming of these animals could be a great source of income, even the Government could earn a lot of foreign exchange by exporting those items.

6.4 Amphibians in education and research

Amphibians have been using as a biological model for the study of basic vertebrate anatomy and physiology. The most commonly used species are Common Toad (*Duttaphrynus melanostictus)* and Indian Bull Frog (*Hoplobatrachus tigerinus*).

6.5 Medicinal values of Amphibians

Amphibian species are known to have some kind of medicinal values. The integuments of amphibians produce a variety of biologically active compounds. Recently, researchers have identified peptides from the skin of the green tree frog that show promise as antibiotics (Erspamer 1994). Amines, alkaloids and polypeptides are found in amphibian skin and have pharmacological importance.

Amphibians are extremely important in the pharmacopoeia of Asian cultures, where parts of certain amphibians are believed to have medicinal properties. Several toads, from the genus *Duttaphrynus (Bufo)* produce a toxin from their paratoid glands, bufotenine that has hallucinogenic properties.

6.6 Tourism Potentiality

Frogs and toads, different species of lizards, turtles and tortoises and snakes could be a great attraction for the development of nature tourism. Nesting ground of marine turtles in coastal areas could also be a great attraction to the tourists. Captive breeding center and reptile farms could also be used as tourist attraction.

7. Objectives of Strategic Plan

7.1 Overview

The herpetofauna management strategy of Bangladesh provides guidelines for the conservation of amphibians and reptiles in the country over the next ten years. Within this ten year time period the implementing agencies will mobilize conservation programs in priority basis. This strategic plan also provides vision and goals to guide conservation efforts. This strategic plan covers an outline plan with guidelines which need to be integrated in management plans or project plans of BFD. The implementing authority will prioritize project concepts and will develop necessary collaborations to ensure the implementation of the strategic plan.

7.2 Vision and Goals

Vision

The vision of the strategic plan is to ensure protection of herpetofaunal population, their habitats in Bangladesh. To minimize the threats to herpetofauna and to initiate captive breeding and reintroduction program for threatened species is another focus of this strategic plan.

Goals

Addressing threats

- Protection and restoration of critical herpetofaunal habitats throughout the country
- Provide conservation guidelines for herpetofaunal species group
- Prevent hunting, poaching, illegal trade and retribution killing of herpetofauna
- Initiate captive breeding, farming and reintroduction
- Minimize human-herpetofauna conflicts in the country

Addressing challenges

- Strengthen the capacity of FD for the implementation of conservation goals
- Improve law enforcement to protect herpetofaunal population and their habitats
- Strengthen the capacity of Wildlife Crime Control Unit to stop illegal trading

- Capacity building for the mitigation of human-herpetofauna conflicts
- Capacity building for the implementation of awareness and training programs
- Strengthen the capacity and facilities for research and monitoring
- Encourage collaborations to support the FD for the implementation of strategic plan

7.3 Prioritization

Priority list has been prepared by evaluating existing threats and conservation status of the species. The threats particularly to the habitat, climate change and conservation needs of the herpetofaunal species and its conservation status were considered. Nationally and Globally threatened species must get the top conservation priority followed by the keystone species.

8. Strategies

Amphibians and Reptiles in Bangladesh have a diverse group of animals and each of the group of animals has different ecological needs as well as facing different level of threats for their existence. A holistic approach is needed for the development of an effective management strategy for herpetofauna in the country. Herpetofaunal management strategy must be focused on the following fifteen areas (Table 2).

Table 2 Ten years strategic plan for the management of herpetofauna (2015 -2025)

Task	Timing / frequency	Activities	Implementing body/org	Indicators
Institutional development				
1. Capacity building of BFD especially for WNCC and WCCU	Five years	Training	BFD Other organizations	• Performance in field operation • Efficiency in carrying out duties • Field officials attitude and performance
	Five years	Establishment of Rescue and Recovery Team	WNCC FD	• Performance in rescue operations
	Five years	Providing sufficient incentive and logistic for field operation	MoEF	• Changes in current system of resource allocation
		Correction of policy of forest management	MoEF BFD	• Changes in the institutional framework
Species/ species group management				
2. **Tortoises and Freshwater Turtles** Elongated tortoise *Indotestudo elongata* Asian Giant tortoise *Manouria emys* River Terrapin *Batagur baska* Peacock Softshell Turtle ***Nilssonia hurum*** Ganges Softshell Turtle *N. gangetica* Asiatic Softshell Turtle *Chitra indica*	Five years	Population status and habitat viability survey	BFD Research organizations Universities	• Availability of updated information
	Regular	Habitat protection	BFD	• Comparative view of habitat quality
	Regular	Protect breeding ground	BFD in collaboration with other stakeholders	• Availability of breeding habitats
	Ten years	Captive breeding and reintroduction	BFD NGOs Universities	• Survivability of captive breed animals
	Regular	Prevent hunting	WCCU	• Frequency of hunt/poached animals
	Regular	Prevent national and international trade Border control	WNCU WCCU	• Availability of animals in illegal markets
3. **Marine Turtles**	Every year during nesting season (Nov – Feb)	Protect nesting ground	BFD DoE Ministry of Tourism Development	• Suitability of breeding grounds
		Protect eggs from	BFD	• Rate of successful

Task	Timing / frequency	Activities	Implementing body/org	Indicators
		poachers, dogs and other predators	DoE NGOs	hatching
		Establish hatchery	BFD DoE NGOs	• Survival rate of hatchlings per clutch
	Regular	Control gill nets for fishing	DoE DOF	• Frequency of dead turtles
	Annually	Awareness building among local people and fishermen	BFD DoE NGOs	• Perception of local people and fishermen on turtle conservation
4. **Gharial and Crocodiles** Gharial *Gavialis gangeticus* Saltwater Crocodile *Crocodylus porosus*	Regular	Protect nesting habitats	BFD in collaboration with other stakeholders	• Availability of breeding habitats
	Regular	Prevent water pollution	BFD in collaboration with DoE	• Water quality in habitat
	Ten years	Captive breeding and reintroduction	BFD NGOs Universities	• Survivability of captive breed animals
	Annually	Awareness raising among fishermen	BFD DoE NGOs	• Perception of fishermen on Gharial and Crocodile conservation
5. Snakes	Regular	Habitat protection	BFD	• Comparative view of habitat quality
	Regular	Stop hunting and poaching	WCCU Law enforcing agencies	• Frequency of hunt/poached animals
	Regular	Prevent local and international trade	WNCU WCCU	• Availability of animals/ products in illegal markets
	Regular	Awareness raising among mass people to break down their misconceptions about snakes to stop retribution killing	BFD NGOs Universities	• Perception of mass people on snakes
	Ten years	Alternative livelihood program for snake charmers	BFD NGOs	• Number of snake charmers
6. Monitor Lizards Bengal Monitor *Varanus bengalensis* Yellow monitor *V. flavescens* Ring Lizard *V. salvator*	Regular	Awareness raising among mass people to break down their misconceptions on monitor lizards and to focus on their beneficial roles	BFD NGOs Universities	• Perception of mass people on monitor lizards
	Regular	Stop hunting and poaching	WCCU Law enforcing agencies	• Frequency of hunt/poached animals
	Regular	Prevent local and international trade	WNCU WCCU	• Availability of skins in illegal markets
7. Geckos Tokey Gecko *Gekko gecko*	Regular	Prevent local and international trade	WCCU Law enforcing agencies	• Availability of geckos in illegal markets
	Regular	Awareness raising	BFD	• Perception of mass

Task	Timing / frequency	Activities	Implementing body/org	Indicators
		among mass people informing them that this species has no medicinal value	NGOs Universities	people on geckos
8. Garden lizards	Regular	Awareness raising among mass people highlighting that these species are not blood sucking	BFD NGOs Universities	• Perception of mass people on Garden lizard
9. Skinks	Regular	Habitat protection: Protect forest floor from any modifications Prevent intentional forest fire	BFD	• Comparative view of habitat quality
	Regular	Prevent retribution killing through awareness raising among mass people	BFD NGOs Universities	• People attitude towards skinks
10. Habitat protection and restoration	Ten years	Strengthening PA management system	MoEF BFD	• Management of PA system
	Ten years	Improve habitat management through protection and restoration	MoEF BFD	• Quality of habitats
	Year round	Regular patrolling	BFD CMC	• Quality of habitat • Species richness of the habitat
	Regular	Co-management involving all stakeholder	NGOs CBOs Local community	• Quality of habitats • Management system
11. Human-herpetofauna conflict mitigation	Regular	Awareness raising among mass people	BFD NGOs Universities	• Perception of mass people on geckos
	Regular	Enforcement of law	BFD Law enforcing agencies	• Rate of hunting and killing
12. Reduction in Demand for herpetofauna	Annually	Mass awareness about wildlife and existing law	BFD MoEF NGOs	• Frequency of herpetofauna in pet markets • Rate of hunting and poaching
	Regular	Law enforcement	Law enforcing agencies	• Frequency of wildlife crime related to herpetofauna
	Regular	Provide alternative protein sources to hunting communities	BFD NGOs	• Rate of hunting and poaching
	Regular	Campaign for demand reduction outside the country	BFD MoEF	• Demand in illegal international markets
13. Non-consumptive use	Regular	Develop nature based ecotourism Visitor access to captive	BFD CMC NGOs	• Systematic and well managed ecotourism • Improvement of socio-

Task	Timing / frequency	Activities	Implementing body/org	Indicators
		breeding centre		economic condition of local people
14. Awareness raising	Annual	Circulation in electronic and print media, Poster, Billboard, events/day observation Documentary show	BFD CMC NGOs	• Changes the attitudes and behaviors of locals towards herpetofauna
15. Research and Monitoring	Round the year	Allocating small funds for basic ecological research	BFD Research Organizations	• Regular dissemination of research information
	Round the year	Providing scholarship among research students	BFD Research Organizations	• Availability of continuous and up to date information
	Round the year	Development of research facilities both in the field and laboratories	BFD	• Availability of research facilities
	Biannually	Monitoring population trend of the keystone species and overall health of the habitats	Universities Research Organizations	• Regular dissemination of baseline information

8.1 Institutional Development

Training on protected area management and biodiversity conservation should be provided among the official and staffs especially for the peripheral officials who are directly involved in the field. The approach of the forest staffs and officials would not only to provide protection to the forest but also should include monitoring and monitoring and evaluation. Skills for biodiversity conservation should be considered in annual review process for the FD officials. Institutional development must be focused on co-management, strengthening wildlife crime control unit and development of interagency collaborations.

8.2 Species / species group management

8.2.1 Amphibians

Forest Department must have to take innitiatives for the protection of amphibian habitats. As water is must during the breeding season of amphibians, FD must be aware of ensuring the availability of amphibian breeding pools in PAs. Inter departmental collaboration is necessary to prevent water pollution (Table 2).

8.2.2 Tortoises and Turtles

Forest Department must have to take initiatives to assess habitat viability and population status of threatened turtles and tortoises in the country. Universities and research organizations must be included in this process. Critical habitats for survival and breeding must be protected. Enforcement of law is necessary to prevent hunting, poaching and also for the prevention of local and international trading. Border control must be improved through the coordination among different agencies. FD needs to take initiatives for captive breeding of threatened turtles and tortoises (Table 2).

Breeding ground for marine turtles must be protected in priority basis. Visitors must be controlled in critical turtle breeding areas. FD must coordinate different agencies including DoE and the ministry of Tourism. Initiatives also need to save turtles and their eggs from poachers, dogs and other predators. FD with the collaboration with DoE is needed to establish marine turtle hatchery in different areas of marine turtle breeding grounds.

8.2.3 Gharial and Crocodile

Nesting ground of Gharials in the Padma and Jamuna Riverine system must be protected in priority basis. Awareness program is also necessary among the fishermen in their breeding grounds. Captive breeding of Gharials and Saltwater Crocodiles must be undertaken under the supervision of FD. FD must be initiated collaborative programs among different stakeholders.

8.2.4 Snakes

Law enforcement is essential to prevent illegal trade of alive snakes, snake venom and snake skins. Awareness raising among the mass people is necessary to minimize retribution killing of snakes. FD should take initiatives for the development of alternative income source for snake charmers in the country.

8.2.5 Monitor Lizards

WCCU of the Forest Department must be strengthened to control illegal trading of monitor lizard skin. FD must be collaborated with law enforcing agencies. Alternative protein sources must be provided among the tribal communities.

8.2.6 Geckos

Demand for Tokey Gocko for traditional medicine preparation in local and international market must be prevented. WCCU with the collaboration of other agencies must control local markets and borders.

8.2.7 Garden Lizards

FD must take initiatives for awareness raising among mass people to break down their misconceptions on Garden Lizards that they can suck blood from a distant. It is also needed to focus on the beneficial roles of garden lizards.

8.2.8 Skinks

As the skinks are ground dwelling lizards, FD must take special care to protect modifications of forest floors. Special cares also need to take against forest fire.

8.3 Habitat Protection and Restoration

Protection of exiting habitats for herpetofauna throughout the country must get the first priority. Restoration of critical habitat for threatened keystone species should also be considered carefully.

Forest Department will take initiatives regarding this in following ways.

8.3.1 Strengthening PA Management system

Forest Department must strengthen PA management system through the following initiatives.

i. Presently PAs cover around 10.7% forest areas in the country, more forests areas should include in PA management system.

ii. Strengthen capability of forest department officials working in PAs by providing training and logistics.

iii. Need to demarcate core area and buffer zones in PAs.

iv. Establishment of connectivity among the fragmented habitats of PAs by establishing corridors.

v. Restriction of visitors in PAs.

vi. Enforcement of laws must be executed properly.

vii. A central coordination cell must be established in PAs management system for sharing knowledge and management strategies among different PAs.

8.3.2 Improve Habitat Management

Herpetofaunal habitats in PAs will be managed under the PA management system of Forest Department. Habitats in no-protected forest areas will be managed by the existing laws and regulations. Forest Department will protect existing habitats in the country through the reduction of dependency of the local people on forests, implementation of co-management and finally by the implementation of laws.

Wetlands and marine areas in our country are not under the jurisdiction of Forest Department. Interdepartmental collaborations especially between the FD and the Department of Fisheries are essential to save the critical amphibian and reptile populations living in those areas.

8.4 Collaboration

Herpetofauna conservation in the country needs incorporate different stake holders. Collaborations among the decision makers in the Forest Department, ministry of Environment and Forest, ministry of Land and other ministries is essential for the sustainability of any conservation initiatives. Collaboration with other national and international organizations including NGOs is also important. Forest Department must create a platform to facilitate collaboration.

8.5 Human-Herpetofauna conflict mitigation

Human-wildlife conflict can be managed through a variety of approaches. Prevention strategies endeavor to avoid the conflict occurring in the first place and take action towards addressing its root causes. It is very important to involve stakeholders in management activities. Stakeholders are individuals and groups who may be affected by or can affect wildlife management decisions and programs (Decker *et al.* 1996). Stakeholders may be affected positively or negatively. Human-wildlife conflict management could involve a wide variety of interested and affected people. As wildlife poses various risks to people; the risk of disease transmission, the risk of physical injury, the risk of property damage, the tolerance of wildlife depends in part on how people perceive these risks (Knuth *et al.* 1992). Understanding and managing risk perceptions can be a critical component of managing human-wildlife conflicts (Knuth *et al.* 1992).

Community should involve to the management programs because it is difficult or impossible for the implementing agencies to provide in-depth service to every community with wildlife damage concerns. Expectations of quick, no-cost, permanent solutions to wildlife damage issues are unrealistic. All involved should quickly accept that sustainable management decisions.

8.6 Reduction in Demand for Herpetofauna

Though the wildlife pet is not popular in Bangladesh but it is found in some extent. Turtles are the most popular wild pets after birds. The internal demand for herpetofauna in the country seems to be limited to pets and meat for consumption and traditional medicine preparation. Some of the tribal communities in the northeast, southeast and northern part of the country and the Hindu people traditionally hunt and consume turtle meat. Most of the pet owners and consumers of wild meat are not aware of existing laws. Awareness building through various media including social and religious discourse can play a vital role for reducing the demand for wild animals.

There is a huge demand turtles in international black markets. Demand for snake skin and venom are also evident. The Governments and international conservation organizations across the globe should work together for the reduction of wildlife demand globally.

8.7 Non-consumptive use of Resources

One of the non-consumptive uses of the natural resources is the ecotourism. Bangladesh has huge prospects of developing sustainable ecotourism. Bangladesh forest Department through the co-management organizations have been initiated ecotourism in protected forest areas. In this program local peoples have been trained up as tour guide. Local people also facilitated through small business in and around tourist spots. Eco-cottages for accommodation facilities of tourists are also developed by the local people. Fifty percent of the revenue earning from the entrance money by the tourists are going to the co-management fund and local stakeholders are getting benefit from that. This sustainable approach for managing protected areas is quite successful in some PAs but it also raises some conservation issues.

8.8 Raise awareness

Awareness rising can play a vital role in changing knowledge, attitudes and behavior of the stakeholders to achieve conservation objectives. As a developing country, most of the people are not aware of wild animals and the existing law. Centuries old tradition of enemy-attitude towards wild animals is also one of the vital reasons for wildlife depletion. Most of the people in rural areas curiously kill wild animals without any reason. Even, most of the people do not know the beneficial role of wild animals for pest control or to maintain the health of their environment. Forest Department will take necessary steps for ensuring effective campaign through mass media to convey these messages quickly to the mass people. Forest Department will collaborate with the ministry of education to include lessons on environment education in national curricula of school going children. Forest department needs to take initiatives for awareness building programs among the school students during observing different national days such as World Environment Day, World Wildlife Day, and International Water Day etc. Forest Department should incorporate people from the all levels of the society including teachers, social and religious leaders, and elite persons to motivate mass people towards wildlife conservation.

8.9 Promote Captive breeding and farming

Captive breeding program must be undertaken to save the Critically Endangered species from extinction. Elongated tortoise (*Indotestudo elongata*), Asian Giant tortoise (*Manouria emys*), River Terrapin (*Batagur baska*), Peacock Softshell Turtle (*Nilssonia hurum*), Ganges Softshell Turtle (*N. gangetica*), Asiatic Softshell Turtle (*Chitra indica*), Gharial (*Gavialis gangeticus*) and Saltwater Crocodile (*Crocodylus porosus*) must be included in this program. Captive breed animals must be reintroduced to suitable habitats through the reintroduction programs.

Reptile farming is necessity to be encouraged due to the growing demands in local and international markets. Saltwater crocodile, Bengal monitor and turtles are recommended for farming. Farming must be strictly followed the guidelines provided by the expert committee of the Forest Department.

8.10 Promote Research and Monitoring

Baseline information on habit, habitat, ecological requirements and the position of the species in the ecosystem is very important for the development of any management and conservation strategy for the species. It is not also possible to evaluate the possible effects and the outcomes of any management strategy without understanding the ecology of the species. At the same time, it is not possible to develop any sustainable management strategy without understanding the socio-economic context of the country because a lot of threats to the species may underlay with it.

Basic research on different species of amphibians and reptiles must be initiated in priority basis. Though the research capability of FD has been increased in last decade but it is unrealistic for FD to collect all required basic information. Forest Department through the ministry of Environment and Forest should encourage independent researchers from different research organizations by providing research fund. Wildlife research group of some public universities are involved in basic ecological research but generally they do not have enough fund to support research students. Scholarships among the graduate research students should be provided which will enrich research information and at the same time will develop skilled manpower in this field.

Literature Cited

Balmford, A., Green, R.E., Jenkins, M. 2003. Measuring the changing state of nature. Trends in Ecology and Evolution 18: 326-330. doi: 10.1016/S0169-5347(03)00067-3.

Decker, D. J., C. C. Krueger, R. A. Baer, Jr., B. A. Knuth, and M. E. Richmond. 1996. From clients to stakeholders: a philosophical shift for fish and wildlife management. Human Dimensions of Wildlife 1:70–82.

Feeroz MM, Hasan, M.K., Khan, M.M.H. 2011. Biodiversity of Protected Areas of Bangladesh. Vol. I: Rema-Kalenga Wildlife Sanctuary. . Bangladesh: BioTrack. Arannayk Foundation.

Feeroz, M.M. 2013. *Biodiversity of Protected Areas of Bangladesh. Vol. III: Teknaf Wildlife Sanctuary.* BioTrack, Arannayk Foundation Bangladesh.

Feeroz, M.M., Hasan, M.K. and Hossain, M.K. 2012. *Biodiversity of Protected Areas of Bangladesh. Vol. II: Dudpukuria-Dhopachari Widlife Sanctuary.* BioTrack, Arannayk Foundation Bangladesh.

Gitay, H., Suarez, A., Dokken, D.J., Watson, R.T. 2002. Climate Change and Biodiversity. Intergovernmental Panel on Climate Change V. UNEP and WMO.

Gittins, S. P. and Akonda, A.W. 1982. What survives in Bangladesh?.*Oeyx*. **16**: 275-281.

Hasan, M.K., Khan, M.M.H and Feeroz, M.M. 2014. Amphibians and Reptiles of Bangladesh A Field Guide. Arannayk Foundation Bangladesh. 192 pp.

Huq F, Islam MA, Sarker MH, Chowdhury B, Ali MW, Kabir MM. Epidemiology of snake bite in Bangladesh. Bangladesh J Zool 1995;23(1):61-64.

IUCN Bangladesh 2000. Red Book of Threatened Amphibians and Reptiles of Bangladesh. IUCN-The World Conservation Union. Bangladesh country office.

Khan, M.M.H. 2008. Protected areas of Bangladesh-A Guide to Wildlife. Nishorgo Program, Bangladesh Forest Department, Dhaka, Bangladesh.

Knuth, B. A., R. J. Stout, W. F. Siemer, D. J. Decker, and R. C. Stedman. 1992. Risk management concepts for improving wildlife population decisions and public communication strategies. Transactions of the North American Wildlife and Natural Resources Conference.

Miah, M.T, Hoque, A.A., Tarafder, B.K., Patwary, M.K.H., Khan, R.R. and Kabir, S.M.E.J. 2009. Epidemiology, Clinical Profile and Outcome of Patients of Snake Bite in Mymensingh Medical College Hospital. *Journal of Bangladesh College of Physicians and Surgeons,* 27 (2): 70-75.

Stanford CB. 1991. The capped langur in Bangladesh: Behavioral ecology and reproductive tactics: Karger Publishers.

Appendices

Appendix 1 List of threatened reptiles of Bangladesh with national and global status (Total number of threatened species = 58).

(Status code: CR- Critically Endangered, EN -Endangered, VU - Vulnerable, LR - Lower Risk, DD - Data Deficient.)

Class: Reptilia

Sl	***Scientific Name***	**English Name**	**Local Name**	**Local Status**	**Global Status**
	Order: Crocodylia **Family:** Crocodylidae				
1.	*Crocodylus porosus*	Saltwater Crocodile	Lonapanir Kumir	CR	LC
	Family : Gavialidae				
2.	*Gavialis gangeticus*	Gangetic Gharial	Ghot Kumir	CR	CR
	Order: Testudines **Family :** Bataguridae				
3.	*Batagur baska*	River Terrapin	Baro Kaitta	CR	-
4.	*C uora amboinensis*	Malayan Box Turtle	Deeba Kasim	EN	-
5.	*Geoclemys hamiltonii*	Black Pond Turtle	Kalo Kasim	EN	VU
6.	*Hardella thurjJii*	Brahminy River Turtle	Kali Kaitta	EN	-
7.	*Kachuga dhongoca*	Tree Striped Roofed Turtle	Dhoor Kasim	CR	-
8.	*Kachuga kachuga*	Painted Roofed Turtle	Kasim	EN	CR
9.	*Pangshura smithii*	Brown Roofed Turtle	Baro Kori Kaitta	EN	NT
10.	*Pangshura sylhetensis*	Assam Roofed Turtle	Sylhet kachuga	EN	EN
11.	*Pangshura tentoria*	Indian Tent Turtle	Majhari Kaitta	EN	LR
12.	*Melanochelys tricarinata*	Three-keeled Land Tonoise	Kasim	EN	VU
13.	*Melanochelys trijuga*	Indian Black Tuttle	Kalo Kasim	EN	NT
14.	*Morenia petersi*	Indian Eyed Turtle	Haldy kaitta	VU	VU
	Family : Testudinidae				
15.	*Indotestudo elongated*	Elongated Tortoise	Halud Pahari	CR	-

			Kasim		
16.	*Manouria emys*	Asian Giant Tortiose	Pahari Kasim	CR	EN
	Family : Trionychidae				
17.	*Nilssonia gangetica*	Ganges Softshell Turtle	Khalua Kasim	EN	VU
18.	*Nilssonia hurum*	Peacock Softshell Turtle	Dhum Kasim	EN	VU
19.	*Nilssonia nigricans*	Bostami Turtle	Bostami Kasim	CR	Ex. in wild
20.	*Chitra indica*	Asiatic Softshell Turtle	Sim Kasim	CR	EN
21.	*Lissemys punctata*	Spotted Flapshell Turtle	Shundhi Kasim	VU	LR
22.	*Pelochelys bibroni*	Bibron,s Softshell Turtle	Jata Kasim	CR	VU
	Order : Lacertilia **Family :** Gekkonidae				
23.	*Gekko gecko*	Tucktook	Tokkhak	VU	-
24.	*Hemidactylus bowringii*	House Lizard	Tiktikhi	VU	-
	Family : Agamidae				
25.	*Calotes rouxii*	Forest Calotes	Rokto chosha	VU	LC
26.	*Draco blanfordii*	Flying Lizard	Urantho Tiktiki	CR	-
	Family : Scincidae				
27.	*Mabuya dissimilis*	Stripped Skink	Anjon	VU	-
	Family : Varanidae				
28.	*Varanus Bengalensis*	Grey Monitor Lizard	Gui Shap	VU	LC
29.	*Varanus flavescens*	Yellow Monitor	Sona Gui	EN	LC
30.	*Varanus salvator*	Ring Lizard	Ram Godi	EN	LC
	Order : Serpentes **Family :** Boidae				
31.	*Python molurus*	Rock Python	Ajagar	EN	VU
32.	*Python raticulata*	Reticulated Python	Golbahar	CR	-

	Family : Colubridae				
33.	*Ahaetulla nasutus*	Common Vine Snake	Sutanoli Shap	VU	-
34.	*Boiga cyanea*	Green Cat Snake	Sabuj Phonimonosha	VU	-
35.	*Cerberusrhyanchops*	Dog-faced Water Snake	Jalbora Shap	VU	-
36.	*Chrysopelea ornata*	Golden Flying Snake	Kalnagini	EN	-
37.	*Coluber mucosus*	Rat Snake	Darash Shapj	VU	-
38.	*Coluber nigromarginatus*	Green Rat Snake	Daraj	VU	-
39.	*Dendrelaphis pictus*	Painted Bronzeback Tree Snake	Gecho Shap	VU	-
40.	*Dendrelaphis tristis*	Common Bronzeback Tree Snake	Gecho Shap/ Bet Anchora	VU	-
41.	*Elaphe helena*	Common Trinket Snake	Dudhraj Shap	EN	-
42.	*Elaphe radiata*	Copper Head Trinket Snake	Dudhraj	EN	-
	Family : Dipsadidae				
43.	*Lycodon aulicus*	Common Wolf Snake	Gharginni Shap	VU	-
44.	*Lycodon fasciatus*	Banded Wolf Snake	Gharginni Shap	VU	-
45.	*Lycodon jara*	Yellow-speckled Wolf Snake	Gharginni Shap	VU	LC
	Family : Natricidae				
46.	*Macropisthodon plumbicolor*	Green Keelback Snake	Sabuj Dhora	EN	-
	Family : Dipsadidae				
47.	*Oligodon cyclurus*	Cantor's Kukri Snake	Bankaraj	VU	LC
48.	*Oligodon dorsalis*	Spot-tailed Kukri Snake	Bankaraj	VU	-

	Family : Natricidae				
49.	*Rhabdophis subminiatus*	Red-necked Keelback	Laldhora Shap	VU	LC
50.	*Xenochrophis cerasogaster*	Dark-bellied Marsh Snake	Kalo Mete Dhora Shap	VU	-
	Family : Elapidae				
51.	*Bangarus caeruleus*	Common Krait	Kal Keotey	EN	-
52.	*Bangarus fasciatus*	Banded Krait	Shankini Shap	EN	-
53.	*Naja kaouthia*	Monocellate Cobra	Gokhra Shap	VU	LC
54.	*Naja naja*	Binocellate Cobra	Khoia Gokhra	EN	LC
55.	*Ophiophagus hannah*	King Cobra	Raj Gokhra	EN	VU
	Family : Viperidae				
56.	*Trimeresurus erythrurus*	Spot Tailed Pit Viper	Viper Shap	EN	LC
57.	*Trimeresurus gramineus*	Bamboo Pit Viper	Viper Shap	EN	LC
58.	*Viper russellii*	Russel's Viper	Chandra Bora	CR	-

Ref. Red List of Threatened Animals of Bangladesh, IUCN-The World Conservation Union 2000.

Appendix 2 Status and Distribution of Amphibians in Bangladesh
Status Code: V=Very Common, C= Common, U= Uncommon and R= Rare, VU=Vulnerable globally, ( ) = Global status.

Distribution Code: W= Widely distributed, CE=Central, N=North, S=South, NE=Northeast, NW= Northwest, SE = Southeast, SW=Southwest, F=Forests, MF=Mangrove Forests, MEF = Mixed Evergreen Forests, DF = Deciduous Forests and WT = Wetlands.

Sl. No.	Scientific Name	English Name	Local Name	IUCN Local status	Distribution
	Order: Anura, Family: Bufonidae				
1.	*Bufo stomaticus*	Marbled Toad	-	U	S and SW in coastal islands, Sundarbans
2.	*Duttaphrynus himalayanus*	Himalayan Toad	-	R?	NE?
3.	*Duttaphrynus melanostictus*	Common Toad	Kuno Bang	V	W
4.	*Pedostibes kempi*	Garo-Hill Tree Toad	-	R?	N and NE in hills?
	Family: Dicroglossidae				
5.	*Euphlyctis cyanophlyctis*	Skipper Frog	Mali Bang	V	W, mainly in WT
6.	*Euphlyctis hexadactylus*	Green Frog	Sabuj Bang	U	SW, NW and CE, but mainly in SW
7.	*Fejervarya frithi*	Jessore Cricket frog	-	R	SW (Jessore)
8.	*F. limnocharis*	Cricket Frog	Jhijhi Bang	V	W
9.	*F. syhadrensis*	Southern cricket frog	-	C	W
10.	*Hoplobatrachus crassus*	Jerdon's bull frog	-	U	W, mainly in F & well-vegetated areas
11.	*H. tigerinus*	Indian Bull Frog	Sona Bang	V	W
12.	*Limnonectes khasianus*	Anderson's Khasi Hills Frog	-	R?	NE and N in hills?
13.	*L. laticeps*	Flat-headed Frog	-	R	NE and N in hills
14	*Occidozyga borealis*	Northern Frog	-	R	SE CHT, NE and

.					N
15.	*O. lima*	Puddle Frog	-	R	SE in MEF, might also occur in SW
16.	*Sphaerotheca breviceps*	Burrowing Frog	-	R	NW in dry areas
	Family: Hylidae				
17.	*Hyla annectans*	Jerdon's Tree Frog	-	R	NE, SE and N in hills
	Family: Megophrydae				
18.	*Leptobrachium smithi*	Smith‘s Litter Frog	-	U	NE (Lawachara NP) and SE in MEF
19.	*Xenophrys parva*	Myanmar Pelobatid Toad	-	R	SE (CHT), NE and N, mainly hill streams
20.	*X. robusta*	-	-	R?	NE and N in hills?
	Family: Microhylidae				
21.	*Kalophrynus interlineatus*	Sticky Frog	-	R	CE (Madhupur) in DF, MEF
22.	*Kaloula pulchra*	Asian Painted Frog	-	C	NE and SE in and around NEE
23.	*K. taprobanica*	Sri Lankan Painted Frog	-	R	CE(Madhupur), N & NE in MEF
24.	*Micrihyla berdmorei*	Microhylid Frog	-	C	NE and SE in MEF CE and N in DF
25.	*M. ornata*	Ornate Microhylid Frog	-	V	W, mainly in hills and highlands
26.	*M. rubra*	Red Microhylid Frog	-	C	W mainly NE and SE in hills
27.	*Ramanella variegata*	White-bellied Pug-snout Frog	-	R	SW and NW
28.	*Uperodon globulosus*	Indian Balloon Frog	-	U	W in hills, mainly in Madhupur Tract
29.	*U. systoma*	Marbled Balloon Frog	-	R	NW

	Family: Ranidae				
30.	*Amolops formosus*	Assam Sucker Frog	-	R	N and NE in hills
31.	*A. gerbillus*	Gerbill Frog	-	R	NE in hills
32.	*A. marmnoratus*	Marbled Sucker Frog	-	R	NE and SE in MEF, near hill streams
33.	*A. monticola*	-	-	R?	NW and NE?
34.	*Huia chloronota*	Green Cascade Frog	-	R	NE and N in hills
35.	*Humerana humeralis*	Bhamo Frog	-	R	NE (Rema-Kalenga WS) and SE in MEF
36.	*Hyla rana tytleri*	Leaping Frog	-	U	W
37.	*Nasirana alticola*	Pointed-headed Frog	-	R	SE (CHT), bushy hills preferably near water
38.	*Sphaerotheca breviceps*	Short-headed Burrowing Frog	-	R	NW
39.	*Sylnirana garoensis*	Garo Hills Frog	-	R	NE and N in hills
40.	*S. leptoglossa*	Cope's Assam Frog	-	C	NE, SE and CE in hills and highlands
41.	*S. taipehensis*	Two-striped Grass Frog	Kad Bang	U	CE, SE and SW, preferably in wetlands
	Family: Rhacophoridae				
42.	*Chirixalus simus*	Annandale's Tree Frog	-	R	SE (CHT) and SW
43.	*C. vittatus*	Striped Asian Tree Frog	-	C	SE and NE in MEF, bush & bamboo clump
44.	*Philautus annandalii*	East Himalayan Bush Frog	-	R	NE in Hills
45.	*P. garo*	Garo Hills Frog	-	R?	N and NE in hills?

46.	*Polypedates leucomystax*	Asian Brown Tree Frog	Gecho Bang	C	W, commonly in and around F
47.	*P.maculaus*	Indian Tree Frog	Gecho Bang	V	W
48.	*P. taeniatus*	Terai Tree Frog	-	R	NW
49.	*Rhacophorus bipunctatus*	Twin spotted Tree Frog	-	R	NE and SE in MEF
50.	*R.htunwini*	Htun Win's Tree Frog	-	R	NE (Satchari NP) and SE in MEF
51.	*R. maximus*	Large Tree Frog	-	R	NE in MEF and N in DF
52.	*R. tuberculatus*	-	-	R?	NW?
	Order : Gymnophiona, Family: Ichthyophiidae				
53.	*Ichthyophis garoensis*	Caecillan	-	R?	N and NE in hills?

Ref. Khan, M. M. H. 2008. A Guide to Wildlife. Nishorgo Program, Bangladesh Forest Department, funded by USAID, 303pp.

Appendix 3 Status and distribution of reptiles in Bangladesh

Status Code: V = Very Common, C = Common, U = Uncommon, R = Rare, CR = Critically Endangered globally, EN = Endangered globally, VU = Vulnerable globally and EW = Extinct in the Wild, ( ) = Global status.

Distribution Code: W = widely distributed, CE = Central, N = North, S = South, NE = Northeast, NW = Northwest, SE = Southeast, SW = Southwest, F = Forests (mangrove, mixed evergreen and deciduous), MF = Mangrove Forests, MEF = Mixed Evergreen Forests, DF = Deciduous Forests, WT = Wetlands, and CO- Coast.

SL	*Scientific Name*	English Name	Local name	IUCN Status	Distribution
	Oder = Testudinea **Family = Batagiridae**				
1.	*Batagur baska*	Common River Terrapin	Baro Kasim	R (CR)	SW in rivers of Sundarbans
2.	*Cuora amboinensis*	Malayan Box Turtle	-	R (VU)	SE and NE in MEF and WT
3.	*Cyclemis oldhami*	Asian Leaf Turtle	-	R	NE and SE in MEF & vegetated areas.
4.	*Geoclemys harmiltonii*	Spotted Pond Turtle	Mogom Kasim	U (VU)	W in WT
5.	*Hardella thurjii*	Crowned River Turtle	Kali Kaitta	U (VU)	W in WT
6.	*Kachuga dhongoca*	Three-striped Roofed Turtle	Dhoor Kasim	U(EN)	W, mainly in large rivers
7.	*Kachuga kachuga*	Red-crowned Roofed Turtle	Kori Kasim	U (CR)	W in WT
8.	*Melanochelys tricarinata*	Three-keeled Land Tortoise	Shila Kasim	U (VU)	W in WT
9.	*M. trijuga*	Pond Tortoise	Kali kasim	U	CE and NE in WT
10.	*Morenia petersi*	Yellow Turtle	Haldha kaitta	U (VU)	W in WT
11.	*Pangshura smithii*	Brown Roofed Turtle	Baro kori Kaitta	U	Mainly in Padma River
12.	*P. sylhetensis*	Sylhet Roofed Turtle	Sylheti kori Kaitta	R (EN)	NE and SE in MEF and WT

13.	*P. tectum*	Indian Roofed Turtle	Kori kaitta	C	W in WT
14.	*P. tentoria*	Median Roofed Turtle	-	U	W in WT
15.	*Pyxidea mouhotii*	Keeled Box Turtle	-	R?	NE and SE in MEF?
	Family : Cheloniidae				
16.	*Caretta caretta*	Loggerhead Sea Turtle	Logger samudrik kasim	R (EN)	CO inshore and offshore
17.	*Chelonia mydas*	Green Turtle	Sabuj samudrik kasim	R (EN)	CO inshore and offshore
18.	*Eretmochelys imbricata*	Hawksbill Sea Turtle	Samudrik kasim	R	CO inshore and offshore
19.	*Lepidochelys olivacea*	Olive Ridley Turtle	Jalpaironga samudrik kasim	C (EN)	CO inshore and offshore
	Family : Dermochelyidae				
20.	*Dermochelys coriacea*	Leatherback Sea Turtle	Baro samudrik kasim	R	CO inshore and offshore
	Family : Testudinidae				
21.	*Indotestudo elongata*	Elongated Tortoise	Halud pahari kasim	R (EN)	SE and NE in MEF
22.	*Manouria emys*	Burmese Black Tortoise	Kalo pahari kasim	R (EN)	SE in hills, mainly in CHT
	Family : Trionychidae				
23.	*Aspideretes gangeticus*	Ganges Softshell Turtle	Khalua kasim	U(VU)	W in rivers
24.	*A. hurum*	Peacock Softshell Turtle	Dhum kasim	C (VU)	W in WT
25.	*A. nigricans*	Bostami Softshell Turtle	Bostami kasim	R (EW)	Pond of Bayzid Bostami's Shrine, Ctg
26.	*Chitra indica*	Narrowaheaded Softshell Turtle	Sim kasim	U (EN)	W mainly in large rivers
27.	*Lissemys*	Spotted Flapshell	Shundi	C	W in WT

	punctata	Turtle	kasirn		
28.	*Pelochelys cantorii*	Cantor's Softshell Turtle	Jata kasim	U(EN)	W in large rivers, particularly CO
Order : Lacertilia **Family: Agamidae**					
29.	*Calotes emma*	Emma Gray's Forest Lizard	-	C	NE and SE in and around MEF
30.	*C. jerdoni*	Jerdon's Forest Lizard	-	R	NE and SE in MEF. NW in rural areas
31.	*C. versicolor*	Common Garden Lizard	Raktachosa/ Girgiti	V	W
32.	*Draco maculatus*	Spotted Flying Lizard	Urukku Girgiti	R	SE and NE in MEF and plantation
33.	*Ptyctolaemus gularis*	Green Fan-throated Lizard	-	U	NE and SE in and around MEF
	Family : Gekkonidae				
34.	*Cosymbotus platyurus*	Flat-tailed Gecko	-	U	NE and SE mainly near human habitations
35.	*Cyrtodactylus khasiensis*	Khasi Hills Bent-toed Gecko	-	R	SE and NE in MEF
36.	*Gekko gecko*	Tokay Gecko	Tokkhak	V	W in F and human habitations
37.	*Hemidactylus bowringii*	Bowring's House Gecko	-	U	Wooded urban areas
38.	*H. brookii*	Brook's House Gecko	-	C	W mainly in well-wooded urban areas
39.	*H. flaviviridis*	Yellow-bellied House Gecko	Goda Tiktiki	C	West of Jamuna River, rarely in CE
40.	*H. frenatus*	Common House Gecko	Haroil Tiktiki,	V	W, mainly in human habitations
41.	*H. garnotii*	Garnots Gecko	-	R	SE, mainly in

					human habitations
	Family: Lacertidae				
42.	*Takydromus khasiensis*	Khasi Hills Long-tailed Lizard	Pahari Moshap	U	NE in MEF and tea estates
	Family: Anguidae				
43.	*Ophisaurus gracilis*	Burmese Glass Snake	-	R	NE in MEF and well-vegetated areas
	Family: Scincidae				
44.	*Lygosoma albopunctata*	White-spotted Supple Skink	-	R?	NE and SE in MEF
45.	*L. bowringii*	Bowring Supple Skink	-	R	SE in hilly areas, mainly in CHT
46.	*L.lineolatum*	Striped Writhing Skink	-	R	SE in hilly areas of CHT
47.	*L. punctata*	Spotted Supple Skink	-	R	NE and SE in hills
48.	*L. vosmaerii*	Osmaers Supple Skink	-	R?	NE and SE in MEF?
49.	*Mabuya carinata*	Keeled Grass Skink	Anzoni	V	W mainly around wetlands
50.	*M. dissimilis*	Stripped Grass Skink	-	R	NW and N in DF
51.	*M. macularia*	Bronze Grass Skink	Anzon	R	W in hills, around MEF and DF
52.	*Scincella reevesi*	Reeves Ground Skink	-	U	NE and SE in MEF
53.	*Sphenomorphus indicus*	Himalayan Litter Skink	-	R	NE and SE in hilly areas
54.	*S. maculatus*	Spotted Litter Skink	-	V	NE, SE and Comilla in hilly areas
55.	*Tropidophorus assamensis*	Northeastern Water Skink	-	R	NE in and around hill streams

	Family: Varanidae				
56.	*Varanus bengalensis*	Bengal Monitor	Kalo Gui Shap	V	W
57.	*V. flavescence*	Yellow Monitor	Sona Gui	U	W
58.	*V. salvator*	Water Monitor	Ramgadi Gui	C	CO, Sundarbans
	Order: Serpentes **Family: Typhlopidae**				
59.	*Gryptotyphlops acutus*	Beaked Blind Snake	-	R?	SW?
60.	*Romphotyphlops braminus*	Common Blind Snake	-	U	W
61.	*Typhlops diardii*	Diard's Blind Snake	Sutanali Shap	R	Possibly absent in SE
62.	*Typhlops jerdoni*	Jerdon's Blind Snake	Choto durnukha	C	W
63.	*Typhlops porrectus*	Slender Blind Snake	-	U	W
	Family : Acrochordidae				
64.	*Acrochordus granulatus*	Western Wart Snake	Reti Shap	R	SW brackish, estuaries & freshwater rivers
	Family : Boidae				
65.	*Eryx conicus*	Common Sand Boa	Balu-bora Shap	R	CE, NW and SW
66.	*E. johnii*	Red Sand Boa	Lal bora sap	R?	NW in dry areas?
67.	*Python molurus*	Rock Python	Azagar/Moya	R	SW in MF, and SE and NE in MEF
68.	*P. reticulatus*	Reticulated Python	Golbahar Shap	R	SE and NE in MEF
	Family : Colubridae				
69.	*Ahaetulla nasuta*	Common Vine Snake	Laodoga Shap	U	W, mainly in F

70.	*A. prasina*	Short-nosed Vine Snake	Laodoga Shap	U	SW in MF, NE and SE in MEF
71.	*Amphiesma khasiensis*	Khasi Hills Keelback	-	R?	NE and N
72.	*A. platyceps*	Himalayan Keelback	-	R	NE and N
73.	*A. stolatum*	Striped Keelback	Chilu Shap	C	W, commonly in SW
74.	*Argyrogena fasciolatus*	Banded Racer	-	R	NW and SW
75.	*Atretiun schistosum*	Olive Keelback	Maita Shap	V	W in wetlands
76.	*Boiga cyana*	Green Cat Snake	Sabuj Phonimonosa	U	SW in MF, NE and SE in MEF
77.	*B. gokool*	Eastern Cat Snake	-	U	W, rural areas and F
78.	*B. multomaculata*	Large-spotted Cat Snake	-	R	NE in MEF, vegetated areas
79.	*B. ocelluta*	Ocellated Cat Snake	-	R	NE in MEF
80.	*B. ochracea*	Tawny Cat Snake	Khoriae Phonimonisa	U	SE and NE, hills, mainly CHT
81.	*B.trigonata*	Common Cat Snake	Phonimonosha Shap	U	W
82.	*Cerberus rynchops*	Dog-faced Water Snake	Maichha Shap	C	Sundarbans
83.	*Chrysopelea ornata*	Ornate Flying Snake	Kalnagini/Urukku Shap	U	W mainly ainly in F
84.	*Coelognathus helena*	Common Trinket Snake	-	R	W
85.	*Coelognathus radiatus*	Copper-headed Trinket	Duclhraj/Arbali Shap		F and rural areas
86.	*Dendrelaphis cyanochloris*	Blue-green Bronzeback Tree Snake	-	R	NE and SE in MEF
87.	*D.pictus*	Painted	Rangila	U	W, mainly in F

		Bronzeback Tree Snake	Gecho Shap		
88.	*D. tristis*	Common Bronzeback Tree Snake	Badami Gecho Shap	C	W, mainly in F
89.	*Elachistodon westermanni*	Indian Egg-eater	-	R	NW (Rangpur)
90.	*Elaphe frenata*	Khasi Hills Trinket Snake	-	R?	N and NE in well-vegetated hills?
91.	*E.porphyracea*	Banded Trinket Snake	-	R?	N and NE in F?
92.	*E. prasina*	Green Trinket Snake	-	R	NW
93.	*Enhydris enhydris*	Common Smooth Water Snake	Paina Shap	V	W in WT
94.	*Enhydras seiboldii*	Seibold's Smooth Water Snake	-	U	W in WT
95.	*Fordonia leucobalia*	White-bellied Mangrove Snake	-	R	SW in MF
96.	*Gerardia prevostiana*	Glossy Marsh Snake	Maita Shap	U	CO, mainly in Sundarbans
97.	*Liopeltis calamaria*	Lesser Stripe-necked Snake	-	R	NE and SE in MEF
98.	*L. frenata*	Gunthers Stripe-necked Snake	-	R?	N and NE?
99.	*Lycodon aulicus*	Common Wolf Snake	Gharginni Shap	V	W, around human habitations
100.	*L. fasciatus*	Banded Wolf Snake	-	R	W, urban areas
101.	*L. jara*	Yellow-speckled Wolf Snake	-	R	W, mainly wooded and bushy areas
102.	*L. zawi*	Zaw's Wolf Snake	-	R?	SE, NE and N?

103.	*Macropisthodon plumbicolor*	Green Keelback Snake	Sabuj Dhora Shap	R	SE in grassy and bushy areas
104.	*Oligodon albocinctus*	White Barred Kukri Snake	Bankoraj Snap	U	NW, NE, N and SE
105.	*O. arnensis*	Common Kukri Snake	-	U	W
106.	*O. cinereus*	lack-barred Kukri Snake	-	R	W
107.	*O. cyclurus*	Cantor's Kukri Snake	-	R	W
108.	*O. dorsalis*	Spot-tailed Kukri Snake	-	R	W
109.	*O. taeniolatus*	Russels Kukri Snake	-	U	W
110.	*O.theobaldi*	Mandalay Kukri Snake	-	R	NE and SE in MEF
111.	*Orthriophis cantoris*	Eastern Trinket Snake	-	R?	NW, N and NE?
112.	*O. hodgsonii*	Himalayan Trinket Snake	-	R?	NW, N and NE?
113.	*Pareas macularius*	Darjeeling Snail eater	-	R	NE and SE in MEF
114.	*P. monticolus*	Assam Snail-eater	-	R	NE and SE in MEF
115.	*Psammodynastes pulverulentus*	Mock Viper	Pahari Shap	C	NE and SE in MEF vegetated areas
116.	*Psammophis condanarus*	Condanarus Sand Snake	-	R	NW and SW?
117.	*Ptyas korros*	Indo-Chinese Rat Snake	-	U	SE, NE and N in MEF, DF
118.	*P. mucosus*	Indian Rat Snake	Daraj Shap	C	W

119.	*P. nigromarginata*	Green Rat Snake	Sabuj Daraj Shap	R	SE in MEF
120.	*Rhabdophis himalayanus*	Himalayan Keel back	-	R	NW
121.	*R. subminiatus*	Red-necked Keelback	-	U	NE in MEF and well-vegetated areas
122.	*Sibynophis collaris*	Collared Black-headed Snake	-	R?	NE and SE in MEF
123.	*S. sagittaria*	Cantors Black-headed Snake	-	R	NW
124.	*S. subpunctatus*	Dumerils Black-headed Snake	-	R	SW
125.	*Xenochrophis cerasogaster*	Dark-bellied Marsh Snake	-	U	W
126.	*X. piscator*	Checkered Keelback	Dhora Shap	V	W
	Family :Elaphidae (all deadly venomous species)				
127.	*Bungarus caeruleus*	Common Krait	Kal-keutey Shap	C	W
128.	*B. fasciatus*	Banded Krait	Shonkhini Shap	U	W Commonly in CE in DF
129.	*B.lividus*	Lesser Black Krait	-	R	NW
130.	*B. niger*	Black Krait	-	R	SW in MF, NE in MEF
131.	*B. sindanus*	Wall's Krait	-	R?	CE in DF?
132.	*Callophis melanurus*	Slender Coral Snake	-	R	NE and SE in MEF vegetated areas
133.	*Naja kaouthia*	Monocled Cobra	Gokhra Shap	U	W, commonly in Sundarbans
134.	*N. naja*	Spectacled Cobra	Khoia Gokhra	C	W

135.	*Opiophagus hannah*	King Cobra	RajGokhra , Alot Shap	U	SW, NE, SE and CE in F, commonly in Sundarbans
136.	*Sinomicrurus macclellandi*	Macclellands Coral Snake	-	R?	NE and SE in MEF
	Family : Hydrophiidae (all deadly venomous species)				
137.	*Astrotia stokesii*	Learge-headed Sea Snake	-	R	Inshore, particularly along Sundarbans
138.	*Enhydrina schistosa*	Hookanosed Sea Snake	Samudrik Shap-	V	Inshore
139.	*Hydrophis caerulescens*	Manytoothed Sea-Snake	-	C	Inshore
140.	*H.cantoris*	Cantor's Narrow headed Sea Snake	-	C	Inshore
141.	*H. cyanocinctus*	Annulated Sea Snake	-	U	Inshore, upstream along rivers
142.	*H. fasciatus*	Banded Sea Snake	Lati samudrik shap	C	Inshore and offshore
143.	*H. gracilis*	Common Narrow-headed Sea Snake	-	U	Inshore
144.	*H. nigrocinctus*	Black-headed Sea Snake	-	C	Inshore
145.	*H. obscurus*	Estuarine Sea Snake	-	C	Inshore
146.	*H. ornatus*	Cochin Banded Sea Snake	-	R	Inshore
147.	*Lapemis curtus*	Malabar Sea Snake	-	R	Inshore and Offshore
148.	*Laticauda colubrina*	Colubrine Amphibious Sea Snake	-	R	Inshore

149.	*Laticauda laticauda*	Common amphibious Sea Snake	-	R	Inshore
150.	*Pelamis platurus*	Black and Yellow Sea Snake	Rgnglla Samudrik shap	U	Offshore
	Family: Viperidae, (all deadly venomous species)				
151.	*Daboia resselji*	Russell's Viper	Chandra-bora Shap	U	(W, commonly in dry NW
152.	*Ovophis monticola*	Blotched Pit Viper	-	R	NE &SE in MEF
153.	*Protobothrops jerdonii*	Jerdon's Pit Viper	-	R?	NE in MEF, N in DF
154.	*Trimeresurus albolabris*	White lipped Pit Viper	Sabuj-bora Shap	U	NE and SE in MEF, tea estates SW in MF
155.	*T. erythrurus*	Spot-tailed Pit Viper	-	U	NE and SE in MEF and vegetated areas
156.	*T. popeiorum*	Pope's Pit Viper	-	R	NE and SE in MEF
	Order: Crocodylia **Family: Crocodylidae**				
157.	*Crocodylus porosus*	Estuarine Crocodile	Lonapanir Kumir	U	SW in and around Sundarbans
158.	*Gavialis gangeticus*	Gharial	Meso, Ghot Kukir	R (CR)	Padma, Jamuna, Brahmaputra rivers

Ref. Khan, M. M. H. 2008. A Guide to Wildlife. Nishorgo Program, Bangladesh Forest Department, funded by USAID, 303pp.

Appendix 4. List of National parks in Bangladesh

Sl.No.	National Parks	Latitude/Longitude	Area (ha.)	Location	Year of Establishment
1	Bhawal NP	24° 4.760N 90° 23.964'E	5022	Gazipur	1982
2	Modhupur NP	24° 41.323'N 90° 8.275'E	8436	Tangail/ Mymensingh	1982
3	Ramsagar NP	25° 33.013'N 88° 37.415'E	28	Dinajpur	2001
4	Himchari NP	21° 21.302'N 92° 1.480'E	1729	Cox's Bazar	1980
5	Lawachara NP	24° 19.515'N 91° 47.246'E	1250	Moulavibazar	1996
6	Kaptai NP	22° 30.100'N 92° 10.190'E	5464	Chittagong Hill Tracts	1999
7	Nijhum Dweep NP	22° 4.115'N 91° 0.428'E	16352	Noakhali	2001
8	Medha Kachhapia NP	21° 37.837'N 92° 4.509'E	396	Cox's Bazar	2008
9	Satchari NP	24° 7.595'N 91° 26.732'E	243	Habigonj	2005
10	Khadim Nagar NP	24° 57.438'N 91° 55.979'E	679	Sylhet	2006
11	Baraiyadhala NP	22° 40.489'N 91° 38.597'E	2934	Chittagong	2010
12	Kuakata NP	21° 48.964'N 90° 7.071'E	1613	Patuakhali	2010
13	Nababgonj NP	25° 25.598'N 89° 3.960'E	518	Dinajpur	2010
14	Shingra NP	25° 50.447'N 88° 39.538'E	306	Dinajpur	2010
15	Kadigarh NP	24° 19.614'N 90° 19.147'E	344	Mymensingh	2010
16	Alta Dighi NP		264	Naogaon	2012
17	Birgonj NP		169	Dinajpur	2012

Appendix 5 List of Wildlife Sanctuaries in Bangladesh

Sl. No.	Wildlife Sanctuaries	Latitude/Longitude	Area (ha.)	Location	Year of Establishment
1	Rema-Kalenga WS	24° 11.106'N 91° 37.484'E	1796	Hobigonj	1996
2	Char Kukri-Mukri WS	21° 55.857'N 90° 39.688'E	40	Bhola	1981
3	Sundarban (East) WS	21° 51.395'N 89° 46.951'E	31227	Bagerhat	1996
4	Sundarban (West) WS	21° 50.377'N 89° 7.208'E	71503	Satkhira	1996
5	Sundarban (South) WS	21° 45.549'N 89° 25.459'E	36971	Khulna	1996
6	Pablakhali WS	23°04.057'N 92° 14.689'E	42087	Chittagong Hill Tracts	1983
7	Chunati WS	21° 55.497'N 92° 3.496'E	7764	Chittagong	1986
8	Fashiakhali WS	21° 42.497'N 92° 4.824'E	1302	Cox's Bazar	2007
9	Dudh Pukuria-Dhopachari WS	22° 18.700'N 92° 9.160'E	4717	Chittagong	2010
10	Hazarikhil WS	22° 42.196'N 91° 41.070'E	1178	Chittagong	2010
11	Sangu WS	21° 51.080'N 92° 12.524'E	2332	Bandarban	2010
12	Teknaf WS	20° 54.020'N 92° 16.560'E	11615	Cox's Bazar	2010
13	Tengragiri WS	21° 54.240'N 90° 5.244'E	4049	Barguna	2010
14	Sonar Char WS	-	2026	Bhola	2011
15	Dhangmari WS	22° 26.435'N 89°32.936'E	340	Sundarban	2012
16	Chandpai WS	22° 22.227'N 89°36.951'E	560	Sundarban	2012
17	Dudmukhi WS	22° 06.078'N 89°46.325'E	170	Sundarban	2012
18	Sonarchar WS	-	2026.48	Patuakhali	2011
19	Nazirganj WS (Dolphin)	-	146	Pabna	2013
20	Shilanda-Nagdemra WS (Dolphin)	-	24.17	Pabna	2013
21	Nagarbari-Mohanganj Dolphin Sanctuary	-	408.11	Pabna	2013
22	Swatch of No-Ground Marine Protected Area	-	1738	South Bay of Bengal	2014

Appendix 6 List of Ecologically Critical Areas in Bangladesh

Sl. No.	ECAs	Latitude/Longitude	Area (ha.)	Location	Year of Establishment
1	Sea shore of Cox's Bazar and Teknaf	21° 22.263'N 92° 0.834'E	10465	Cox's Bazar	1999
2	St. Martin's Island	20° 38.013'N 92° 19.491'E	590	Cox's Bazar	1999
3	Sonadia Island	21° 30.009'N 91° 53.209'E	4916	Cox's Bazar	1999
4	Hakaluki Haor	24° 40.423'N 92° 3.901'E	18383	Maulavi Bazar	1999
5	Tanguar Haor	25° 10.199'N 91° 3.449'E	9727	Sunamganj	1999
6	Marjat Baor	23° 18.534'N 89° 5.437'E	200	Jhenaidaha	1999
7	Gulshan-Banani-Baridhara Lake	23° 46.780'N 90° 25.185'E	20	Dhaka city	2001
8	Strip of 10 km. outside the Sundarbans Reserved Forest	22° 4.843'N 89° 25.304'E	76203	Bagerhat, Khulna, Satkhira	1999
9	Rivers around Dhaka city (Buriganga, Turag, Balu)	-		Dhaka	2009

Appendix 7 List of Other Protected Areas in Bangladesh

Sl. No.	Wildlife Sanctuaries	Latitude/Longitude	Area (ha.)	Location	Year of Establishment
1	National Botanical Garden	23° 49.252'N 90° 20.844'E	84	Dhaka	1961
2	Baldha Garden	23° 43.029'N 90° 25.167'E	1	Dhaka	1909
3	Madhabkunda Eco-Park	24° 38.325'N 92° 13.268'E	266	Moulavibazar	2001
4	Sitakunda Botanical Garden and Eco-park	22° 37.517'N 91° 41.426'E	808	Chittagong	1998
5	Dulahazara Safari Parks	21° 40.084'N 92° 4.788'E	600	Cox's Bazar	1999
6	Sitakunda Botanical Garden and Eco-park	22° 37.517'N 91° 41.426'E	808	Chittagong	1998
7	Banshkhali Eco-park	21° 59.497'N 91° 58.931'E	1200	Chittagong	2003
8	Madhutila EP	25° 12.999'N 90° 8.092'E	100	Sherpur	1999
9	Kuakata EP	21° 48.999'N 90° 7.002'E	5661	Patuakhali	2006
10	Borshizora Eco-park	-	325	Moulovibazar	2006
11	Bangabandhu Sheikh Mujib Safari Park	-	1493.93	Gazipur	2013
12	Rajeshpur Eco-park	-	185.09	Comilla	-

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নং-২২.০০.০০০০.০৮২.১৪.০৩.২০১৬-১৫৭ তারিখঃ ২৭/০৬/২০১৬ খ্রিঃ

বিষয়ঃ Submission of Management Plan (Five), Wildlife Conservation Master Plan and Species Conservation Plan and Ecotourism Management Plan (Three).

সূত্রঃ বন অধিদপ্তরের পত্র নং-২২.০১.০০০০.০১১.(প্রঃ).ডব্লিউ-১৬ (পার্ট-২).২০১৬-২৪৬, তারিখঃ ১২/০৪/২০১৬।

উপর্যুক্ত বিষয় ও সূত্রস্থ পত্রের প্রেক্ষিতে জানানো যাচ্ছে যে, বন অধিদপ্তর কর্তৃক বাস্তবায়নাধী "Strengthening Regional Cooperation for Wildlife Protection (SRCWP)" শীর্ষক প্রকল্পের আওতায় প্রণীত ১২টি প্ল্যান (যথাঃ ৫টি Management Plan, ৩টি Ecotourism Management plan, ২টি Action Plan, ১টি Master Plan এবং ১টি Management Strategy) অনুমোদন করা হল এবং প্ল্যানসমূহ বাস্তবায়নের নিমিত্ত পৃথকভাবে ৫টি প্রাথমিক প্রকল্প প্রস্তাব (PDPP) প্রণয়ন করে মন্ত্রণালয়ে প্রেরণের জন্য নির্দেশক্রমে অনুরোধ করা হল।

০২। উল্লেখ্য আলোচ্য **৫টি Management Plan** (যথাঃ1. Nijhum Dwip National Park Management Plan 2. Dudpukuria-Dhopachari Wildlife Sanctuary Management plan 3. Bhawal National Park Management plan 4.Altadighi National Park Management plan 5. Sundarban West Wildlife Sanctuary Management plan) বাস্তবায়নের নিমিত্ত একটি Umbrella প্রকল্প, **৩টি Ecotourism Management plan** (যথাঃ1. Nijhum Dwip National Park Ecotourism Management plan, 2. Bhawal National Park Ecotourism Management plan 3.Altadighi National Park Ecotourism Management plan) বাস্তবায়নের নিমিত্ত পৃথক একটি Umbrella প্রকল্প, **২টি Action Plan** (যথাঃ1. Action Plan for The Management of Herpetofauna in Bangladesh, 2. Action Plan for The Management of Birds in Bangladesh) সমন্বয় করে একটি প্রকল্প এবং **Master Plan** (যথাঃ 1.Bangladesh Wildlife Conservation Master Plan) ও **Management Strategy** (যথাঃ 1. Mammal Management Strategy With Emphasis on Human-Wildlife Conflicts in Bangladesh) এর জন্য পৃথক ২টি প্রকল্প সহ মোট ৫টি প্রকল্প গ্রহণ করা যেতে পারে। প্রস্তাবিত প্রকল্পসমূহ বাস্তবায়নের নিমিত্ত ইআরডির মাধ্যমে উন্নয়ন সহযোগী সংস্থার সহায়তা চাওয়া যেতে পারে এবং বৈদেশিক সাহায্য না পাওয়া গেলে প্রকল্পগুলো জিওবি অর্থায়নে বাস্তবায়ন করা যেতে পারে।

২৭.৬.১৬
(ফারজানা জাহান)
সহকারী প্রধান
ফোনঃ ৯৫৪০২৫৯

প্রধান বন সংরক্ষক
বন অধিদপ্তর, বন ভবন
আগারগাঁও, ঢাকা।

সদয় অবগতির জন্য অনুলিপি ঃ

১। সচিব মহোদয়ের একান্ত সচিব, পরিবেশ ও বন মন্ত্রণালয়, ঢাকা।
২। প্রকল্প পরিচালক, "স্ট্রেংদেনিং রিজিওনাল কো-অপারেশন ফর ওয়াইল্ড লাইফ প্রটেকশন" শীর্ষক প্রকল্প পুরাতন বন ভবন, মহাখালী, ঢাকা।
৩। অতিরিক্ত সচিব (উন্নয়ন) মহোদয়ের ব্যক্তিগত কর্মকর্তা, পরিবেশ ও বন মন্ত্রণালয়।
৪। উপ-প্রধান মহোদয়ের ব্যক্তিগত কর্মকর্তা, পরিবেশ ও বন মন্ত্রণালয়।

The **Strengthening Regional Co-operation for Wildlife Protection (SRCWP)** project, the first World Bank supported regional project in South Asia, aims to build country capacity and incentives for tackling the illegal wildlife trade and other selected regional conservation threats to habitats in border areas. The project was launched in 2011 in Bangladesh and Nepal in the first phase and Bhutan joined in the second phase to bring regional collaboration in combating wildlife crime through strengthened legislative and regulatory frameworks and well-equipped specialized agencies and systems, as well as relevant training and awareness programmes for staff responsible for enforcement of wildlife laws and regulations. The project is also supporting the institutional strengthening of the South Asia Wildlife Enforcement Network (SAWEN) which was established by SAARC countries in 2011 to combat wildlife crime in the South Asia Region.

The Bangladesh Forest Department (BFD) is implementing the project through a partnership with research institutes, universities and environmental NGOs. A total of 36 sub-projects have been supported to improve the management of protected areas and conservation of flagship species through a landscape approach. Some of the sub-projects are addressing human-wildlife conflict through engagement with the local communities and civil society to foster and enduring culture of wildlife stewardship and protection. The regional wildlife project has supported the establishment of a Wildlife Crime Control Unit (WCCU) within the wildlife circle, three wildlife Divisions in the Forest Department, and a Wildlife Centre to undertake training, research, education and awareness on the issues of wildlife conservation and protection.

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