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BANGLADESH

BANGLADESH ENVIRONMENT SECTOR ASSESSMENT AND STRATEGIC ANALYSIS:

**TROPICAL FORESTRY AND BIODIVERSITY
ANALYSIS UPDATE (118/119 UPDATE)**

**PROSPERITY, LIVELIHOODS AND CONSERVING
ECOSYSTEMS (PLACE) IQC TASK ORDER #8**

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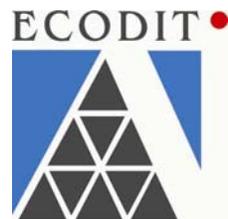
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PREPARED BY

BANGLADESH ENVIRONMENT SECTOR ASSESSMENT AND STRATEGIC ANALYSIS TEAM

ASSEMBLED BY ECODIT LLC



ECODIT LLC

1800 N. Kent Street, Suite 1260
Arlington, VA 22209
USA
Tel: +1 703 841 1883
Fax: +1 703 841 1885
Web: www.ecodit.com

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ACRONYMS

Although an effort was made to reduce the number of acronyms used in this text, in some cases this was necessary. Whenever the acronym or abbreviation appears the first time it is defined in the text. The following list is provided for ease of the readers of this document.

AF	Arannayk Foundation
CAS	Country Assistance Strategy
CBD	UN Convention on Biological Diversity
CCF	Chief Conservator of Forests
CF	Conservator of Forests
CHT	Chittagong Hill Tracts
CIDA	Canadian International Development Agency
CMS	Conservation of Migratory Species
DfID	Department Multi-Donor Trust Fund for International Development of the UK
DoE	Department of Environment, of the MoEF
DoF	Department of Fisheries, of the MoFL
ECA	Ecologically Critical Area
FD	Forest Department
FAA	Foreign Assistance Act
GDP	Gross Domestic Product
GEF	Global Environment Facility
GoB	Government of Bangladesh
IPAC	Integrated Protected Area Co-Management
IUCN	International Union for the Conservation of Nature
MACH	Management of Aquatic Ecosystems through Community Management
MoEF	Ministry of Environment and Forests
MoFL	Ministry of Fisheries and Livestock
NBSAP	National Biodiversity Strategy and Action Plan

NCS	National Conservation Strategy
NEMAP	National Environmental Management Action Plan
NGO	Non-Government Organization
NRM	Natural Resources Management
PRSP	Poverty Reduction Strategy Paper
SEMP	Sustainable Environment Management Program
TFCA	Tropical Forest Conservation Act
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USG	United States Government
WNCC	Wildlife and Nature Conservation Circle

I.0 INTRODUCTION

I.1 Purpose of the Assessment

The Foreign Assistance Act (FAA), which authorizes US bilateral foreign aid programs, requires that tropical forestry and biodiversity assessments be conducted in conjunction with the development of new foreign assistance strategies and programs. The purposes of this legal requirement are 1) to assure that US foreign aid does not support activities that harm the tropical forests and biodiversity of host countries; and 2) to inform USAID strategic planning and find ways to support host countries to sustainably use and conserve their tropical forests and biodiversity.

This report fulfills the planning requirements as set out by two provisions of the FAA (**Annex D**).

Section 118(e) "Country Analysis Requirements.--Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of-- (1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests, and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified."

Section 119(d) "Country Analysis Requirements.--Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of-- (1) the actions necessary in that country to conserve **biological diversity**, and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified."

The intent of the US Congress in passing these amendments was not to support the conservation of biological diversity and tropical forests for their own sake, but rather to support their conservation because of the belief that they are the foundation for the long-term, sustainable social and economic well-being of any country.

The most recent FAA 118/119 Analysis for Bangladesh was conducted in August 2005. Drawing on the other analyses and aspects of the of the Bangladesh Environment Sector Assessment and Strategic Analysis conducted at the end of 2009, this report serves as an update of the most recent FAA 118/119 Analysis. This updated analysis is meant to inform both the USAID Mission Strategy (for all sectors) and the broader United States Government (USG) Country Strategic Plan Process and highlight issues and opportunities for broader USG interventions in all sectors.

I.2 Methodology

This tropical forestry and biodiversity analysis update was conducted from October 30 to December 18, 2009, as part of a larger assessment effort by a team consisting of a Team Leader, Environment and Global Climate Change Specialist, International Biodiversity Specialist, Bangladesh Environmental Policy and Institutions Expert, and two Local Biodiversity Experts, one with a specialty in flora and the other in fauna. See Biographical Sketches of Team Members in **Annex E**. The tropical forestry and biodiversity analysis update contained in this report is based on the following approach:

- Initial consultation with USAID Technical Representative to agree on expectations, methodology and timing. USAID's expectations specified an update of the previous Biodiversity Analysis (August 2005);
- Consultation and interviews with USAID Bangladesh staff and a broad cross-section of donor, NGO and government representatives;

- Field visits to representative conservation sites and consultation with local government staff, NGOs and resource users at these sites;
- A review of relevant documents including studies, media reports, published papers, and USAID documents;
- Consultation and assessment of lessons learned and best practices regarding FAA 118 and 119 analyses (ARD, Inc. 2005);
- Updating of the FAA118/119 analysis based on the literature review and in-country interviews and consultations; and
- Review and comments on initial draft by the USAID COTR.

This Tropical Forestry and Biodiversity Analysis Update for Bangladesh was conducted in the broader context of a larger effort to complete the “Bangladesh Environment Sector Assessment and Strategic Analysis.” USAID/Bangladesh’s “Bangladesh Environment Sector Assessment and Strategic Analysis” has the following objectives:

- Identify the overall needs of the Bangladesh environment sector.
- Assess USAID’s comparative advantage.
- Propose programmatic priorities given various funding levels to match with the Mission’s overarching comparative advantage and goal of promoting responsible pro-poor and equitable economic growth.
- Assist the Arannayk Foundation to develop a program strategy.

A series of reports was produced to fulfill these objectives. The Tropical Forestry and Biodiversity Analysis Update (“Update”) draws heavily from research conducted to produce this series of reports as well as the previous Tropical Forestry and Biodiversity Analysis (2005). The Update supplements the 2005 Tropical Forestry and Biodiversity Analysis with the most relevant current events, changes in the setting and current trends of Bangladesh’s tropical forests and biodiversity, new governmental policies, plans and activities and civil society initiatives, and the current circumstances regarding issues and opportunities for conservation. The Update also presents fresh material on USAID’s current initiatives and recommendations for future actions.

1.3 Report Structure

Section 2 presents background on Bangladesh’s unique physical and socioeconomic setting. An overview of the forest and biodiversity resources in Bangladesh is presented in **Section 3**, followed by the evolving trends and current status of tropical forests and biodiversity in the country in **Section 4**. **Section 5** then presents the relevant aspects of the political and legal framework in country and current programs and projects under the biodiversity umbrella. Civil society initiatives concerning biodiversity, including a detailed sketch of the Arannayk Foundation and its work, are described in **Section 6**. **Section 7** describes threats and other issues related to governance and policy implementation and enforcement. **Section 8** details USAID’s past and current initiatives in tropical forests and biodiversity conservation and management, and lastly, recommendations for future Agency actions are presented in **Section 9**.

2.0 BACKGROUND ON BANGLADESH

2.1 Biophysical Setting: Location and primary biophysical features, including current human population and trends

Bangladesh is situated at the downstream of the watershed of a sprawling, inter-linked basin of three great river systems – the Ganges, Meghna and Brahmaputra. Its extensive alluvial soils, abundant water resources and biological diversity all contribute to a rich and varied natural economy. Yet, Bangladesh has one of the world's poorest populations. The situation presents a paradox of poverty in the midst of plenty.

The total area of Bangladesh is 147,570 km², an area roughly the size of the state of Wisconsin, with a deltaic geomorphology similar to the state of Louisiana. Bangladesh has the highest population density (more than 1000 persons per km²) of any non-city state in the world. The estimated population in 2009 is more than 150 million (up from 90 million in 1981) and may not stabilize before reaching 250 million. Almost half of the population lives below the poverty line. Although the current population growth rate is declining towards 1 percent, a drop from three percent only 25 years ago, this is still a major concern because of the density and size of the existing population, and increasing pressures on natural resources and the environment.

2.2 Poverty-Biodiversity-Livelihood Linkages: Current extent of poverty and linkages with natural resource status and use

Bangladesh's large and growing human population, its heavily exploited natural resource base, and a high and persistent level of poverty are integrally related. Poverty in Bangladesh is mainly rural, and is most prevalent within natural resource dependent and landless communities. Rural poverty is estimated as 53% of the population, compared to 37% in urban areas. Some 77% of rural households are at break even or deficit status. The very poor, comprised of those who are always in deficit, make up 18% of the population. Inequality is continuing to grow, especially between the ultra poor and the rest of society. At present, economic growth benefits primarily the upper levels of income earners and has limited impact on poverty.

Natural capital, represented by the nation's renewable natural resources (notably including its biodiversity resources), is considered central both to poverty alleviation and to future economic growth. Given its relatively small size and large human population, the status of natural resources in Bangladesh is (and will continue to be) very much a function of management interventions that minimize degradation while maximizing productivity, of fair and equitable access rights (which provide an incentive for responsible use and stewardship) and access to markets.

The contribution of biodiversity to livelihoods and to Bangladesh's economy is immense, straddling the fisheries, agricultural and forestry sectors. The people of Bangladesh depend on biodiversity for their day-to-day sustenance as well as overall livelihood security. More than 80% of the rural population is directly or indirectly dependent on open access natural resources. Over 60 million people are directly dependent on aquatic resources on a daily basis. An estimated 1.3 million people are full-time fishermen and another 11 million fish on a part-time basis. Fifty to sixty-five per cent of the country's protein requirement is met by the consumption of fish. The fisheries sector contributes about 5% of the GDP of Bangladesh, earning 11% or more of total export revenue, and employing about 20% of the country's total work force (Parveen and Faisal 2001; GoB 2008). Agriculture and forestry activities together provide approximately two-thirds of the country's employment, contributing about 20% of GDP. The Sundarbans alone provide livelihoods and employment to an estimated 112,000 people (Khan, 2001). About 335,000 people are now involved in social forestry activities in rural areas. These people plant trees in the Government land and guard them until maturity. Once the trees are harvested the people and the Government share the profit.

Above and beyond the statistics on the natural resource sector's contribution to the national economy lies another striking fact that is related to the existing national focus on land use. Wetlands have been historically considered as wastelands, and conversion of those lands for agricultural and other uses has been a common practice. This is directly related to the need to increase agricultural production to feed the growing populace. Many coastal mangroves have been converted for shrimp farming. Side by side, infrastructure and other development activities have contributed to the destruction of productive ecosystems, without giving any consideration to the economic and ecological value of these resources. Vast areas of pristine evergreen forests had submerged and destroyed, and the ethnic communities of the area had to be shifted, due to the dam and hydro-electricity plant in Kaptai, Rangamati. The cost of inaction regarding ecosystem degradation is extremely high; conversely, the benefits of action may be extremely rewarding. Deforestation has been estimated to cost approximately 1.0 percent of GDP (1991-92), and soil degradation approximately 7.7 percent (BBS 1999; ADB 2004). These estimates do not fully consider the economic value of all products and ecosystem services, and hence are not complete. The values of wetland economic outputs are greatest for a healthy ecosystem managed sustainably.

Box 1. The Future Scenario

Bangladesh has one of the highest population densities of any country in the world. By 2050, the population will grow from approximately 150 million people in 2008 to more than 200 million, with almost half of the people living in cities and towns. Some 56 million people still live in poverty (27 million of them in extreme poverty) 12; 62 percent of households lack access to sanitation, at most 68 percent of children currently complete primary school¹³; and the old, disabled and vulnerable people lack adequate social protection services. Since Bangladesh achieved Independence in 1971, GDP has more than tripled in real terms, food production has increased three-fold, the population growth rate has declined from around 2.9 percent per annum in 1974 to 1.4 percent in 2006 and the country is now largely food secure. From 2004 - 2008 the economy has grown at over 6 percent. Between 1991 and 2005, the percentage of people living in poverty declined from 59 percent to 40 percent and the country's Human Development Index improved from 0.347 in 1975 to 0.547 in 2005. Although agriculture now accounts for only 20 percent of GDP, over 60 percent of people depend on agriculture directly or indirectly for their livelihoods. The higher temperatures and changing rainfall patterns, coupled with increased flooding, rising salinity in the coastal belt and droughts are likely to reduce crop yields and crop production. IPCC estimates that, by 2050, rice production in Bangladesh could decline by 8 percent and wheat by 32 percent (against a base year of 1990). Impacts of climate changes are likely to seriously affect agriculture (crops, livestock and fisheries).

Source: Ministry of Environment and Forests, 2009. Bangladesh Climate Change Strategy and Action Plan 2009

3.0 TROPICAL FORESTS AND BIODIVERSITY SETTING

Bangladesh is located in the Indo-Chinese subregion of the Oriental Biogeographic Realm, in a transition zone between the Indo-Gangetic plains and the eastern Himalayas. About a thousand years ago the Tirumala inscription of Rajendra Cola (1012-1044 AD) described Vangaladesa as a land “where the rainwater never stopped ... on the shore of the expansive ocean producing pearls and the Ganga whose water bearing fragrant flowers dashed against the bathing places” (Chowdhury 1967; Khan 1993). Due to its unique biophysical setting, the juxtaposition of a large deltoid freshwater outlet and a large sea fan, and despite its relatively small size, Bangladesh is endowed with a surprisingly rich heritage of plant and animal species, and supports a diverse array of ecosystems. It is bounded in the north and the east by the eastern Himalayan and the western Myanmar hills, which form part of Indo-Burma Biodiversity Hotspot (WWF and IUCN, 1994-1995).

3.1 Ecosystem Diversity

A broad range of ecosystem types are found in Bangladesh, including tropical rainforests, mangrove forests, deciduous forests, floodplains and *char* lands (newly accreted riverine or coastal islands), freshwater and coastal wetlands, and the littoral, sub-littoral and benthic communities of the Bay of Bengal.

Nishat *et al.* (2002) divided Bangladesh into 12 broad bio-ecological zones, shown in Figure 1. The ecosystems of Bangladesh can be classified as four broad types; coastal and marine, inland freshwater, terrestrial forest and man-made (Daniels, 2003). As in many parts of the world, very few ecosystems in Bangladesh are really free of human interference.

3.1.1 COASTAL/MARINE ECOSYSTEMS

Bangladesh is known worldwide for its extensive coastal and marine ecosystems. The Sundarbans is of global importance as the largest mangrove forest in the world, and Teknaf-Cox's Bazar is reportedly the world's longest beach. The Bangladesh Sundarbans is spread over an area of 5,770 km² of which 1,700 km² are water bodies. It is one of the most diverse mangrove ecosystems in the world. Plant diversity was estimated at 334 species in 1903 (Prain, 1903), but currently only 123 species remain. Sundri (*Heritiera fomes*) and Gewa (*Excoecaria agallocha*) are the dominant species. The Sundarbans is currently the last abode of important elements of South Asia's threatened mega fauna, including the Bengal tiger (*Panthera tigris*), Gangetic dolphin (*Platanista gangetica*), Irrawaddy dolphin (*Orcaella brevirostris*), and saltwater crocodile (*Crocodylus porosus*). In total, 425 species of vertebrates (excluding fish) have been reported from this ecosystem. Important globally threatened species include the masked finfoot (*Heliopais personata*) and lesser adjutant stork (*Leptoptilos javanicus*). The 176 species of fish that are known from the mangroves of the Sundarbans make this ecosystem one of the 'hotspots' of Bangladesh's fish diversity.

A large number of offshore islands are scattered in the Bay of Bengal. Significantly, however, Narikel Jinjira (St. Martin's Island) is the only coral-bearing island in Bangladesh. Estuarine floodplains, sand dunes and beaches characterize Bangladesh's coastal areas. The Meghna floodplains of Noakhali and Lakshmipur districts are seasonally inundated by saltwater, attracting a wide variety of waterbirds, including migrants. Significant numbers of globally threatened species, including the Indian skimmer (*Rynchops albicollis*) and spoon-billed sandpiper (*Eurynorhynchus pygmeus*), visit the coastal chars and islands around Hatiya and Cox's Bazar. The sea beaches also are used by nesting sea turtles. The Bay of Bengal, the marine area of Bangladesh, is classified both as a semi-enclosed tropical basin and as a large marine ecosystem. Along with the 710 km long coastline, an area of more than 166,000 km² of the Bay of Bengal falls under the economic jurisdiction of Bangladesh (the remainder being under India and Myanmar). Bangladesh's shelf area covers roughly 66,000 km², of which shallow coastal waters less than 10 m in depth cover about 24,000 km².

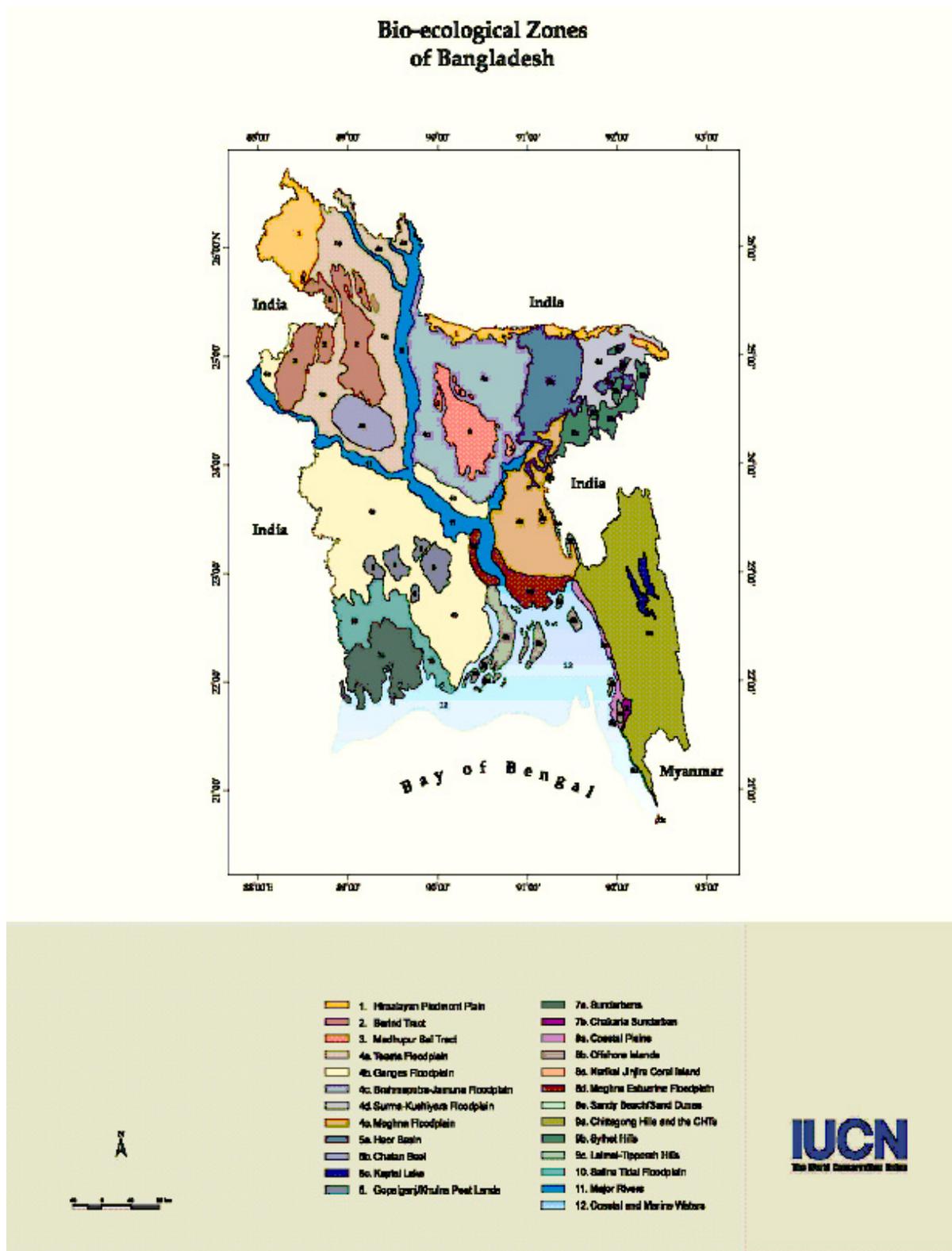


Figure 1. Bio-Ecological Zones of Bangladesh

The species composition of Bangladesh's marine ecosystem remains to be thoroughly investigated. Nineteen species of seaweeds are found along the coasts, *Hypnea* spp. being the most abundant. A total of 475 fish species have been recorded from Bangladesh's marine waters, those currently being exploited consisting mainly of demersal species, shallow water estuarine species and some mid-water species. These include about 100 species of commercial value (of which 15 species are highly commercial), comprising approximately 75% of the total demersal catch. Five species of marine turtles occur in Bangladesh's marine waters, the olive ridley (*Lepidochelys olivacea*) being the most widely distributed, from the Sundarbans to St. Martin's Island. Green turtles (*Chelonia mydas*) also occur but nest in only a few places. Hawksbills (*Eretmochelys imbricate*) formerly nested on St. Martin's Island, but nesting was last reported in 1998. A variety of sharks and rays also occur. Thirty-six species of shrimps have been recorded from the marine waters of Bangladesh, among which the brown shrimp *Metapenaeus monoceros* contributes about 56% of the total shrimp catch. Around one million people in Bangladesh are directly dependent on marine resources for their livelihoods.

3.1.2 INLAND FRESHWATER OR "OPEN WATER" ECOSYSTEMS

The majority of the natural ecosystems of Bangladesh are wetlands and their distribution is detailed in Table 1. Bangladesh's floodplains represent one of the world's most important wetlands, supporting hundreds of species of plants, fish and wildlife, and providing critically important wintering grounds for migratory birds. The freshwater wetlands of Bangladesh have been considered an inexhaustible source of its wealth, but are now overexploited and undervalued. Bangladesh is endowed with an enormous network of aquatic ecosystems owing to its location in the delta of three major rivers. Medieval travelers used to describe Bangladesh as a "hell full of bounties" (Ali 1985; Khan 1993), with apparent reference to the difficulties of travel across its deltaic/wetland areas. The four million hectares of inland waters support an exceptional diversity of freshwater fish (including an estimated 260 species of fin fish), as well as shrimps, turtles, snails, and other wetland resources. The Bangladesh fishery is the third largest freshwater fishery in the world, and the people of Bangladesh have an historical dependency on the floodplain system for their livelihood security.

Freshwater wetlands in Bangladesh are commonly classified as *rivers*, *khals*, *haors*, *baors*, *beels* and *jbeels*, occurring in four landscape units – floodplains, freshwater marshes, lakes and swamp forests. Floodplains undergo periodic flooding as river channels overflow with floodwater, and most are at least seasonally cultivated. Freshwater marshes comprise more or less permanent shallow water dominated by aquatic vegetation. Lakes (natural or man-made) are deeper water bodies. Swamp forests develop in floodplains and marshes and around lake margins where specialist trees are adapted to seasonal inundation, particularly in the north-east, but they are now much reduced. Due to extensive use and modification of wetlands, surface water is the most severely impacted natural resource in the country.

The *haors* in the north-eastern part of Bangladesh are probably the most complex of seasonally inundated wetlands, and the most significant internationally for biodiversity conservation. They vary in size and complexity from a vast basin of water during the monsoon, to a network of smaller wetlands, including *beels* and *khals*, in the dry season. The *haor* basin of Sunamganj, Netrakona, Habiganj and Kishorganj districts, with outliers in Sylhet and Moulvi Bazar Districts, is known for its rich biodiversity. These seasonally inundated wetlands are amongst the most productive ecosystems in the country. Tanguar Haor has been declared a Ramsar site and an Ecologically Critical Area (MoEF, 1991, 2001) in recognition of its high ecological value and relatively unmodified condition. Tanguar Haor is an important "mother fisheries area", where many species breed during the rainy season, and in addition supports up to 250,000 wintering water birds. The largest *haor* in the country is Hakaluki Haor, which extends over 40,000 ha during the rainy season, and consists of more than 80 inter-connected *beels*. The rich fish resources of Hakaluki Haor support one of the largest inland fisheries in the country, and it too is an Ecologically Critical Area (ECA).

Table I. Distribution of Wetlands in Bangladesh

Type	Area in Hectares
Rivers and estuaries	854,000
Mangrove swamps	178,000
Shallow lakes and marshes (<i>beels</i> and <i>baors</i>)	120,000
Large water storage reservoirs	90,000
Small tanks and fish ponds	305,000
Shrimp ponds	218,000
Seasonally-flooded floodplains	5,770,000
Total	7,535,000

Main source: Department of Fisheries 2008. Fisheries Statistical Yearbook of Bangladesh 2007-2008. Estimates of floodplain extent vary widely from 2.8 million hectares (DoF) to 4 million hectares (other authors) to the nearly 5.8 million hectares cited in previous FAA 118/119 reporting.

Floodplains are the main location for agriculture in Bangladesh, and are highly variable with regard to the nature and depth of flooding. The floodplains situated close to the coasts are subject to influence by saline waters.

3.1.3 TERRESTRIAL ECOSYSTEMS

Only 20% of the country's land area can be considered as terrestrial, although large parts of the alluvial and coastal plains have been reclaimed for agriculture and human habitation.

Hills: Hills in Bangladesh are largely confined to the north, northeast and south-east, covering ~12% of the country's land area. The Chittagong Hill Tracts (CHT) region is the major hill range, covering about 10% of total land area. It comprises unique and diverse landscapes ranging from hills to waterbodies, and is rich in flora and fauna. The region is of botanical interest, supporting an admixture of Indo-Chinese floristic elements. It is noteworthy that despite comprising only about 10% of the country's land area, one-third of the flowering plant species known from Bangladesh occur in the CHT. Although there are records of a large number of mammals in the region, at present the only large mammals remaining are the Asian elephant (*Elephas maximus*), sambar (*Cervus unicolor*), Asiatic black bear (*Ursus thibetanus*) and the rare hog deer (*Axis porcinus*).

The wide variety of plants and animals found in the hill tract forests has long supported the livelihoods of the hill people, providing materials for dwellings, food, clothing, health care, festivals and other activities. The CHT are of particular anthropological interest, being inhabited by at least 12 ethnic communities, namely the Chakma, Marma, Tripura, Tanchangya, Khayang, Chak, Murong, Pankhu, Lushai, Bawm, Khumi and the Uchai, each possessing distinct cultures and lifestyles.

The hill ecosystem of Sylhet, representing 9% of the country's hill area, is generally of lower elevation than the CHT. The Sylhet hill forests are classified as tropical evergreen and semi-evergreen.

Undulating Terrain: The northern undulating terrain ecosystem is part of the Himalayan Piedmont Plain Bio-ecological Zone (Nishat *et al.* 2002). The largest area is in the northwest, in the Tentulia-Panchgarh regions, spreading along a narrow corridor further eastwards through Jamalpur, Netrakona, Sherpur and Sunamganj along the Bangladesh-India border to northern Sylhet. Altogether the Piedmont Plains cover an area of about 6,000 km². Being an ecotone between the hills and the lowland swamps, this ecosystem is rich in biodiversity.

Pleistocene Terraces: The Barind Tract is situated in the upper half of northwestern Bangladesh, covering an area of 7,728 km². The original vegetation cover of the Barind Tract was dominated by *sal* (*Shorea robusta*) and semi-evergreen species. Presently, the tract is dominated by scrub cover resembling that in the semi-arid tracts. Over 260 species of birds and 40 species of mammals are known from this ecosystem. *Sal* forests cover approximately 240 km². Nineteen species of mammals, more than 170 species of birds and 28 species of reptiles are known from this area.

3.1.4 MAN-MADE ECOSYSTEMS

Aquatic and terrestrial ecosystems in Bangladesh have been heavily modified by human activity. Wherever the impact has been long-standing and sustained, the remaining biodiversity is much reduced from its natural state. Modified wetland ecosystems vary from small aquaculture ponds to large lakes such as the Kaptai Reservoir. Modified terrestrial ecosystems vary from agro-ecosystems in the hills and plains, to rural homesteads and urban areas. Man-made ecosystems support numerous domesticated plants and animals including plant cultivars, crops (cereals, pulses, vegetables, fruits, *etc.*) ornamental plants, livestock and fish.

3.2 Species Diversity

3.2.1 WILD PLANT DIVERSITY

The number of species of plants in Bangladesh is still not completely known (Table 2). It is thought that many species are disappearing before they can be scientifically described and classified. Khan *et al.* (2001) listed 106 species of plants under the categories of threatened (Critically Endangered, Endangered, and Vulnerable), Lower Risk, Data Deficient, and Not Evaluated, including two or three species of ferns, four species of gymnosperms and approximately 100 species of angiosperms (Appendix I). Of these, the palm *Corypha taliera* is considered as Critically Endangered, the last surviving individuals of the species in the world being limited to Bangladesh.

Table 2. Number of Wild Plant Species in Bangladesh

Categories	Recorded	Estimated
Algae	3,600	6,000
Bryophytes	290	400
Pteridophytes	200	250
Gymnosperms	5	5
Angiosperms	3,000	5,000

Source: Hassan (2003)

3.2.2 WILD ANIMAL DIVERSITY

Information on animal diversity in Bangladesh remains incomplete, the vertebrates probably being the best known group. The high diversity of fishes and birds relative to the size of the country is notable (Khan, 2008). Tentative numbers of species are provided in Table 3.

Table 3. Estimated Number of Animal Species in Bangladesh

Major Taxonomic Group		Tentative Number of Species
Monera (eubacteria etc.)		166
Protista (protozoa, viruses, etc.)		341
Animalia: invertebrates	Poriferans	7
	Cnidarians	68
	Platyhelminths	23
	Nematodes	105
	Annelids	62
	Arthropods	1547
	Molluscs	347
	Echinoderms	6
	Animalia: vertebrates	Fishes
Amphibians		34
Reptiles		154
Birds		650
Mammals		120

Source: Rashid (2003, 2004)

A number of species in Bangladesh are of conservation concern (Critically Endangered, Endangered, or Vulnerable) but information remains incomplete (Annex C).

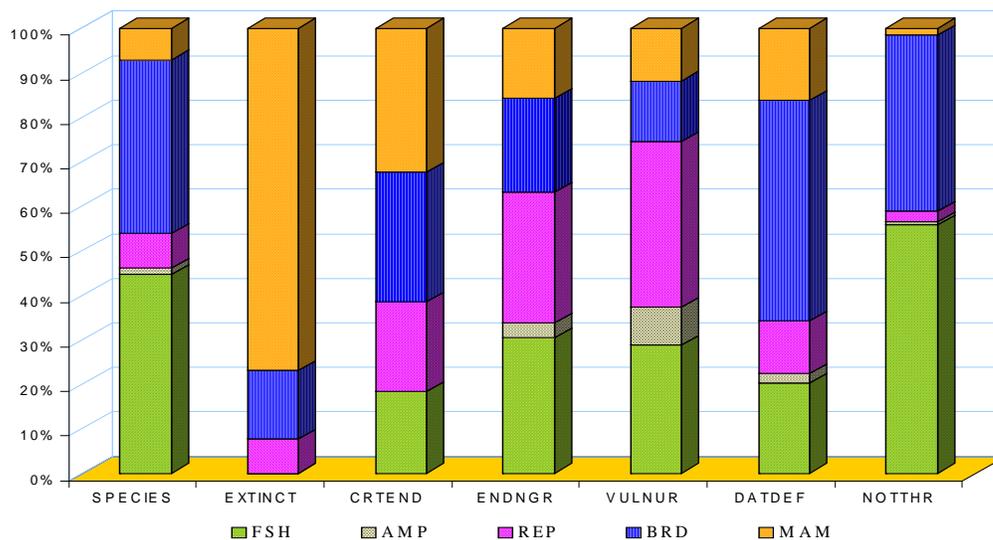


Figure 2. Status of the various groups of vertebrates determined based on the numbers of threatened species and modified IUCN categories (IUCN-Bangladesh Red Data Book, 2000). (MAM-Mammal, BRD-Bird, REP-Reptile, AMP-Amphibia, FSH-Fish, CRTEND-Critically Endangered, ENDNGR-Endangered, VULNER-Vulnerable, DATDEF-data Deficient, NOTTHR-Not Threatened).

3.2.3 INVASIVE ALIEN SPECIES

Decision VI/23 of the Sixth Conference of the Parties (COP6) of the Convention on Biological Diversity (CBD) defines “invasive alien species” as non-native species whose introduction and/or spread threaten biological diversity. Invasive alien species compete and suppress the survival of native species, rendering habitats vulnerable to fire and deterioration.

Plants: Invasive alien plant species known from Bangladesh are listed by Hossain and Pasha (2001), Hassan (2003), and Hossain (2004). The most important of these are –

Eichhornia crassipes (Kachuri pana)
Eupatorium odoratum (Ayapan)
Mikania cordata (Assam lota)
Croton bonplandianum (Bon khira)
Lantana camara (Nak phul)
Leucaena leucocephala (Teli kadam)
Acanthospermum hispidum (Katahara)
Cassia occidentalis (Kasundi)
Ageratum conyzoides (Goat weed, ghag)
Alternanthera flocoidea (Hechi)
Atylosia scarabaeoides, *Commelina obliqua* (Jotakansira)
Convolvulus arvensis, *Evolvulus nummularius* (Bhuiokra)
Hyptis suaveolens (Bon topma)
Ipomoea fistulosa (Dolkalmi)
Ludwigia adscendens (Keshordham)
Mimosa pudica (Lajjaboti)

Eichhornia crassipes (Kachuri pana) is a widespread weed of freshwater ecosystems. *Eupatorium odoratum* (Ayapan) and *Mikania cordata* (Assam lota) are invaders of terrestrial ecosystems that overtop the canopy of shrubs and young tree saplings. *Croton bonplandianum* (Bon khira) and *Lantana camara* (Nak phul) grow along the edges of forest and waste lands and invade local vegetation communities.

Animals: Little information is available on invasive alien animal species in Bangladesh (Rashid 2004). The introduction of alien animal species, particularly fish, began in the early 1950s, primarily to increase food production. To date, at least 32 fish species have been introduced, but their impact on indigenous species has not been thoroughly assessed. Tilapia, consisting of two species, *Oreochromis mosambicus* and *O. niloticus*, are of greatest concern because they have invaded all available habitats, including estuaries (Rashid, 2004).

3.3 Genetic Diversity

The natural ecosystems and diverse agro-ecosystems of Bangladesh are rich in plant and animal genetic resources. Local communities have selected and conserved genetic variations of plants and animals in the various agro-ecological zones for centuries.

Recently, there have been organized efforts aimed at preserving genetic diversity by both governmental and non-governmental agencies, which have built up large germplasm collections. The Bangladesh Agricultural Research Institute and Bangladesh Jute Research Institute are preserving germplasm of crop, rice and jute varieties. The Bangladesh Agricultural University is conserving germplasm of traditional and non-traditional fruits, while the Bangladesh Forest Research Institute is maintaining germplasm of rattans, bamboos, timber trees and medicinal herbs.

Plants: Domesticated plants in Bangladesh range from rice and millets to tubers such as *Dioscorea* (yam), *Colocasia* (taro), *Ipomoea batatas* (sweet potato), legumes, oil seeds, vegetables, fruits, spices and fiber (cotton and jute) (Haque 2003). Six thousand varieties of rice (*Oryza sativa*) are known to have existed in the country (Khan 1997, Haque 2003, Hassan 2003, Yusuf 2003, Hossain 2004).

Animals: Domesticated animal biodiversity in Bangladesh is largely limited to livestock (primarily cattle, goats, sheep and buffalo) and poultry (primarily chickens and ducks), to species raised in aquaculture operations (primarily fish), and to a very limited extent to domestic pets (dogs, cats, ornamental fish) (Kamaruddin 2003).

4.0 CURRENT STATUS AND TRENDS OF TROPICAL FORESTS AND BIODIVERSITY

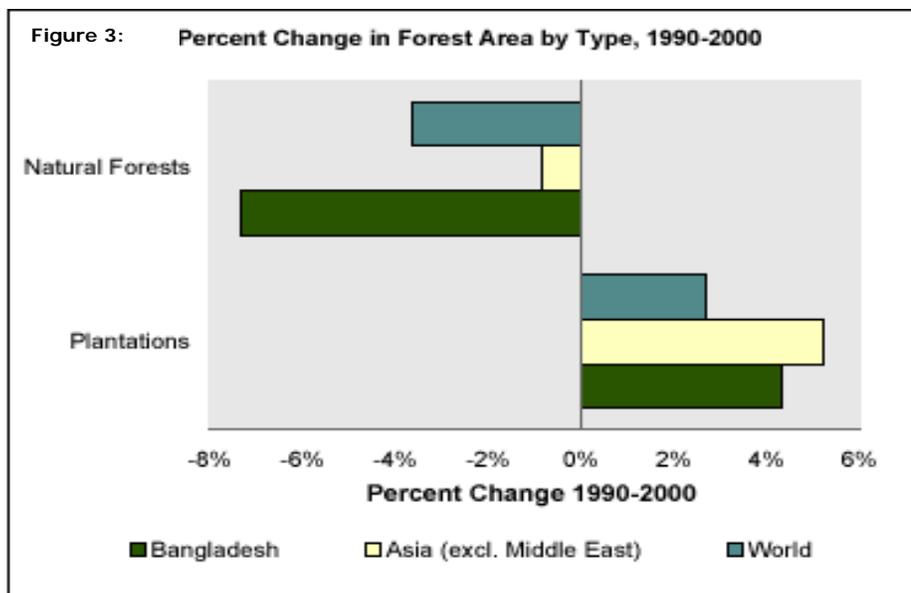
A total of 106 of the estimated 6,000 vascular plant species in Bangladesh have been listed as threatened, and under Lower Risk and Data Deficient categories (Khan *et al.* 2001). Many others, especially medicinal plant species, are under pressure mainly due to loss of habitat and indiscriminate exploitation. About 220 species of vertebrates, including fish, amphibians, reptiles, birds and mammals, are facing some degree of threat. Animal species that are dependent on aquatic ecosystems are most vulnerable. By contrast, the most threatened plant species are those found in forests, where endemism is also highest.

Biodiversity plays an important and irreplaceable role in the economy of Bangladesh. However, due to unregulated or poorly planned development, gaps in policy and legislation, and conflicting institutional mandates, significant portions of the major ecosystems have been lost or degraded in the recent past. At least 14 species of wildlife have been lost during the last 100 years, viz. striped hyena (*Hyaena hyaena*), gray wolf (*Canis lupus*), swamp deer (*Cervus duvaucelii*), blackbuck (*Antelope cervicapra*), nilgai (*Boselaphus tragocamelus*), gaur (*Bos gaurus*), banteng (*Bos javanicus*), wild water buffalo (*Bubalus arnee*), Sumatran rhinoceros (*Dicerorhinus sumatrensis*), Javan rhinoceros (*Rhinoceros sondaicus*), Indian rhinoceros (*Rhinoceros unicornis*), common peafowl (*Pavo cristatus*), pink-headed duck (*Rhodonessa caryophyllacea*) and marsh crocodile (*Crocodylus palustris*) (Khan, 2008).

Forests represent one of the major renewable resources in Bangladesh, but these forest resources are also among the most vulnerable. There are three main types of forests in three zones: (1) tropical evergreen or semi-evergreen hill forests in Greater Chittagong, Chittagong Hill Tracts, and Sylhet areas; (2) deciduous forests in central and north-western Bangladesh; and (3) tidal mangrove forests, including the Sundarbans, in south-western Bangladesh and the southern coastal belt. Hill forests account for 47 per cent of the forest area and supply around 40% of the commercial forest production. All public forests in Bangladesh are under management of the Forest Department, and only a few small patches of forest lie outside its control.

Reliable, up-to-date statistics on the quantity and quality of tropical forest cover in Bangladesh are lacking, and available figures often are contradictory. Recent order of magnitude data suggests that there are about 2.53 million hectares (covering 17.2% of the total land surface) of forest remaining in the country. This includes state forest land of 2.2 million hectares, comprising 1.53 million hectares of natural forests and plantations (there are extensive plantation areas on reserved forest land, particularly in the hilly regions of the country) under the jurisdiction of the Forest Department, and about 0.73 million hectares of unclassified state forest administered by the Ministry of Land (Hossain *et al.* 2008). The remainder of the forest cover is in private hands, notably including the very successful homestead plantations common across the floodplain areas of the country, and small tracts of natural forest and plantations on estate lands. With the exception of some of the most inaccessible areas (*e.g.*, in the Sundarbans Reserve Forest and in the Chittagong Hill Tracts), all of the remaining natural forests are under constant pressure, and have been significantly degraded and fragmented, and their value for biodiversity conservation compromised.

The dire situation with regard to forest cover is illustrated in Figure 3. The rate of forest loss in Bangladesh exceeded 7% in the 1990s, more than both the average for Asia and the global average. The compensatory rate of plantation establishment is insignificant (Figure 3), and even the baseline for plantation area is tiny. In any case, plantation establishment in Bangladesh is not based on consideration of biodiversity issues, and most plantations established since the 1980s have very limited conservation value.



Source:<http://earthtrends.wri.org>

Figure 3: Percent change in forest area by type

The establishment of protected areas as a tool to combat deforestation has not yet had a detectable effect. Further, the 21 localities that have been declared as protected areas, which range in size from only 0.5 to 420 km², are not fully representative of Bangladesh’s diverse ecosystems or important biodiversity elements. For example, the 300-odd wild elephant population, which is largely confined to the hills of the Chittagong and Chittagong Hill Tracts region, is not effectively protected, nor are there measures in place for long-term habitat management. Neither has consideration been given to the full range of area-based conservation options (*e.g.*, the Biosphere Reserve concept, which incorporates traditional land uses on a landscape scale, and hence would seem to be especially relevant to Bangladesh, has not yet been incorporated in the protected areas system) although there is scope for introducing protected area categories that permit certain types and levels of human use. Nor has management planning and implementation yet had a major impact, although the Nishorgo Support Project and currently the Integrated Protected Area Co-Management (IPAC) Project have made significant progress in that direction. Other positive developments include the (pending) addition of Inani National Park which will increase protected area coverage to 1.7% of Bangladesh’s surface area, up from 0.5% in 2005, and representing 16% of the area managed by the Forest Department. Thirteen protected areas are currently under community-based co-management, a model that is considered to be particularly well-suited to the current environmental and socio-economic situation in Bangladesh.

Even though the Ganges, Meghna and Brahmaputra rivers carry a huge quantity of water, availability of fresh water will be the greatest challenge in the new millennium. The fragility of the Himalayan ecosystem and lack of a cooperative planning, coupled with deforestation in the upper riparian and anthropogenic interference in surface water flow in all the basin countries, have led to serious ecosystem degradation as well as deterioration of water quality. Surface water availability in the region in general, and in Bangladesh in particular, fluctuates between excess and scarcity in the wet and dry seasons, respectively. As a result of poor surface water distribution, and declining availability of surface water during the dry season, the maintenance of sustainable ecosystem production is the most critical environmental challenge facing Bangladesh.

Currently, the floodplains of Bangladesh have been largely converted to rice production, or used as source of aquatic protein harvest. With an annual catch of almost 500,000 metric tons of fish and prawns, the floodplains and wetlands serve as an important source of income for millions of people. For the poorest

members of society, they are a crucial source of nutrition and income. However, during the last several decades, the quality and quantity of the country's inland capture fishery has declined. Natural production has stagnated and even decreased for some species. For example, spawning of the commercially important native carps is estimated to have declined by 26% per year between 1986 and 1992. Per capita fish consumption has declined drastically, while fish prices have increased in real terms at the rate of 2.8% per year. Open water fish species formerly supplied 80% of the animal protein consumed, but now supply less than 60%. Deterioration of the fisheries has been attributed to a number of anthropogenic and natural factors.

Loss of fisheries habitats and declines in fish production has had a serious and direct negative impact on the food security, nutrition and income of the poor people of Bangladesh. In addition to the physical shrinkage of floodplain habitats, the rights of poor people to access open water and its resources have gradually been compromised by tenure and policy issues that have restricted access. Poor fishermen, who are the most dependent on open-capture fisheries, have lost access to open water wetlands as private leases have become more common. Increased commercial activity in open water areas, and an emphasis on maximizing short-term profits, has led to degradation of water bodies. The fisheries sector can be sustained only if the major aquatic ecosystems (*haors*, *beels* and *baors*) are sustainably managed, but management and protection have been inadequate to date. Conservation of the nearly 200 km² of freshwater ecosystem that have been declared as Ecologically Critical Areas requires effective management systems to be introduced. The Tanguar Haor Ramsar Site urgently needs a sound management plan if it is to be sustainably utilized.

Traditional systems of agriculture and associated biodiversity are deteriorating due to the large-scale and indiscriminate introduction of cash crops and plantations, high yielding varieties of crops and domestic livestock, and lack of incentives. Indiscriminate use of fertilizers and pesticides, crossing of exotic livestock with indigenous breeds, and introduction of invasive alien species (especially fish) have all accelerated the erosion of the country's biodiversity resources and traditional conservation practices.

In summary, current threats to Bangladesh's biodiversity include indiscriminate exploitation and loss of habitat, including but not limited to continued degradation and fragmentation of remaining forest cover; inadequate inclusion of the range of natural ecotypes in protected areas (exacerbated by extremely limited scope for addition of new areas); indiscriminate introduction of cash crops and plantations; indiscriminate use of pesticides and fertilizers; unsustainable use of aquatic resources; gaps in policy and legislation; conflicting institutional mandates; and unregulated or poorly planned development. However, there are also positive and redeeming trends, including co-management of natural resources and the relative effectiveness of civil society organizations and NGOs working on issues related to sustainable development.

5.0 GOVERNMENT OF BANGLADESH POLICIES, PLANS AND OTHER ONGOING ACTIVITIES

5.1 Policy and Legislative Actions

Concern for biodiversity assets in Bangladesh dates back to colonial times which saw the passage of the **1879 Elephant Preservation Act** and the **1912 Wild Bird and Animals Protection Act**. Bangladesh currently has over a hundred laws that deal with various aspects of environmental issues, the most relevant of which are discussed here. The relevant laws and their provisions should enable effective biodiversity conservation, but implementation effectiveness is hampered by overlapping responsibilities, lack of resources, and the ability of those with influence to bypass the law.

The **Protection and Conservation of Fish Act, 1950** and related **Protection and Conservation of Fish Rules, 1985**, cover not only fish but also amphibians and aquatic reptiles. These rules prohibit harmful fishing, pollution and other activities detrimental to fisheries.

Existing regulations regarding wildlife were repealed in 1973 when the Government passed the **Wildlife (Preservation) Order that was upgraded to an Act in 1974**. This act allows for designating areas of “outstanding scenic and natural beauty with the primary objective of protection and preservation of scenery.” This has to date been interpreted primarily as applying to forests, despite the high level of biodiversity significance and threats faced by other ecosystems. (It also is noteworthy here that public perception of *in-situ* biodiversity conservation has been complicated by the recent declaration of “eco-parks”, which are focused primarily on public visitation and recreation, albeit having high potential for awareness development).

The Forest Act 1927 sets the frame for forest management and use of all Reserve Forests and so is directly relevant to biodiversity conservation, since Reserve Forests are of considerable biodiversity importance and often border the Protected Areas. The Forest Act of 1927 vested considerable power in the hands of the Forest Department, particularly its head, the Chief Conservator of Forests, to determine use of forest lands and to gazette forest as reserves. While allowing for designating use rights in forest for villages, it does not give a role for neighboring communities in any decision making, including minority communities which often had use rights and had settled in forest areas, or for civil society in general. Moreover there was no framework for community participation in forest conservation and management, neither was there recognition of community managed forests other than social forestry, which is aimed primarily at fast growing exotics to generate income for poor people. A revised framework covering recognition for communities and NGOs in long term conservation of non-Forest Department areas, such as swamp forest and forest patches in the CHT, and their roles inside Forest Department lands is needed.

The social forestry framework is appropriate for participation where trees will be felled – as in some buffer areas to provide an income to displaced forest users, but not for long term conservation, Social forestry rules of 2004, developed through ADB and World Bank projects, determine benefit sharing. Social forestry plantations within Forest Department lands, where settlers can live and manage trees, have been proposed in buffer areas adjacent to (and, potentially, inside) PAs. This is the main way that Forest Department interacts with local people and addresses government priorities of poverty reduction. The most common formula for benefit sharing allows participants to grow crops on land and benefit from approved thinning, and allocates 45 percent of harvested revenue to the government, 45 percent to the beneficiaries, and 10 percent for a revolving fund to cover costs of replanting the same land. The regulatory framework of forest benefits distribution is currently being revised.

Legislation outside the forest sector is equally important and requires reform. For example, as a result of the introduction of the ban on tree felling in 1989 (primarily directed at natural and plantation forests), it has

been expected that forests would show significant recovery. However, the Ministry of Finance continues to put pressure on the FD to deliver revenue from tree production. After the ban, according to the FD, revenue from forestry has decreased an estimated 20-25 percent (from US\$ 13 million in 2007 to US\$ 10 million in 2009). Both, the current and past level of revenue are insignificant in relation to the total revenue budget, and the legal provision that mandates the DF to generate revenue from forestry is a perverse incentive to deforestation (i.e. revenue has to come from seizures of illegally cut wood and thus encourages illegal cutting and promotes corruption). In order to sustain forest recovery, the modification of this regulation requires immediate attention.

In 1989, the Government of Bangladesh (GoB) established an independent Ministry of Environment and Forests (MoEF), to oversee environmental issues.

The **National Tourism Policy (1992)** focuses on generating foreign exchange by developing infrastructure and encouraging private investment. It supports conservation but this is focused on infrastructure including safari parks. It did not foresee the recent rapid growth of domestic tourism, nor does it place any special emphasis on ecotourism, or on achieving a compromise between the increasing numbers of visitors to environmentally important but sensitive areas, and the possibly conflicting needs of visitors and biodiversity conservation.

The **Environment Policy and Implementation Plan (1992)** emphasizes the conservation and development of fisheries and the evaluation of any projects likely to impact on these resources (but the **Agriculture Policy** emphasizes increased irrigation from surface water sources (wetlands), without considering its impact on aquatic biodiversity).

The **Bangladesh Environmental Conservation Act (1995)** established the Department of Environment (DoE) and signaled a move towards ecosystem approaches and regulation of developments harmful to those ecosystems. It was followed by formulation of the Environmental Protection Regulations (1998) which set out the rules and regulations for compliance and enforcement. The Environment Conservation Act is currently the main legislative framework document relating to environmental protection. The main objectives of the Environment Conservation Act are focused on conservation and environmental protection, and controlling and mitigating pollution. The Environment Conservation Act includes provisions for declaring Ecologically Critical Areas (ECAs) and for restricting the types of activities that can be carried out in these areas. The Environment Conservation Act also provides for the formulation and declaration of environmental guidelines and the regulation of pollution. The Department of Environment, a relatively new and weak department under the Ministry of Environment and Forests, has been assigned responsibility for implementing the Environment Conservation Act.

The **National Fisheries Policy** approved in 1998 focuses on fish production, but included an objective of conserving biodiversity and conserving inland open water bodies. However, this is now superseded by the national fisheries strategy (see below), while implementation of policies set by the Ministry of Fisheries and Livestock (MoFL) is largely dependent on the policies, attitudes and practice of the land administration which controls decisions over most water bodies.

Adopted in 1999, the **National Water Policy** emphasizes river basin management, water rights and environmental considerations.

The **Environmental Court Act, 2000 (amended 2002)** provides for the establishment of one or more Environmental Courts, primarily in every Division of the country, with specific terms of reference to deal with offences under the Environment Conservation Act, or any other law specified in the Official Gazette and the rules made under these laws.

The **Land Use Policy (2001)** identifies issues of water body loss and degradation and emphasizes the need to harmonize national agricultural and fisheries policies in order to avoid conflict and simultaneously increase agricultural and fisheries production. The policy also recognizes the perilous situation of deforestation and land degradation in terrestrial ecosystems.

The **Conservation, Restoration and Filling Control Act of 2003, for Rivers, Canals, Flood Plains and Aquifers** was formulated “since within the country’s geographic border natural resources such as water resource development, flood control and environmental pollution control and maintaining balance is necessary, so a law concerning restoration and control of filling of all rivers, canals, flood plains, natural aquifers, etc. needs to be developed”.

The Ministry of Water Resources introduced a **Coastal Zone Policy** in 2005 because it considered that the coastal zone was lagging behind in socio-economic development, and initiatives to cope with disasters and gradual deterioration of the environment had been weak, and that there was a higher potential for this zone to contribute to national development. The policy makes this zone a special management area with an integrated planning framework, and aims to create an enabling institutional environment.

In 2009, the Ministry of Land introduced a new **Jalmohal Management Policy** for fisheries in public water bodies. On paper, this policy will support and expand recent successful experiences in community management of wetlands and fisheries and encourages sanctuaries and swamp forest restoration, but it retains an emphasis on short-term access and revenue generation. As with all policies, the issue is not the wording and rhetoric but how it is implemented. This can only be determined over time, but in this case, Members of Parliament have been given a key role in advising on decisions over who can access waterbodies.

5.2 Commitment to International Treaties Conventions and Cooperative Agreements

Bangladesh has signed, ratified, and acceded 27 international conventions and protocols related to environment and development, and is a member and participant in the related international organizations. Agreements and memberships of direct relevance to biodiversity include the following:

The **1971 Ramsar Convention** (Convention on Wetlands of International Importance, especially as Waterfowl Habitat), under which Bangladesh has an obligation to identify important wetlands, designate and protect wetlands of international importance, and promote wise use (sustainable management) of all wetlands. Some steps towards wetlands designation and protection have been taken, albeit these are mainly limited to designating two wetlands – Sundarbans and Tanguar Haor- as Ramsar sites.

The **1972 Convention Concerning the Protection of World Cultural and Natural Heritage**. GoB has declared parts of the Sundarbans mangrove forest as a “World Heritage Site,” helping ensure the protection and sustainable management of this globally important wetland forest.

The **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**, an international agreement between governments to ensure that international trade in species of wild animals and plants does not threaten their survival, which Bangladesh ratified in 1981.

The **Convention on Biological Diversity (CBD)**, was signed in Rio de Janeiro in 1992. The objectives of the CBD are to conserve biodiversity and promote sustainable use of its components, establish protected areas, integrate biodiversity in national plans and policies, protect traditional cultural activities, and ensure a fair and equitable sharing of the benefits arising out of the use of genetic resources. Since signing the CBD, biodiversity issues have received some attention in a variety of sector policy and strategy documents. It is noteworthy that Bangladesh also was a participant in earlier global conservation initiatives, before "biodiversity" became the watchword of the day.

The **United Nations Framework Convention on Climate Change (UNFCCC or Agenda 21, 1992)**, an international treaty under which countries began to consider what can be done to reduce global warming and cope with whatever temperature increases are inevitable.

The **Global Tiger Forum** (1999), an international body focused on tiger conservation.

MIKE (2003), a monitoring protocol used by CITES for monitoring the illegal killing of elephants.

The **Kyoto Protocol (2005)**, an international and legally binding agreement to reduce greenhouse gas emissions worldwide.

Convention on the Conservation of Migratory Species (CMS). Acceded to in 2005. Under this Convention, Bangladesh has signed the Indian Ocean-South East Asian Marine Turtle Memorandum of Understanding, which provides a framework for cooperation to conserve and replenish depleted marine turtle populations, although measures within Bangladesh have so far been limited and primarily dependent on NGO initiatives.

Other conventions and agreements of relevance are The International Plant Protection Convention (1951); The International Convention for the Prevention of Pollution of the Sea by Oil (1954); The Plant Protection Agreement for the South East Asia and Pacific Region (1956); The Indigenous and Tribal Population Convention (1957); The International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (1969); The United Nations Convention on the Law of the Sea (1982); The Vienna Convention for the Protection of the Ozone Layer (1985); the Montreal Protocol (1990) and London Amendment to the Montreal Protocol (1992); The International Convention to Combat Desertification (1994); The International Convention for the Protection of Plant Genetic Resources for Food and Agriculture (1999); and the Cartagena Protocol on Bio-safety (2000).

5.3 National Strategies and Action Plans

The legislation governing the establishment and management of protected areas in Bangladesh (**The Wildlife Preservation Act, 1974**) allows for designating areas of “outstanding scenic and natural beauty with the primary objective of protection and preservation of scenery.” This has to-date been interpreted primarily as applying to forests, despite the high level of biodiversity significance and threats faced by other ecosystems. (It also is noteworthy here that public perception of *in-situ* biodiversity conservation has been complicated by the recent declaration of “eco-parks”, which are focused primarily on public visitation and recreation, albeit having high potential for awareness development).

The **Bangladesh Forestry Master Plan (1995-2015)** provided initial guidelines and recommendations for developing a protected area system in Bangladesh, including a forest biodiversity conservation plan. However, pilot actions to develop effective protected areas through co-management have been taken only since 2003, with support from USAID.

The **Bangladesh National Environmental Management Action Plan (NEMAP)** was developed in 1996 in order to implement the recommendations of Agenda 21 and address country-level environmental problems. This was a product of a participatory process led by NGOs, with participation at grassroots level. Biodiversity conservation was a major theme in the NEMAP, and subsequently in the 1997 **National Conservation Strategy**.

In the **GoB Fifth Five Year Plan (1997-2002)**, there is a commitment on the part of government to implement International Conventions and Protocols related to the environment, as well as other national policies and plans approved by the GoB.

National Biodiversity Strategy and Action Plan (NBSAP) (2004): Bangladesh has an obligation under the Convention on Biological Diversity to develop a national strategy and programs or plans for conservation and sustainable use of biodiversity resources. The MoEF with the collaboration of International Union for the Conservation of Nature (IUCN)/Bangladesh and funding support from United Nations Development Programme (UNDP)/ Global Environment Facility (GEF), prepared a National Biodiversity Strategy and Action Plan (NBSAP) in 2003. This initiative was taken to comply with planning requirements for each country signatory to the CBD. The overall goal of the NBSAP is to conserve Bangladesh's biological diversity, in order to ensure that its various components are utilized in a sustainable manner for attaining progress and socio-economic development of the nation, and ensuring livelihood security for present and future generations. Some of the priorities identified by the Strategy include: improved coordination between the many government agencies with mandates or activities impacting the environment, ensuring wise use of wetlands, strengthening monitoring of biodiversity, adopting co-management for protected areas, use of traditional knowledge in management, restoring ecosystems and endangered species, and strengthening conservation of coastal islands.

National Adaptation Programme of Action 2005, with specific regard to forests and biodiversity, the analysis behind this program predicts increased soil erosion in hill forest areas and increased moisture stress in *sal* forests, and adverse climate change impacts in the Sundarbans. However, it does not propose any strategies to sustain these forests. Its proposed actions include strengthening aquaculture in the north-east in response to changes in water regimes, rather than sustaining vital natural wetlands and capture fisheries.

Poverty Reduction Strategy Paper (PRSP). Unlocking the Potential: National Strategy for Accelerated Poverty Reduction (2005). This report was issued in 2005, following an interim report which had not treated the environment as a sector, or integrated environmental issues into the rest of the document. A local consulting group (Environment Subgroup) worked with the concerned PRSP Thematic Group to include environmental concerns into the main PRSP. USAID played a pivotal role in this process to ensure that environmental concerns were duly reflected. The first PRSP noted that "a careful balancing act must be orchestrated where economic growth is maximized without compromising environmental protection". Although it noted a need to maintain water flows in key wetlands through sustainable abstraction, it retained a production, rather than environmental sustainability, emphasis in areas such as fisheries and forests.

National Fisheries Strategy 2006: Almost every person in Bangladesh has a connection with the country's fisheries resources, whether catching or producing fish, supplying markets or services, or as a consumer. A growing export sector is also contributing substantially to the national economy. Around one million people are estimated to fish full time, and 11 million are involved part time. Four out of five rural dwellers are dependent to some extent on aquatic resources. These resources, from both capture fisheries and aquaculture, are estimated to supply between 60% and 80% of the animal protein needs of the country, as well as being a key source of essential minerals, vitamins and fatty acids, vital factors in child development and adult health (Fisheries Sector Review and Future Development Study 2003). The 2006 Strategy and its associated action plan were developed by the Department of Fisheries with the aim of supporting sustainable growth in production, and managing open water fisheries through community participation and a more equitable distribution of benefits. In addition to promoting a community-based approach, it emphasizes conservation of the environment and fish diversity through adoption of appropriate ecosystem management regimes, including conservation and restoration of wetlands and fisheries, and stronger cooperation with and support from other agencies to meet these aims. The strategy is a positive move on the part of government towards a pragmatic approach to sustainable wetland management and conservation. However, implementation is constrained by the Ministry of Land's control of policy in *jalmohals* (water estates or fisheries that are state property leased out for revenue), and the lack of external assistance for vital implementation measures for the inland capture fisheries component of the strategy.

Bangladesh Climate Change Strategy and Action Plan 2008 (revised 2009). The focus of this strategy and action plan is on adaptation to maintain livelihoods in various sectors, including hazard warnings and strengthening flood protection infrastructure, as well as some mitigation measures. It proposes a systematic monitoring program to determine impacts on ecosystems and biodiversity, but unlike other sectoral planning, it does not identify potential impacts or actions to maintain vulnerable ecosystems of high biodiversity significance.

National Sustainable Development Strategy 2008. This strategy prepared by Department of Environment (under a UNEP program) has a wide remit, covering economic growth, agriculture and rural development, social protection, and environment and natural resources. With regard to natural resources management, the strategy supports community-based conservation of wetland and coastal areas and crop/genetic biodiversity, although details remain to be developed.

Moving Ahead: National Strategy for Accelerated Poverty Reduction II (FY 2009 – 2011) 2008. This second poverty reduction strategy paper focuses on pro-poor economic growth. Although it notes the loss of wetlands and their biodiversity, it does not address sustainability of capture fisheries, instead emphasizing aquaculture as a development option. However, it does recognize co-management of forest protected areas and the need for wildlife conservation. A final section on caring for the environment elaborates in some detail many of the key environmental issues facing Bangladesh, and some measures to be taken up (including climate change adaptation), but these are not integrated into the strategy as a whole.

Bangladesh Tiger Action Plan 2009, with the vision to ensure protected tiger landscapes where wild tigers will thrive at optimum carrying capacities and which will continue to provide essential ecological services to mankind. This policy-level document will guide an integrated and focused tiger conservation programme for Bangladesh.

5.4 Tropical Forest, Biodiversity and Ecosystem Conservation Systems

5.4.1 PROTECTED TROPICAL FOREST AREAS (NATIONAL PARKS, WILDLIFE SANCTUARIES AND GAME RESERVES)

Recognizing the perilous situation of natural forests in the country, the Forest Department has established a series of protected forest areas (distinct from gazetted forest reserves), including ten national parks, eight wildlife sanctuaries and one game reserve (Figure 4). Table 4 provides a listing of these areas and brief site descriptions. These protected areas are defined in the Act as:

- “National Park means comparatively large areas of outstanding scenic and natural beauty with the primary object of protection and preservation of scenery, flora and fauna in a natural state to which access for public recreation, education and research may be allowed”.
- “Wildlife Sanctuary means an area closed to hunting, shooting or trapping of wild animals and declared as such under Article 23 by the government as undisturbed breeding ground primarily for the protection of wildlife inclusive of all natural resources, such as vegetation, soil and water”.
- “Game Reserve means an area declared by the Government as such for the protection of wildlife and increase in population of important species where capturing of wild animals shall be unlawful”.

IPAC Clusters and Sites

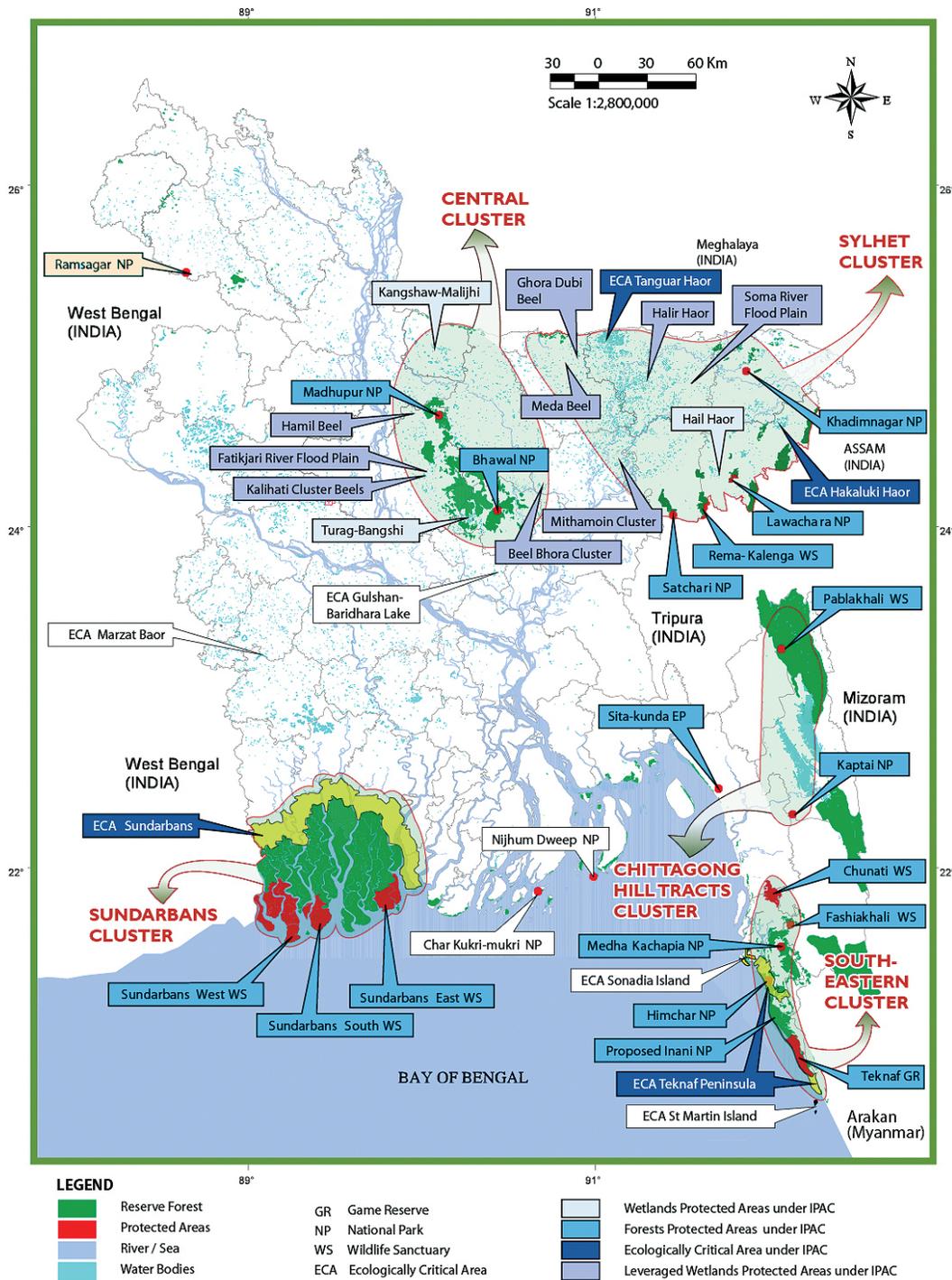


Figure 4. Protected natural tropical forest areas, Ecologically Critical Areas and biodiversity rich clusters in Bangladesh (Courtesy: Integrated Protected Area Co-management).

Table 4. Synopsis of the Protected Tropical Forest Areas of Bangladesh

Name	Location	Year created	Area (ha)	Special Features	Present Condition
Bhawal National Park	Gazipur District near Dhaka	1982	5,022	<ul style="list-style-type: none"> - tract of encroached and degraded sal forests - extensively used for recreational purposes, owing to ease of access from Dhaka 	<ul style="list-style-type: none"> - management plan Prepared - new development activities including the establishment of industries pose an increasingly significant threat to the park - areas are thinly covered in forest and are being degraded
Char Kukri Mukri Wildlife Sanctuary	southern part of Bhola District	1981	40	<ul style="list-style-type: none"> - small area of planted mangrove trees and wetlands - formerly supported a heronry - spotted deer population 	<ul style="list-style-type: none"> - no management plan to-date
Chunati Wildlife Sanctuary	Chittagong Division	1986	7,764	<ul style="list-style-type: none"> - existing small population of endangered Asian elephants - potential for linkage to nearby reserved forest areas - endangered serow thought to still occur in the area 	<ul style="list-style-type: none"> - management plan prepared - management supported by Nishorgo and IPAC - ease of access has led to use as open access resource - includes deeded agricultural lands, Forest Villages and 1000 ha ecopark - very conflictive situation with local population - nearby brickfields openly use area as a fuel source
Fashiakali Wildlife Sanctuary	Cox's Bazar Division	2007	3,217	<ul style="list-style-type: none"> - mixed evergreen forest 	<ul style="list-style-type: none"> - co-management support provided by IPAC
Hazarikhil Wildlife Sanctuary (Proposed)	north-eastern part of Chittagong Division	proposed as a W.S. in 1974 but not yet legally gazetted	Proposed to include 2,908		<ul style="list-style-type: none"> - yet to be notified formally - draft management plan prepared

Name	Location	Year created	Area (ha)	Special Features	Present Condition
Himchari National Park	Cox's Bazar Division	legally gazetted in 1980	1,729	<ul style="list-style-type: none"> - steep coastal cliffs, low hills along the sea front (but not including the beach itself) - established with a view to increasing the opportunities for tourism and recreation 	<ul style="list-style-type: none"> - draft management plan prepared - high level of illegal timber harvest - numerous "illegal" settlements and housing within the area - heavy livestock grazing - periodic fires - both subsistence and commercial fuel wood and bamboo harvest
Inani National Park (Proposed)	Cox's Bazar	Proposed in 2009	7,700	<ul style="list-style-type: none"> - wet evergreen and semi evergreen forests; contiguous extension of Teknaf Game Reserve 	<ul style="list-style-type: none"> - management support provided by IPAC. Arannayk Foundation is providing funding through a local NGO
Khadimnagar National Park	Sylhet	2006	679	<ul style="list-style-type: none"> - degraded mixed evergreen forests, with remnant patches of bamboo exists - easily accessible from Sylhet city 	<ul style="list-style-type: none"> - management support provided by IPAC
Kaptai National Park	Rangamati Hill District	1999	5,464	<ul style="list-style-type: none"> - serves as part of the watershed of the Kaptai Lake and power generation facility 	<ul style="list-style-type: none"> - no management plan prepared to-date - management support provided by IPAC

Name	Location	Year created	Area (ha)	Special Features	Present Condition
Lawachara National Park	Moulvi Bazar District, Sylhet Division	Legally gazetted in 1996	1,250	<ul style="list-style-type: none"> - mixed tropical evergreen forest - part of the watershed for Hail Haor - high diversity of wildlife particularly birds - easily accessed 	<ul style="list-style-type: none"> - management plan prepared - co-management support provided by Nishorgo and IPAC - approximately 40% of the area converted to plantations now over 50 years old - approximately 20% in younger plantations of fast-growing exotics - sustains primates and extensive bird life
Madhupur National Park	north-eastern part of Tangail Division/some in Mymensingh	Legally gazetted in 1982	8,437	<ul style="list-style-type: none"> - one of the last remaining tracts of mixed sal (<i>Shorea robusta</i>) forests - plant biodiversity still intact - medicinal plants and primates - once part of the ancestral territory of the Mandis 	<ul style="list-style-type: none"> - draft management plan prepared - larger wildlife eliminated - 20,000 people live within the park - largely degraded but some patches of dense coppice regrowth - extensive conversion to plantations - co-management support provided by IPAC
Meda-Kacchapia National Park	Cox's Bazar	2004	396	<ul style="list-style-type: none"> - remnant patch of dipterocarp forest easily accessed from road 	<ul style="list-style-type: none"> - co-management supported by IPAC but no management plan to date
Nijhum Dweep National Park	a <i>char</i> area in the southeastern part of Noakhali District	2001	16,352	<ul style="list-style-type: none"> - successfully planted with mangrove species by the Forest Department 	<ul style="list-style-type: none"> - no management plan prepared to-date

Name	Location	Year created	Area (ha)	Special Features	Present Condition
Pablakhali Wildlife Sanctuary	Khagrachari Hill District	1983	42,087	<ul style="list-style-type: none"> - extensive evergreen forest and marshes but now degraded - formerly supported population of endangered white-winged duck 	<ul style="list-style-type: none"> - no management plan to-date - co-management supported by IPAC - requires permission to visit
Ramsagar National Park	eastern part of Dinajpur District	1974	28	<ul style="list-style-type: none"> - an old tank (man-made reservoir) with plantations of exotics - used for recreation 	<ul style="list-style-type: none"> - no management plan prepared to-date
Rema-Kalenga Wildlife Sanctuary	Habiganj District, Sylhet Division	gazetted in 1981; expanded in 1996	1,095 and then 1795	<ul style="list-style-type: none"> - largest remaining block of natural forest in Sylhet Division - serves as watershed for nearby wetlands - mixed tropical evergreen forest - some riparian habitat 	<ul style="list-style-type: none"> - management plan prepared - degraded but natural high closed canopy forest still occupies 80% of area - conversion of parts of the area to plantations in 1980s
Satchari National Park	Habigonj District, Sylhet Division	2006	242	<ul style="list-style-type: none"> - small area of evergreen and semi-evergreen forest and old mixed plantations - high diversity of birds and primates for small area 	<ul style="list-style-type: none"> - management support provided by Nishorgo and IPAC - logging and habitat degradation in bordering areas

Name	Location	Year created	Area (ha)	Special Features	Present Condition
Sundarbans East Wildlife Sanctuary	southern part of Bagerhat District	1996	31,226	<ul style="list-style-type: none"> - mangrove forests (part of the Sundarbans Reserve Forest) with rich biodiversity - - high degree of social, economic and ecological value - rich in wildlife including the royal Bengal tiger, spotted deer, wild boar, and unexplored fisheries biodiversity assets 	<ul style="list-style-type: none"> - management plans prepared for all Sundarbans sanctuaries - all three declared as Ramsar Sites - all three declared as UNESCO World Heritage sites - management support provided by IPAC
Sundarbans South Wildlife Sanctuary	southern part of Khulna District	1996	36,970	- see above	- see above
Sundarbans West Wildlife Sanctuary	southern part of Satkhira District	1996	71,502	- see above	- see above

Name	Location	Year created	Area (ha)	Special Features	Present Condition
Teknaf Game Reserve	Cox's Bazar Division	legally established in 1983	11,610	<ul style="list-style-type: none"> - wet evergreen and semi-evergreen forest - modest number of endangered Asian elephants widely distributed in the area - very diverse habitat conditions - high biodiversity - potential for significant expansion incorporating nearby reserved forest areas 	<ul style="list-style-type: none"> - management plan prepared - incursions of Rohingya refugees (from Burma) and local population pressure have severely degraded the forest - subject to impact of cyclones - some conversion to plantations - livestock grazing problem - management support provided by Nishorgo and IPAC

Outside of the Sundarbans (which includes approximately 600,000 ha of mangrove forest cover in one contiguous block, of which 139, 698 ha have been protected) and the two protected *char* areas, only approximately 84,000 hectares of "relatively intact, upland tropical forests" are currently included within protected areas. The total extent of protected areas comprises only 1.7 percent of the national territory. Some additional areas of natural forest remain within the Reserved Forest system managed by the Forest Department and in ungazetted state forest land (for example, Patharia Hill Reserved Forest in Sylhet), and possibly on ungazetted state forest land (for example, in the hilly areas of the extreme southeast of the Bandarban Hill Tracts, primarily in the Sangu and Matamuhuri Reserved Forests). However, none of these areas are immune from pressure from local communities seeking to meet their basic needs, or from illegal logging operations. These areas are the last refuge of terrestrial biodiversity in the country. Many of the large mammal species (leopards, wild dogs, sambar, bear, rhinoceros, gaur, and wild buffalo) have already been extirpated, and serious impacts have also doubtless occurred on the bird and reptilian fauna and on forest flora.

At an estimated 1.7 percent of the country's surface area, the protected area network in Bangladesh is the smallest in Asia, in both percent of surface area and area per capita. By comparison, nearby Sri Lanka has over 10 percent and India an estimated 5.1 percent of total surface area under protection. International guidelines suggest a minimum of 5-10% of surface area be allocated as protected areas, placing Bangladesh well below the international standard (Source: EarthTrends Database www.earthtrends.wri.org, and IUCN Protected Area Categories I-V). Further, the shortfall in protected area coverage varies by region of the country, being more pronounced in the western part of the country than in the east. Apart from Madhupur National Park in the Tangail District, there are no declared protected areas of over 50 hectares in the western half of the country north of the Sundarbans.

5.4.2 PROTECTED TROPICAL FOREST AREAS (ECO-PARKS)

In recent years, the Bangladesh Government has acted to increase the extent of protected areas, principally through the creation of a number of Eco-Parks and Safari Parks on Reserved Forest land (Table 5). However, these newly created protected areas are extremely small in relation to the extent needed for effective biodiversity conservation, and are designed to serve a "nature recreation" need rather than biodiversity conservation.

Table 5. Eco-Parks and Safari Parks

No.	Name of the Protected Area	Declared Status	Area in ha	Year of Notification
1	National Botanical Garden, Dhaka	Botanical Garden	84	1961
2	Balda Garden, Dhaka	Botanical Garden	1.37	1909
3	Banghabandhu Sk. Mujib Safari Park, Dulhazara, Cox's Bazar	Safari Park	600	1999
4	Sitakunda Botanical Garden, Sitakunda, Chittagong	Botanical Garden/Eco-Park	1,000	2000
5	Madhutila Eco-Park, Sherpur	Eco-Park	125	2000
6	Madhabkunda Eco-Park, Moulvibazar	Eco-Park	654	2000
7	Barshijura Eco-Park, Moulvibazar	Eco-Park	370	2006
8	Banskali Eco-Park, Chittagong	Eco-Park (within Chunati Wildlife Sanctuary)	1,000	2003

5.4.3 ECOLOGICALLY CRITICAL AREAS

Another relatively recent (and positive) development related to the concern for biodiversity and the sustainability of the natural resources base has been the declaration of ecologically critical areas (ECAs). The Bangladesh Environmental Conservation Act of 1995 includes a provision whereby if the Government is concerned that the degradation of an ecosystem has reached "a critical state" or is so threatened, it may declare the area to be an ECA by notification in the official gazette. In April 1999, this authority was exercised for the first time by the Director General of the Department of the Environment in officially notifying the establishment of six separate wetland areas as ECAs, covering approximately 40,000 ha. During the subsequent preparation of a GEF project, two more sites were added to the list of notified ECAs. Very recently, the polluted rivers surrounding Dhaka have also been declared as ECAs (Table 6).

Table 6. List of Ecologically Critical Areas (ECAs)

Name	Location	Year Established	Area (ha)	Present Condition/Remarks
Sundarbans	10 km buffer zone around the Sundarbans Reserved Forest in the Districts of Satkhira, Khulna and Bagerhat	1999 (?)	currently unknown	Initially (April 1999) the whole of the Sundarbans Reserved Forest (approximately 750,000 ha) was declared as an ECA. However, an amendment was later made in response to objections from the Forest Department. Co-management support provided by IPAC.
Cox's Bazar-Teknaf Sea Beach	Teknaf, Ukhia, Ramu and Cox's Bazaar Districts	1999	10,645	Brought under community-based management with support from UNDP/GEF/DoE Coastal and Wetland Biodiversity Management Project in 2003. Currently under IPAC support.
St. Martin's Island	Teknaf Upazila, Cox's Bazaar District	1999	590	Brought under community-based management with support from UNDP/GEF/DoE Coastal and Wetland Biodiversity Management Project in 2003. Now suffers from unsustainable numbers of visitors during the dry season and hotel developments by outside investors.
Sonadia Island	Moheshkhali Upazila, Cox's Bazaar District	1999	4,916	Brought under community-based management with support from UNDP/GEF/DoE Coastal and Wetland Biodiversity Management Project in 2003.
Hakaluki Haor	Barolekha and Kulaura of Moulvibazar District and Fenchuganj, Golabganj Upazilas of Sylhet District	1999	18,383	Largest single <i>haor</i> in the country. Brought under community-based management with support from UNDP/GEF/DoE Coastal and Wetland Biodiversity Management Project in 2003. Various income-generating activities, swamp forest and fisheries management in small <i>beels</i> are already underway with support from SEMP and execution by IUCN/CNRS. Larger <i>beels</i> are mostly controlled by powerful individuals. IPAC support currently under planning.

Name	Location	Year Established	Area (ha)	Present Condition/Remarks
Tanguar Haor	Taherpur and Dharmapasha Upazilas of Sumanganj District	1999	9,727	Most pristine of Bangladesh's haors, with diverse fish population and large overwintering bird populations. Declared as a Ramsar Site and removed from fishing leasing system. Environmental Management Plan prepared. Currently under IPAC support. IUCN is pursuing community management based on a zoning system.
Marzat Baor	Kaliganj Upazila of Jhedaidah District	1999	200	No work to date on the area
Gulshan-Baridhara Lake	Dhaka City Corporation of Dhaka District	2002	(?)	An entirely urban setting but with both aesthetic and recreational value. Under considerable pressure as a result of local urbanization. No management intervention to date.
Dhaka rivers	Dhaka District	2009	(?)	Recently established; degraded and polluted rivers surrounding Dhaka.

5.5 Tropical Forest, Biodiversity and Ecosystem Conservation Programs and Projects

5.5.1 GOVERNMENT PROGRAMS

A "Wildlife and Nature Conservation Circle (WNCC)" was established for the management of protected areas in 2001. The WNCC is headed by a Conservator of Forests (CF), reporting directly to the Chief Conservator of Forests (CCF). The WNCC has four Divisions: Dhaka, Chittagong, Khulna and Sylhet. However, the existing staffing pattern is not in keeping with protected area/ biodiversity/wildlife management systems or requirements. The WNCC, or for that matter the Forest Department (FD), does not have any institutional strategic planning for protected areas management. Currently protected areas are managed through the territorial Forest Divisions, and not as individual operational units. Only the CF office, and Chittagong and Khulna Divisions, are in operation. Other than three (Lawachara, Rema-Kalenga and Satchari) protected areas of Sylhet Division, only Chunati Wildlife Sanctuary has so far been handed over to WNCC for management. Protected areas are not properly staffed and are being "managed" with insufficient staff at all levels from PA to CF office. There are no research staffs or other technical back up at Division or PA level.

5.5.2 THE NISHORGO PROGRAM

The Nishorgo Program was conceived by the Bangladesh Forest Department (FD) as a strategic response to protected area management requirements, and was implemented during 2003-2009. The Program aimed to ensure protection and improved management of natural areas through six complementary components:

Co-management and Partnership: The Nishorgo Program recognized that Government cannot ensure protection of nature without the collaboration of local and national stakeholders. To this end, the Program established co-management agreements through which participants supported conservation. Specially established Co-management Councils and Committees at pilot protected areas set standards for transparency and openness, and permitted a local voice in protected area management.

Alternative Income Generation: The Nishorgo Program worked to identify and introduce viable alternative options for local stakeholders who relied on forests for livelihoods/income generation. An important option was community-friendly eco-tourism. Others included tree nurseries, handicraft enterprise development, alternative energy use, livestock fattening, rice processing, and other agricultural activities.

Policy Change and New Constituencies for Protected Areas: The Program worked to improve policies for protected areas. The Wildlife Act (1974) was revised. A vision statement entitled Nishorgo Vision 2010 set out ambitious goals and a new orientation for protected area management. The Program also worked to build constituencies to support protected area conservation.

Institutional Capacity Development: The Program supported a variety of training and capacity building efforts focused principally on local stakeholders, FD staff and institutions.

Infrastructure and Visitor Services: The Program developed hiking trails and accompanying brochures for five protected areas. Local people were trained to serve as professional eco-tour guides. Other activities included improved signage, visitor centers, staff quarters, access and parking facilities.

Ecosystem Regeneration and Rehabilitation: Bangladesh is blessed with very fast growing forests. In most cases, if logging and fuel wood collection can be stopped, the forests return naturally. However, where natural regeneration needed an extra push, the Program worked to rehabilitate sites through selected planting.

The Forest Department set out its vision for change in Nishorgo Vision 2010. Expected changes included the following institutional improvements:

- The protected areas will become an integrated, recognizable and accessible system;
- Protected area managers will be partners in local and regional development;
- At each protected area, visitors will be able to receive an orientation about what can be observed or learned from the site;
- Visitor facilities will be made available at each protected area. These improvements, and others, will lead to changes in the quality of the protected areas;
- In targeted protected areas, illegal felling will cease;
- Biodiversity will increase, as evidenced by indicator bird species; and
- Forest loss will be reversed, and forests will begin to regenerate.

5.5.3 OTHER PROJECTS

Specific biodiversity conservation components have also been included in some of the major multilateral bank funded loan projects, including the World Bank-funded Forest Resources Management Project (completed in 2001), the Asian Development Bank-funded Sundarbans Biodiversity Conservation Project

(suspended in 2003), and the Asian Development Bank-funded Forestry Sector Project (completed in 2006), and the GEF component of the World Bank and DfID-supported Fourth Fisheries Project. Under the Forest Sector Project, management plans were prepared for seven protected areas (Rema Kalenga, Lawachara, Hazarikhil – proposed protected area, Chunati, Madhupur, Himchari and Teknaf), and the importance of biodiversity conservation in each of the country's Forest Divisions was synthesized to guide the efforts of the Forest Department in engaging this new mandate for biodiversity conservation. These plans were not acted upon during the project period but were subsequently used, with the agreement of the Forest Department, in the elaboration of the work plans for the Nishorgo Project and the Integrated Protected Area Co-Management (IPAC) Project.

A UNDP/GEF project – the Coastal and Wetland Biodiversity Management Project (BGD/99/G31) – has been the first effort to operationalize the Ecologically Critical Area concept at four main sites: Hakaluki Haor (UNDP 2001) and three sites in the Cox's Bazar-Teknaf area.

NEMAP was followed-up through an ambitious UNDP initiative called the Sustainable Environmental Management Project (SEMP), which focused on 26 sectors covering five thematic areas, including biodiversity conservation.

As can be seen from the above, donor support to the environment sector has been substantial, particularly with regard to biodiversity conservation and natural resources management.

6.0 CIVIL SOCIETY INITIATIVES

6.1 Arannayk Foundation (Bangladesh Tropical Forest Conservation Foundation)

The Arannayk Foundation (AF) is a civil society-led entity established for tropical forest conservation through a unique funding mechanism. Bangladesh was the first country to benefit from provisions of the Tropical Forest Conservation Act (TFCA) of 1998 which provides eligible countries the opportunity to reduce concessional debts owed to the United States, and at the same time generate funds to conserve or restore their tropical forests. The Government of Bangladesh (GoB) and the United States Government (USG) have signed two agreements under the TFCA: one to reschedule outstanding debt (The Debt Agreement) that the GoB owes to the USG, and the second to establish a Bangladesh Tropical Forest Fund (The Forest Agreement), following the debt-for-nature-swap provision of the TFCA. In order to promote tropical forest conservation under these agreements, \$8-9 million in local currency will be made available over a period of 18 years to support Bangladesh's tropical forest conservation efforts.

The Arannayk Foundation (AF), a not-for-profit company without shares, was established in July 2003 as the "Tropical Forest Fund pursuant to the Bangladesh Companies Act of 1994 and the TFCA of 1998. The main objective of AF is to promote activities designed to conserve, maintain or restore the natural tropical forest and forest biodiversity of Bangladesh, through grants to worthy applicants. A legally-established Board of Directors oversees the operations of the AF. The Board consists of five representatives of Bangladesh civil society, plus one representative each from the USG (USAID Mission Director) and the GoB (Joint Secretary [Development], Ministry of Environment and Forests).

Funding for AF is primarily from food aid debt relief provided by the USG to Bangladesh, per the terms of the debt-for-nature swap mechanism defined in the bilateral TFCA Agreements. In addition, the AF is enabled to solicit and receive funds from other entities both public and private. The foundation has three options regarding the use of these debt relief funds: (1) to directly support foundation administration and grant activities, (2) to invest the debt-relief funds and (3) operate from the interest income, or some combination of the two.

The activities supported by the Arannayk Foundation may include:

- Establishment, restoration, protection and maintenance of protected areas and reserves;
- Development and implementation of scientifically sound systems of natural resources management;
- Training programs to increase scientific, technical and managerial capacities of individuals and organizations involved in forest conservation;
- Restoration, protection or sustainable use of diverse animal and plant species;
- Research and identification of medicinal uses of tropical forest plants; and
- Development and support of the livelihoods of individuals living in or near a tropical forest, in a manner consistent with protecting such a tropical forest.

The entities in Bangladesh which shall be eligible to receive grants from the fund are: non-governmental environmental, forestry, conservation, development and indigenous peoples organizations; scientific, academic and professional organizations related to forests; other appropriate forest-related entities active in the country, and, exceptionally, agencies of the GoB.

6.2 Other Initiatives

The only international non-governmental environmental organization that has a presence in Bangladesh is IUCN. IUCN has led the process of development of the National Conservation Strategy (NCS) and the National Biodiversity Strategy and Action Plan (NBSAP). Bangladesh also has a vibrant NGO community including environmental NGOs that have gained international reputations. The following organizations have been notably active in conservation of biodiversity in Bangladesh to date:

- Bangladesh Center for Advanced Studies
- Nature Conservation Management
- Bangladesh Unnayan Parishad
- Center for Natural Resources Studies
- Caritas Bangladesh
- Rangpur Dinajpur Rural Services
- Bangladesh Action Research Center for Indigenous Knowledge
- Community Development Center
- Bangladesh Paribesh Andolon
- UBINIG
- Wildlife Trust of Bangladesh

7.0 ISSUES AND OPPORTUNITIES RELATED TO THE CONSERVATION OF TROPICAL FORESTS AND BIODIVERSITY

7.1 Policy Issues

Bangladesh provides a favorable policy climate for administering natural resource management programs, although implementation advances slowly. A review of the policy regime over the last thirty years in Bangladesh indicates that:

- a large number of policies have been produced covering both national (overarching) and sectoral agendas; each Ministry has come up with its own policies.
- as a result of the abundance of policies, there has been considerable overlap and lack of coherence between policies as well as gaps in policy content. For example:
 - there are key differences between the Ministry of Land and the Ministry of Fisheries and Livestock policies regarding inland fisheries and wetlands and
 - the Environmental Policy and the Environmental Conservation Act, which mandate the Department of Environment to declare Ecologically Critical Areas, are in direct conflict with the management of forest protected areas (under the jurisdiction of the Forest Department) and wetlands (under the administrative jurisdiction of the Ministry of Land for leasing and under the management jurisdiction of the Ministry of Fisheries and Livestock for fisheries management).
- policy-making has tended to be top-down, originating from central government (in some cases without wider consultation), favoring the priorities and interests of influential elites, and without taking institutional capabilities into minimal consideration
- policy changes can and do take place, but there is little assessment of policy performance and minimal feedback into the policy development process

7.2 Governance and Other Related Issues

USAID (2001) has summarized the issues related to biodiversity conservation in terrestrial ecosystems, particularly the hilly areas. Table 7 updates this summary, taking a wider view of biodiversity conservation in all key ecosystems. Among the root causes of ecological degradation are:

- Population density among the highest in the world, which exerts tremendous pressure on all natural resources;
- Poverty and social inequality, which gives few choices to those at the bottom of the social and economic ladder;
- Colonial era laws on the management of public lands and their use to generate revenue;
- Government departments, which are inadequately equipped for modern concepts of resource management;
- Lack of financial planning at all levels; and
- Systemic corruption.

Table 7. Threats and Opportunities for Tropical Forest and Biodiversity Conservation

Identification and Discussion of Threats	Opportunities for Addressing the Threats
Macro-Economic Threats	
<p>The Economic Implications of the Culture of "Command and Control" Approaches to Conservation: Application of a regulatory approach to protection and conservation of biodiversity (creating rules and/or enforcing existing rules) can lead to a perverse reaction on the part of those seeking to use biodiversity resources. As demand for forests, wetlands and other ecosystems are likely to remain constant or increase, an attempt to apply regulations will 1) limit supply and/or 2) be perceived as curtailing supply, thus causing prices to rise and/or 3) result in a willingness for users to take risks to obtain an increasingly scarce but needed commodity.</p>	<ul style="list-style-type: none"> - Replace the Forest Act of 1927 with legislation which incorporates biodiversity conservation and community participation objectives, as well as 21st Century forestry practices. - Using program-based learning to improve the understanding of policy and decision-makers about the realities of the macro-economics of supply and demand for natural resources. - Participatory forest and wetland fishery management programs should be used to reduce the costs of public administration of protected areas, wetlands and reserved forests, encouraging local people to understand the tangible values of these areas and encouraging self-regulation of access and exploitation in return for rights to defined benefits. This in turn will reduce the unit costs of management for the responsible government agencies and permit further program expansion.
<p>Funding for Biodiversity Conservation: Although the global significance of biodiversity is now well recognized and considerable funding for conservation programs has been made available, the donor community is rarely responsive unless the host government provides at least part of the financing required (at a minimum, the establishment budget requirements). The rationale is that unless the host government shares costs, activities are likely to be unsustainable once donor funding is exhausted.</p>	<ul style="list-style-type: none"> - It needs to be recognized that the conservation of biodiversity has economic value and is a worthwhile investment option. NRM accounting procedures that value biodiversity in terms of its real value to the nation (e.g., as a present and future source of needed natural resources, as a representation of national heritage or as contribution to global conservation goals) and that also take account of the environmental services associated with protected areas (watershed protection, storm and flood mitigation, protection from cyclonic storm surges, undervalued natural products) need to be established.
<p>Illegal Activities within Protected Areas: If local communities are to be convinced to relinquish their use rights (legal or otherwise) in protected areas, government must ensure that activities by outsiders (illegal logging, harvesting of fuel for brickfields, land-grabbing) also do so. Also if communities establish protected areas (sanctuaries) within wetlands that they manage, they need support and recognition for enforcing sanctions on outside users.</p>	<ul style="list-style-type: none"> - If there is demand for scarce supply, the ingredients are there for an investment program. For example, communities can be stimulated to supply industry with the raw materials it needs (e.g., plantations of fast growing species for supplying brickfields and sawmills). - In wetlands, there is good evidence that protecting part of the system results in improved fish catches in the rest of the wetland.

Identification and Discussion of Threats	Opportunities for Addressing the Threats
Socio-Economic Threats	
<p>Unrelenting Demographic Pressure on Hill Forest Areas: Farmers and rural people are well aware of the limitations of the natural resources base because they live with this reality day in and day out. However, in the absence of choices or plans to the contrary, they choose the only course of action open to them: trying to meet their basic needs however and wherever they can. All concerned, including GoB agencies and the communities, need to understand that the costs of natural resource rehabilitation and socio-economic development in the face of widespread degradation are orders of magnitude higher than a proactive program of prevention and wise management.</p>	<ul style="list-style-type: none"> - In order to effectively address socio-economic issues, communities need to be engaged in an assessment not just about the problems (awareness-raising) but about resource management alternatives and the benefits that they might derive from improved stewardship of the natural resource base. There is also a need to quantify actual usage and value of community use of forests, wetlands and other ecosystems in order to determine how best to manage resources and alleviate use pressures. Alternative fuels and increased efficiencies in fuel use show some promise as future strategies for alleviating pressures on forest resources.
<p>Poverty and a Lack of Alternative Sources for Basic Needs and Employment Opportunities: Where there is demand for subsistence use of common forest products (e.g., fuel wood and poles) there is scope for action, as has been repeatedly demonstrated by the very successful homestead plantations common on the floodplains of Bangladesh.</p>	<ul style="list-style-type: none"> - Local communities and local people often have priorities such as the need for basic social services and rural infrastructure that could stimulate local development far more than access to natural resources on fragile or protected areas. - Production trade-offs, particularly for forest harvesters (both legal and illicit) will need to be offset by introducing alternative production and/or employment activities.
<p>Land Tenure Constraints: In some cases, villages have been established before protected areas or reserved forests were gazetted, often by indigenous peoples. The issue here is how can they be accommodated? If neighboring <i>khas</i> (public) lands are available, do they present an opportunity to develop solutions for the landless and/or for those who depend on forest resources to survive?</p>	<ul style="list-style-type: none"> - Can tensions with existing villages be mitigated and if so, how? What potential is there for relocation of villages, on adjacent reserve forest areas or <i>khas</i> lands and what would be required to get people to move? Or can resident villages be convinced to stay within their defined boundaries and if so, in return for what? Such arrangements already exist between the communities and FD which employs villagers for management operations. Can protected areas provide similar opportunities?

Identification and Discussion of Threats	Opportunities for Addressing the Threats
<p>Lack of Local Organizational Capacity to Broker Community NRM Conflicts: Villages are rarely egalitarian social structures, although a certain amount of social justice is required to avoid conflict. Conservation programs have best succeeded where they can create local organizations to ensure that the needs of all segments of society (including landless, women, and indigenous peoples) are taken into account in designing natural resources management. This is an inherently social (rather than technical) action involving decision-making about how to use reserve and share resources.</p>	<p>- Local resource management organizations can fill the need for community understanding, conviction and consensus that it is possible to reverse downward trends in resource condition and acceptance of use restrictions in protected areas, and for promoting/ allowing and organizing communities to participate in decision-making about conservation/management measures.</p>
<p>Institutional Threats</p>	
<p>Conventional Single Sector/Single Agency Approach: Protected areas cannot be dealt with in isolation of their surroundings, particularly in a densely populated country such as Bangladesh. To maintain the integrity of an ecosystem often requires off-site actions. Sharing the responsibilities for addressing the challenges among different concerned government partners makes better sense and lowers program costs. This requires an appropriate institutional development strategy.</p>	<p>- An integrated approach to dealing with the pressures on protected areas is needed but the key is planning and prioritizing. There are many things that <u>can</u> be done but the challenge is to know what <u>should</u> be done. Departmental policies, plans, programs and budgets are made in advance so planning is the key. A much more dynamic use of the conventional Project Steering Committee approach is required, based on a secretariat type function that prepares the members of the committee to take informed decisions and track progress in achieving them. Much stronger collaboration and joint initiatives at local level also are needed, but the conventional system of single agency projects and initiatives constrains achieving this.</p>

Identification and Discussion of Threats	Opportunities for Addressing the Threats
<p>Institutional Set-up and Capacity including Skills and Understanding: At present, most protected areas are under the mandate of the territorial staff of the concerned Forest Department Circle, Division, Range and Beat. Staff is routinely and regularly transferred among these sites and may not even be fully aware of the rationale, importance, limits or management requirements of protected areas. Similarly, water bodies are under the district and upazila administrations which lack expertise in biodiversity conservation and ecosystem management, while Department of Fisheries’s staff may or may not have built this capacity depending on previous postings and project experience. Department of Environment has a minimal staff presence in the field.</p>	<ul style="list-style-type: none"> - Replacement of the Forest Act of 1927 (see above). The principal focus of the Forest Department has been production, and FD staff has not had the training required to understand the value of protected areas and the environmental services they offer (biodiversity conservation, watershed protection, recreation and ecotourism). The creation of a Wildlife and Nature Conservation Circle within the FD represents an opportunity to build the skills required for conservation planning and implementation. Similarly, the Department of Fisheries focuses on production and aquaculture extension although, through various projects, more of its field staff now has appreciation or experience of supporting community initiatives in open water fisheries management, which can be built upon. Department of Environment staff mainly has responsibility for regulation of environmentally harmful activities.

Identification and Discussion of Threats	Opportunities for Addressing the Threats
<p>The Need for a Protected Area System: Experience worldwide has demonstrated that a genuine <i>system</i> of protected areas provides a center around which to organize and strengthen institutional capacity for conservation. Furthermore, because a protected area system targets values appreciated by society in general and not just those who use ecosystem products, it reaches a wider audience and can improve the images of the agencies and departments responsible for providing these services. It also helps to create a national understanding and growing constituency for environmental conservation.</p>	<ul style="list-style-type: none"> - A system of protected areas works better than isolated protected areas under territorial mandate, especially in terms of enhanced institutional capabilities (increased opportunities for staff specialization, learning and experience; the development of internal organizational capabilities specific to protected areas; and career development options for staff). - A primary aim of modern protected areas systems is to conserve representative examples of natural ecosystems. A national system generally seeks to do this within national borders, but due to its high population and the extensive conversion of natural ecotypes that has already occurred, this does not remain a viable option in Bangladesh. While representative examples of remaining natural ecosystems should certainly be brought under conservation management where feasible, a “regional” approach to setting priorities is warranted (i.e., asking the questions “where only small or scattered examples of a particular ecotype remain in Bangladesh, are they better represented in neighboring countries, and conversely, which species populations and/or ecosystems in Bangladesh are of international significance and hence represent priorities for conservation?”). - There is also an opportunity to distinguish between different types of protected areas and their functions, including biodiversity conservation but also outdoor recreation and environmental services (watershed functions). - As a cautionary note, designation of protected areas with specified boundaries and use restrictions risks minimizing the potential ecosystem and livelihood links between forest protected areas and adjacent similar habitats. In wetlands, a sustainable use approach is needed, including no use zones (sanctuaries) in part of the wetland and designation of other areas where fishing and exploitation of other aquatic resources is allowed. - Specialized staff training in sustainable management of forest protected areas, freshwater wetlands and coastal wetlands would enhance both implementation effectiveness and capacity retention.

Identification and Discussion of Threats	Opportunities for Addressing the Threats
<p>Inappropriate Land-Use Choices and Practices: The essence of natural resources management is matching land-use to land capability. The protected areas of Bangladesh are for the most part in hilly areas where other options for use are limited because of the fragile nature of these areas. Even if the protected area can be safeguarded, actions are needed to ensure that surrounding areas are not degraded and depleted, as this will only lead to greater pressures on remaining forest areas. Similarly freshwater and coastal wetlands are fragile and have been affected or threatened by agriculture, drainage, ship-breaking, ports and oil exploration development. Recently floodplain wetlands are being rapidly enclosed for aquaculture, negatively affecting aquatic biodiversity.</p>	<ul style="list-style-type: none"> - The key to addressing inappropriate land-use lies in knowing more about the land and not just the technology. Land capability studies need to be prepared. A wide variety of improved management methods for hilly areas are available but to date have not been much applied in Bangladesh. These include soil and water conservation engineering measures for agriculture; cut and carry fodder systems; agro-forestry; composting; green manures for soil fertility improvement; etc. - Appropriate development activities around protected areas can be used to alleviate use pressures on protected area resources.
<p>Need for Watershed Management: There is very little mention of the needs for watershed management in sector programs and even fewer program efforts (if any) to address it. Yet each year, flash floods during the early monsoon damage the <i>boro</i> rice crops in the <i>haor</i> areas. Siltation run-off blocks watercourses, damages embankments and fills in fish habitat. Similarly, low season flows into the <i>beels</i> limit their utility as brood areas for fish.</p>	<ul style="list-style-type: none"> - A lack of watershed management programs is not surprising, although the country is very aware of the issue because of the damages wrought by conditions in the extra-territorial watersheds of the Brahmaputra and Ganges Rivers. There are opportunities to address watershed management issues, albeit on a smaller scale, in the northeast and south-eastern hilly regions that could mitigate the adverse impacts felt downstream. Many of the protected areas are watersheds for neighboring wetlands and need attention to guarantee the sustainability of proactive wetland biodiversity conservation and sustainable use programs.
<p>Knowledge Gaps about Biodiversity Assets: Good data and information about the status of biodiversity in the country is lacking, contradictory or not up to date. This hampers sound planning for its protection.</p>	<ul style="list-style-type: none"> - A good set of baseline data and information on the condition of protected areas, habitat integrity and the species found in these areas will be fundamental to sound program planning and subsequent monitoring of program performance. - Bangladesh has numerous competent professionals capable of undertaking basic surveys and studies on the status of biodiversity, both for monitoring and evaluation and awareness raising purposes. - To coordinate and make available diverse data, an easily accessible biodiversity meta-data base is needed. The Department of Environment has an interest in facilitating this.

Identification and Discussion of Threats	Opportunities for Addressing the Threats
<p>Biodiversity Sensitive Choices of Forest Management Technology: Because many of the protected areas were once part of Reserved Forests, their natural stand structure has been altered by the Forest Department through production plantation planting programs.</p>	<ul style="list-style-type: none"> - Encouraging natural regeneration of degraded protected areas should be a preferred methodology for restoration. - There may be occasional need for modest enrichment planting of key species important to forest ecosystems and/or wildlife. This can be accomplished with minimum site disturbance.
<p>Need for Connectivity with other Natural Areas: The long-term sustainability of certain key animal species populations (e.g. elephants) requires larger areas than currently available within the protected area system. The conservation value of Reserved Forest areas and unclassified state forest land needs to be evaluated with “connectivity” requirements in mind. Similarly a number of native “white” fishes (such as carps and large catfish, as well as <i>hilsha</i>, the national fish) migrate along river systems to spawn. They require not only overwintering sanctuaries but also an unhindered flow of water and safe passage in the early monsoon.</p>	<ul style="list-style-type: none"> - There is some potential for accommodating elephant seasonal habitat requirements and movements within Reserved Forest areas, particularly in the southeast of the country (CHT). This could potentially reduce present problems of crop raiding and conflicts with local villagers. - Short but widespread closed seasons to protect <i>Hilsha</i> spawning have shown some success, and similar approaches could be tried in the main rivers. Cooperation with BWDB and local sluice committees is also needed to encourage sluices to be opened for fish migration in the early monsoon.

8.0 USAID'S CURRENT INITIATIVES IN TROPICAL FORESTS AND BIODIVERSITY CONSERVATION AND MANAGEMENT

USAID is successfully pioneering an integrated co-management approach to natural resources management in Bangladesh through its environment program support (MACH, Nishorgo, and, currently, IPAC). While conservation of natural resources remains the central theme, the USAID support also works to expand economic opportunities at a landscape level, giving the poor a central role in the planning and implementation process. It also encourages participation of other members of the community who have a stake in the management and utilization of natural resources, including local government and private enterprise. The objective is to reduce utilization pressure on natural resources by providing alternative livelihood opportunities to communities who depend on these resources. By its very nature, co-management also addresses issues of economic opportunity, food security and governance, in tandem with biodiversity conservation. MACH and the Nishorgo Support Project now stand complete. Since mid-2008, co-management capacity has continued to be built through implementation of IPAC. USAID also remains at the forefront of implementation of bilateral debt-for-nature swap agreements enabled by the Tropical Forest Conservation Act, and implemented in Bangladesh through the Arannayk Foundation.

8.1 Integrated Protected Area Co-management Project (IPAC)

The IPAC Project broadly addresses the following issues:

The Need for an Integrated Protected Area System: The classic (and still valid) approach to conserving biodiversity assets is through development of a representative, national-level protected areas system. The primary challenge is in establishing and institutionalizing management of biodiversity assets within an integrated, representative system, as opposed to individual protected areas selected and managed on the basis of other criteria. Experience worldwide has demonstrated that a genuine system of protected areas provides a center around which to organize and strengthen institutional capacity for conservation. A protected area system works better than isolated protected areas under sectoral/territorial mandate, especially in terms of enhanced institutional capabilities (increased opportunities for staff specialization, learning and experience; the development of internal organizational capabilities specific to protected areas; and career development options for staff). Furthermore, because a protected area system targets values appreciated by society in general and not just those who consume forest products, it reaches a wider audience and can improve the image of the department responsible for providing these services. It also helps to create a national understanding and growing constituency for environmental conservation. There is also an opportunity to distinguish between different types of protected areas and their functions, including biodiversity conservation but also outdoor recreation and environmental services (e.g., watershed functions).

Ensuring Sustainability of Natural Resources Co-management as an Approach: Improving environmental management to reduce poverty requires: (1) a comprehensive understanding of how local environmental conditions relate to poverty, (2) the ability to identify and set priorities with regard to alternative policy options, and (3) the capacity for evaluating their effectiveness and impact. Co-management relies on democratic processes and uses democratic institution building as a tool to promote improved and transparent resource management. It also aims at empowering the poor and landless, who would otherwise be victimized by natural resource degradation and non-sustainable use of resources primarily benefiting wealthy elites. Co-management also addresses fundamental issues of inequality and risk.

USAID's continuing support of co-management in protected areas will help to build local capacity for resource management while also contributing to the development and management of a representative protected areas system. USAID-supported activities have already encouraged GoB policy-makers to consider co-management as a workable means of meeting conservation goals without compromising the productivity of natural resources and poor people's livelihoods.

USAID has been successful to a notable extent in facilitating an enabling policy environment for co-management. The issues addressed by USAID's environment interventions are increasingly being recognized in GoB laws, policies, strategies, action plans and commitments to international conventions and protocols. However, new challenges have emerged and can be expected to continue to emerge in the course of on-the-ground implementation, and continued attention towards emerging issues is therefore required.

Sustainable Financing for Protected Areas Management: A sustainable financing strategy continues to be needed both for the protected areas system as a whole and for individual protected areas. This continues to be a major challenge in institutionalizing the co-management approach.

8.2 Advisory Support to the Arannayk Foundation (Bangladesh Tropical Forest Conservation Foundation)

Starting from negotiating the debt-for-nature swap agreements to formally registering the Arannayk Foundation with the Registrar of Joint Stock Companies, USAID/Bangladesh played a pivotal role in advancing the TFCA process. The USAID Mission Director has been designated the USG Representative on the Board of Directors of AF. The AF is currently considering options for its future development, including attracting funding from a variety of sources and possible evolution into an Eco Fund. Such developments would open the way for AF to play a larger role in co-financing or channeling USAID projects.

8.3 The Role of Other USAID Funding in Supporting Biodiversity Conservation

USAID will also take appropriate steps to ensure that other elements of its country program do not have undue impacts on biodiversity in Bangladesh. The country program as currently constituted (FY2006-2010) comprises four strategic objectives:

- More effective and responsive democratic institutions and practices;
- Expanded economic opportunities created through equitable economic growth;
- A better educated, healthier and more productive population; and
- Improved food security and disaster mitigation, preparedness and relief.

Of these, the objectives related to expanded economic opportunities and improved food security could potentially involve negative impacts on natural biodiversity resources and/or tropical forests. Although the implementation period of the current Country Assistance Strategy (CAS) (2006-2010) is nearly past, continued due diligence will be required to ensure that USAID-supported activities related to these objectives do not negatively impact Bangladesh's biodiversity resources, or otherwise contradict or interfere with biodiversity or tropical forest conservation and management activities being supported by USAID. These caveats also need to be applied explicitly during formulation of any new USAID-supported activities to be included in the 2011-2015 CAS.

More specifically, current USAID programs outside environment/ biodiversity are categorized in Table 8, together with possible synergies with sustainability objectives and conflicts to be avoided or minimized.

Table8: USAID/Bangladesh Country Program – Sustainability Synergies and Conflicts

Program	Sustainability Synergy	Sustainability Conflict to be avoided or minimized
Health and family planning	Reduced population pressure	
Strengthening of local government	Better support to co-management	
Transparency and anti-corruption	Better support to co-management	Lack of cooperation from key natural resource management agencies
Gender equality	Better support to co-management	
Rural electrification	Less reliance on dirty fuels and reduced carbon emissions; Better AIG opportunities	
Renewable energy - solar	Less reliance on dirty fuels and reduced carbon emissions; Better AIG opportunities	
Food for local development (PL 480)	Better AIG opportunities; Better disaster preparedness and response	Better rural roads may improve access for illegal loggers and poachers; roads may disrupt floodplain aquatic habitats
Cyclone shelters	Better disaster preparedness and response	
Disaster response systems	Better disaster preparedness and response	
Education	Improved public environmental awareness	
Shrimp cultivation	Opportunity to introduce sustainable techniques	Possible land use conversion; impact on shrimp fry prevalence

Source: USAID/ Bangladesh website.

9.0 FUTURE USAID ACTIONS PROPOSED IN SUPPORT OF TROPICAL FOREST AND BIODIVERSITY CONSERVATION

Building upon the successful pilot initiatives in pioneering the co-management approach in natural resources and biodiversity management, USAID will continue its oversight of both the IPAC Project and the Arannayk Foundation. To reiterate, these initiatives are broadly aimed at:

- Development of a representative protected areas system in Bangladesh;
- Effective establishment of co-management of natural resources within protected areas, from implementation to policy levels; and
- Establishment of sustainable financing for protected areas management and biodiversity conservation.

Based on current work planning, activities to be implemented under IPAC will continue to focus on:

- Supporting the further development of the natural resources sector and the conservation of biological diversity;
- Developing a protected areas strategy that applies to all ecologically and economically significant areas, including freshwater and forest ecosystems;
- Building technical capacity for protected areas co-management;
- Expanding the geographic area under co-management to ensure the long-term success of the model and to extend socio-economic benefits to surrounding communities; and
- Addressing global climate change mitigation and adaptation issues.

Based on current work planning, activities being supported by Arannayk Foundation funding (2009) focus on:

1. Biodiversity monitoring in selected protected forest areas;
2. Assessment of current status and annual change in carbon stock in selected protected forest areas;
3. Community based restoration and conservation of biodiversity in degraded *Sal* forests;
4. Survey and documentation of sacred groves of Bangladesh;
5. Mass awareness raising and policy advocacy on biodiversity conservation;
6. Arannayk Foundation Information Day;
7. Capacity building of NGOs for improved planning and management of forest and biodiversity conservation projects; and
8. Arannayk Scholarships.

The Arannayk Foundation program is currently under review and recommendations for future directions will be provided separately.

As noted in the previous section, other USAID programs in the future have the potential either to support sustainability objectives or to raise potential conflicts that will need to be avoided or minimized. This is particularly true for the new funding for food security. In the past, innovations in agriculture often produced unforeseen environmental impacts. While it is an important priority for Bangladesh to develop crop varieties that are adapted to the emerging changes in temperature, water regimes and salinity that are expected to flow from climate change, it will be equally important to ensure that all potential negative impacts on the environment are identified and appropriate mitigation measures planned.

If USAID receives new money for climate change mitigation and adaptation, this should have a major positive impact on biodiversity and tropical forest conservation. Nevertheless, USAID should be conscious of potential negative impacts, especially when any change in existing land use is proposed.

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ANNEX B: NATIONALLY THREATENED VASCULAR PLANTS OF BANGLADESH

SOURCE: BANGLADESH NATIONAL HERBARIUM 2001

National Status	Scientific Name	Family
Critically Endangered	<i>Corypha taliera</i>	Palmae
Endangered	<i>Aldrovanda vesiculosa</i>	Droseraceae
Vulnerable	<i>Knema bengalensis</i>	Myristicaceae
	<i>Licuala peltata</i>	Palmae
Lower Risk	<i>Rauvolfia serpentina</i>	Apocynaceae
	<i>Cycas pectinata</i>	Cycadaceae
	<i>Cymbidium aloifolium</i>	Orchidaceae

Note: Bangladesh National Herbarium (2001) has categorized many species as Data Deficient and Not Evaluated which could come under threatened category if there were enough data on their status or if they were evaluated.

ANNEX C: NATIONALLY THREATENED VERTEBRATES (INLAND FISHES, AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS) OF BANGLADESH

SOURCE: IUCN BANGLADESH 2000

INLAND FISHES

National Status	English Name	Scientific Name
Critically Endangered	Boga labeo	<i>Labeo boga</i>
	Nandi labeo	<i>Labeo nandina</i>
	Pangusia labeo	<i>Labeo pangusia</i>
	Olive barb	<i>Puntius sarana</i>
	Tor mahseer	<i>Tor tor</i>
	'Garua bacha'	<i>Clupisoma garua</i>
	Batchwa bacha	<i>Eutropichthys vacha</i>
	Pungas catfish	<i>Pangasius pangasius</i>
	Gangetic goonch	<i>Bagarius bagarius</i>
	Sisor catfish	<i>Sisor rhabdophorus</i>
	Barca snakehead	<i>Channa barca</i>
	Rita	<i>Rita rita</i>
Endangered	Humped featherback	<i>Chitala chitala</i>
	Hamilton's barila	<i>Barilius bendelisis</i>
	Vagra baril	<i>Barilius vagra</i>
	Bengal barb	<i>Bengala elanga</i>
	Glass-barb	<i>Chela laubuca</i>
	Gangetic latia	<i>Crossocheilus latius</i>
	Bata labeo	<i>Labeo bata</i>
	Black rohu	<i>Labeo kalbasu</i>
	Kuria labeo	<i>Labeo gonius</i>
	Cotio	<i>Osteobrama cotio</i>
	Trout	<i>Raiamas bola</i>
	Gangetic Sissortail	<i>Rasbora rasbora</i>
	Necktie loach	<i>Botia Dario</i>
	Y-loach	<i>Botia lohachata</i>
	Giant River-catfish	<i>Sperata seenghala</i>
	Dwarf catfish	<i>Batasio tengana</i>
	Butter catfish	<i>Ompok bimaculatus</i>
	Pabda catfish	<i>Ompok pabda</i>
	Pabo catfish	<i>Ompok pabo</i>
	Silondia vacha	<i>Silondia silondia</i>

National Status	English Name	Scientific Name
	Squarehead catfish	<i>Chaca chaca</i>
	Wrestling Halfbeak	<i>Dermogenys pusillus</i>
	Deocata pipefish	<i>Microphis deocata</i>
	Spotted scat	<i>Scatophagus argus</i>
	Badis	<i>Badis badis</i>
	Frail gourami	<i>Ctenops nobilis</i>
	Giant snakehead	<i>Channa marulius</i>
	Tire-track spiny eel	<i>Mastacembelus armatus</i>
Vulnerable	Gray featherback	<i>Notopterus notopterus</i>
	Giant mottled eel	<i>Anguilla bengalensis</i>
	Reba	<i>Cirrhinus reba</i>
	Two-spot barb	<i>Puntius ticto</i>
	Long-whiskered catfish	<i>Sperata aor</i>
	Gangetic mystus	<i>Mystus cavasius</i>
	Jamuna ailia	<i>Ailia punctata</i>
	Canine catfish eel	<i>Plotosus canius</i>
	Gangetic mud eel	<i>Monopterusuchia</i>
	Elongate glass-perchlet	<i>Chanda nama</i>
	Glassy fish	<i>Pseudambassis ranga</i>
	Mudperch	<i>Nandus nandus</i>
	Asiatic snakehead	<i>Channa orientalis</i>
	One-stripe spiny eel	<i>Macrognathus aculeatus</i>

AMPHIBIANS

National Status	English Name	Scientific Name
Endangered	Balloon frog	<i>Uperodon globulosus</i>
	Green frog	<i>Euphlyctis hexadactylus</i>
	Taipeh frog	<i>Rana taipehensis</i>
Vulnerable	Painted bull frog	<i>Kaloula pulchra</i>
	Ornate microhylid	<i>Microhyla ornate</i>
	Red microhylid	<i>Microhyla rubra</i>
	Boulenger's frog	<i>Rana alticola</i>
	Southeast Asian tree frog	<i>Rhacophorus maximus</i>

REPTILES

National Status	English Name	Scientific Name
Critically Endangered	Estuarine crocodile	<i>Crocodylus porosus</i>
	Gangetic gharial	<i>Gavialis gangeticus</i>
	River terrapin	<i>Batagur baska</i>
	Three-striped roof turtle	<i>Kachuga dhongoka</i>
	Yellow tortoise	<i>Indotestudo elongate</i>
	Asian giant tortoise	<i>Manouria emys</i>
	Bostami turtle	<i>Aspideretes nigricans</i>
	Asiatic softshell turtle	<i>Chitra indica</i>
	Bibron's softshell turtle	<i>Pelochelys bibroni</i>
	Flying lizard	<i>Draco blanfordii</i>
	Reticulated python	<i>Python reticulate</i>
	Russell's viper	<i>Vipera russellii</i>
Endangered	South Asian box turtle	<i>Cuora amboinensis</i>
	Black pond turtle	<i>Geoclemys hamiltonii</i>
	Brahminy river turtle	<i>Hardella thurjii</i>
	Painted roofed turtle	<i>Kachuga kachuga</i>
	Brown roofed turtle	<i>Kachuga smithii</i>
	Assam roofed turtle	<i>Kachuga sylhetensis</i>
	Median roofed turtle	<i>Kachuga tentoria</i>
	Three-keeled land tortoise	<i>Melanochelys tricarinata</i>
	Bangladesh black turtle	<i>Melanochelys trijuga</i>
	Ganges soft shell turtle	<i>Aspideretes gangeticus</i>
	Peacock soft shell turtle	<i>Aspideretes hurum</i>
	Yellow monitor	<i>Varanus flavescens</i>
	Water monitor	<i>Varanus salvator</i>
	Rock python	<i>Python molurus</i>
	Ornate flying snake	<i>Chrysopelea ornata</i>
	Common trinket snake	<i>Elaphe Helena</i>
	Copper head trinket snake	<i>Elaphe radiate</i>
	Green keelback snake	<i>Macropisthodon plumbicolor</i>
	Common krait	<i>Bungarus caeruleus</i>
	Banded krait	<i>Bungarus fasciatus</i>
	Binocellate cobra	<i>Naja naja</i>
	King cobra	<i>Ophiophagus Hannah</i>
	Spot-tailed pit viper	<i>Trimeresurus erythrurus</i>
	Green pit viper	<i>Trimeresurus gramineus</i>
Vulnerable	Bengal eyed turtle	<i>Morenia petersi</i>
	Spotted flap shell turtle	<i>Lissemys punctata</i>
	House lizard	<i>Hemidactylus bowringii</i>
	Garden lizard	<i>Calotes rouxii</i>

National Status	English Name	Scientific Name
	Striped keelback	<i>Mabuya dissimilis</i>
	Bengal monitor	<i>Varanus bengalensis</i>
	Common green whip snake	<i>Ahetulla nasutus</i>
	Green cat snake	<i>Boiga cyanea</i>
	Dog-faced water snake	<i>Cerberus rhynchops</i>
	Common rat snake	<i>Coluber mucosus</i>
	Green rat snake	<i>Coluber nigromarginatus</i>
	Painted bronzeback tree snake	<i>Dendrelaphis picta</i>
	Common bronzeback tree snake	<i>Dendrelaphis tristis</i>
	Common wolf snake	<i>Lycodon aulicus</i>
	Banded wolf snake	<i>Lycodon fasciatus</i>
	Yellow speckled wolf snake	<i>Lycodon jara</i>
	Cantor's kukri snake	<i>Oligodon cyclurus</i>
	Red-necked keelback	<i>Rhabdophis subminiatus</i>
	Dark-bellied marsh snake	<i>Xenochrophis cerasogaster</i>
	Monocellate cobra	<i>Naja kaouthia</i>

BIRDS

National Status	English Name	Scientific Name
Critically Endangered	Black francolin	<i>Francolinus francolinus</i>
	Swamp francolin	<i>Francolinus gularis</i>
	Gray peacock pheasant	<i>Polyplectron bicalcaratum</i>
	White-winged duck	<i>Cairina scutulata</i>
	Comb duck	<i>Sarkidiornis melanotos</i>
	Great pied hornbill	<i>Buceros bicornis</i>
	Dollarbird	<i>Eurystomus orientalis</i>
	Large Indian parakeet	<i>Psittacula eupatria</i>
	Pale-capped pigeon	<i>Columba punicea</i>
	Pin-tailed green pigeon	<i>Treron apicauda</i>
	Pallas's fish eagle	<i>Haliaeetus leucoryphus</i>
	Red-headed vulture	<i>Sarcogyps calvus</i>
	Malayan night heron	<i>Gorsachius melanolophus</i>
	Eurasian spoonbill	<i>Platela leucorodia</i>
	Greater adjutant	<i>Leptoptilos dubius</i>
	Painted stork	<i>Mycteria leucocephala</i>
	Yellow-throated laughing thrush	<i>Garrulax galbanus</i>
	Black-breasted parrotbill	<i>Paradoxornis flavirostris</i>
	Spot-throated babbler	<i>Pellorneum albiventer</i>
Endangered	Kalij pheasant	<i>Lophura leucomelanos</i>

National Status	English Name	Scientific Name
	Manipur bush quail	<i>Perdica manipurensis</i>
	Oriental pied hornbill	<i>Anthracoceros albirostris</i>
	Common gray hornbill	<i>Ocyrceros birostris</i>
	Red-headed trogon	<i>Harpactes erythrocephalus</i>
	Blyth's kingfisher	<i>Alcedo Hercules</i>
	Sirkeer cuckoo	<i>Phaenicophaeus leschenaultia</i>
	Spot-bellied eagle owl	<i>Bubo nipalensis</i>
	Tawny fish owl	<i>Ketupa flavipes</i>
	Gray nightjar	<i>Caprimulgus indicus</i>
	Masked finfoot	<i>Heliopais personata</i>
	Spur-winged lapwing	<i>Vanellus duvaucelli</i>
	Scissorbill	<i>Rynchops albigollis</i>
	Black-bellied tern	<i>Sterna acuticauda</i>
	Lesser adjutant	<i>Leptoptilos javanicus</i>
	White-bellied sea eagle	<i>Haliaeetus leucogaster</i>
	Purple cochoa	<i>Cochoa purpurea</i>
	Streaked spiderhunter	<i>Arachnothera magna</i>
Vulnerable	Rufous-bellied woodpecker	<i>Dendrocopos hyperythrus</i>
	Ruddy kingfisher	<i>Halcyon coromanda</i>
	Brown fish owl	<i>Ketupa zeylonensis</i>
	Darter	<i>Anhinga melanogaster</i>

MAMMALS

National Status	English Name	Scientific Name
Critically Endangered	Bengal slow loris	<i>Nycticebus bengalensis</i>
	Long-tailed macaque	<i>Macaca fascicularis</i>
	Pig-tailed macaque	<i>Macaca nemestrina</i>
	Common langur	<i>Semnopithecus entellus</i>
	Phayre's langur	<i>Trachyithecus phayrei</i>
	Hoolock gibbon	<i>Hylobates hoolock</i>
	Asiatic wild dog	<i>Cuon alpinus</i>
	Asian golden cat	<i>Catopuma temmincki</i>
	Clouded leopard	<i>Neofelis nebulosa</i>
	Leopard	<i>Panthera pardus</i>
	Tiger	<i>Panthera tigris</i>
	Common otter	<i>Lutra lutra</i>
	Sun bear	<i>Ursus malayanus</i>
	Sloth bear	<i>Melarsus ursinus</i>
	Binturong	<i>Arctictis binturong</i>
	Broad-beaked dolphin	<i>Peponocephala electra</i>
	Snubfin dolphin	<i>Orcaella brevirostris</i>
	Asian elephant	<i>Elephas maximus</i>
	Sambar	<i>Cervus unicolor</i>
	Burmese goat antelope	<i>Capricornis sumatraensis</i>
	Indian pangolin	<i>Manis crassicaudata</i>
Endangered	Capped langur	<i>Trachypithecus pileatus</i>
	Jungle cat	<i>Felis chaus</i>
	Fishing cat	<i>Prionailurus viverrinus</i>
	Crab-eating mongoose	<i>Herpestes urva</i>
	Oriental small-clawed otter	<i>Aonyx cinerea</i>
	Smooth-coated otter	<i>Lutra perspicillata</i>
	Asiatic black bear	<i>Ursus thibetanus</i>
	Large Indian civet	<i>Viverra zibetha</i>
	Finless porpoise	<i>Neophocaena phocaenoides</i>
	Gangetic dolphin	<i>Platanista gangetica</i>
	Barking deer	<i>Muntiacus muntjak</i>
	Crested porcupine	<i>Hystrix indica</i>
	Rufous-tailed hare	<i>Lepus nigricollis</i>
Vulnerable	Rhesus macaque	<i>Macaca mulatta</i>
	Jackal	<i>Canis aureus</i>
	Bengal fox	<i>Vulpes bengalensis</i>
	Common mongoose	<i>Herpestes edwardsi</i>
	Common palm civet	<i>Paradoxurus hermaphroditus</i>
	Small Indian civet	<i>Viverricula indica</i>

ANNEX D: SECTION 118 AND 119 OF THE FOREIGN ASSISTANCE ACT

Part I, Section 118\73\ - Tropical Forests

(a) Importance of Forests and Tree Cover.--In enacting section 103(b)(3) of this Act the Congress recognized the importance of forests and tree cover to the developing countries. The Congress is particularly concerned about the continuing and accelerating alteration, destruction, and loss of tropical forests in developing countries, which pose a serious threat to development and the environment. Tropical forest destruction and loss—

(1) result in shortages of wood, especially wood for fuel; loss of biologically productive wetlands; siltation of lakes, reservoirs, and irrigation systems; floods; destruction of indigenous peoples; extinction of plant and animal species; reduced capacity for food production; and loss of genetic resources; and

(2) can result in desertification and destabilization of the earth's climate. Properly managed tropical forests provide a sustained flow of resources essential to the economic growth of developing countries, as well as genetic resources of value to developed and developing countries alike.

(b) Priorities.--The concerns expressed in subsection (a) and the recommendations of the United States Interagency Task Force on Tropical Forests shall be given high priority by the President--

(1) in formulating and carrying out programs and policies with respect to developing countries, including those relating to bilateral and multilateral assistance and those relating to private sector activities; and

(2) in seeking opportunities to coordinate public and private development and investment activities which affect forests in developing countries.

(c) Assistance to Developing Countries.--In providing assistance to developing countries, the President shall do the following:

(1) Place a high priority on conservation and sustainable management of tropical forests.

(2) To the fullest extent feasible, engage in dialogues and exchanges of information with recipient countries--

(A) which stress the importance of conserving and sustainably managing forest resources for the long-term economic benefit of those countries, as well as the irreversible losses associated with forest destruction, and

(B) which identify and focus on policies of those countries which directly or indirectly contribute to deforestation.

(3) To the fullest extent feasible, support projects and activities--

(A) which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and

(B) which help developing countries identify and implement alternatives to colonizing forested areas.

- (4) To the fullest extent feasible, support training programs, educational efforts, and the establishment or strengthening of institutions which increase the capacity of developing countries to formulate forest policies, engage in relevant land-use planning, and otherwise improve the management of their forests.
- (5) To the fullest extent feasible, help end destructive slash-and-burn agriculture by supporting stable and productive farming practices in areas already cleared or degraded and on lands which inevitably will be settled, with special emphasis on demonstrating the feasibility of agroforestry and other techniques which use technologies and methods suited to the local environment and traditional agricultural techniques and feature close consultation with and involvement of local people.
- (6) To the fullest extent feasible, help conserve forests which have not yet been degraded, by helping to increase production on lands already cleared or degraded through support of reforestation, fuelwood, and other sustainable forestry projects and practices, making sure that local people are involved at all stages of project design and implementation.
- (7) To the fullest extent feasible, support projects and other activities to conserve forested watersheds and rehabilitate those which have been deforested, making sure that local people are involved at all stages of project design and implementation.
- (8) To the fullest extent feasible, support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing, including reforestation, soil conservation, and other activities to rehabilitate degraded forest lands.
- (9) To the fullest extent feasible, support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation, including research in agroforestry, sustainable management of natural forests, small-scale farms and gardens, small-scale animal husbandry, wider application of adopted traditional practices, and suitable crops and crop combinations.
- (10) To the fullest extent feasible, conserve biological diversity in forest areas by--
 - (A) supporting and cooperating with United States Government agencies, other donors (both bilateral and multilateral), and other appropriate governmental, intergovernmental, and nongovernmental organizations in efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis;
 - (B) whenever appropriate, making the establishment of protected areas a condition of support for activities involving forest clearance or degradation; and
 - (C) helping developing countries identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas.
- (11) To the fullest extent feasible, engage in efforts to increase the awareness of United States Government agencies and other donors, both bilateral and multilateral, of the immediate and long-term value of tropical forests.
- (12) To the fullest extent feasible, utilize the resources and abilities of all relevant United States Government agencies.
- (13) Require that any program or project under this chapter significantly affecting tropical forests (including projects involving the planting of exotic plant species)--

(A) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land, and

(B) take full account of the environmental impacts of the proposed activities on biological diversity, as provided for in the environmental procedures of the Agency for International Development.

(14) Deny assistance under this chapter for--

(A) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner which minimizes forest destruction and that the proposed activity will produce positive economic benefits and sustainable forest management systems; and

(B) actions which significantly degrade national parks or similar protected areas which contain tropical forests or introduce exotic plants or animals into such areas.

(15) Deny assistance under this chapter for the following activities unless an environmental assessment indicates that the proposed activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development:

(A) Activities which would result in the conversion of forest lands to the rearing of livestock.

(B) The construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands.

(C) The colonization of forest lands.

(D) The construction of dams or other water control structures which flood relatively undegraded forest lands.

(d) PVOs and Other Nongovernmental Organizations.--Whenever feasible, the President shall accomplish the objectives of this section through projects managed by private and voluntary organizations or international, regional, or national nongovernmental organizations which are active in the region or country where the project is located.

(e) Country Analysis Requirements.--Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of-

(1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests, and

(2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.

(f) Annual Report.--Each annual report required by section 634(a) of this Act shall include a report on the implementation of this section.

Sec. 119 Endangered Species

(a) The Congress finds the survival of many animal and plant species is endangered by overhunting, by the presence of toxic chemicals in water, air and soil, and by the destruction of habitats. The Congress further finds that the extinction of animal and plant species is an irreparable loss with potentially serious

environmental and economic consequences for developing and developed countries alike. Accordingly, the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems, and through the protection of wildlife habitats should be an important objective of the United States development assistance.

(b) \75\ In order to preserve biological diversity, the President is authorized to furnish assistance under this part, notwithstanding section 660,\76\ to assist countries in protecting and maintaining wildlife habitats and in developing sound wildlife management and plant conservation programs. Special efforts should be made to establish and maintain wildlife sanctuaries, reserves, and parks; to enact and enforce anti-poaching measures; and to identify, study, and catalog animal and plant species, especially in tropical environments.

(c) \77\ Funding Level.--For fiscal year 1987, not less than \$2,500,000 of the funds available to carry out this part (excluding funds made available to carry out section 104(c)(2), relating to the Child Survival Fund) shall be allocated for assistance pursuant to subsection (b) for activities which were not funded prior to fiscal year 1987. In addition, the Agency for International Development shall, to the fullest extent possible, continue and increase assistance pursuant to subsection (b) for activities for which assistance was provided in fiscal years prior to fiscal year 1987.

\77\ Pars. (c) through (h) were added by sec. 302 of Public Law 99- 529 (100 Stat. 3017).

(d) \77\ Country Analysis Requirements.--Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of-

- (1) the actions necessary in that country to conserve biological diversity, and
- (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.

(e) \77\ Local Involvement.--To the fullest extent possible, projects supported under this section shall include close consultation with and involvement of local people at all stages of design and implementation.

(f) \77\ PVOs and Other Nongovernmental Organizations.-- Whenever feasible, the objectives of this section shall be accomplished through projects managed by appropriate private and voluntary organizations, or international, regional, or national nongovernmental organizations, which are active in the region or country where the project is located.

(g) \77\ Actions by AID.--The Administrator of the Agency for International Development shall-(1) cooperate with appropriate international organizations, both governmental and nongovernmental;

(2) look to the World Conservation Strategy as an overall guide for actions to conserve biological diversity;

(3) engage in dialogues and exchanges of information with recipient countries which stress the importance of conserving biological diversity for the long-term economic benefit of those countries and which identify and focus on policies of those countries which directly or indirectly contribute to loss of biological diversity;

(4) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity;

(5) whenever possible, enter into long-term agreements in which the recipient country agrees to protect ecosystems or other wildlife habitats recommended for protection by relevant governmental or nongovernmental organizations or as a result of activities undertaken pursuant to paragraph

- (6), and the United States agrees to provide, subject to obtaining the necessary appropriations, additional assistance necessary for the establishment and maintenance of such protected areas;
- (6) support, as necessary and in cooperation with the appropriate governmental and nongovernmental organizations, efforts to identify and survey ecosystems in recipient countries worthy of protection;
- (7) cooperate with and support the relevant efforts of other agencies of the United States Government, including the United States Fish and Wildlife Service, the National Park Service, the Forest Service, and the Peace Corps;
- (8) review the Agency's environmental regulations and revise them as necessary to ensure that ongoing and proposed actions by the Agency do not inadvertently endanger wildlife species or their critical habitats, harm protected areas, or have other adverse impacts on biological diversity (and shall report to the Congress within a year after the date of enactment of this paragraph on the actions taken pursuant to this paragraph);
- (9) ensure that environmental profiles sponsored by the Agency include information needed for conservation of biological diversity; and
- (10) deny any direct or indirect assistance under this chapter for actions which significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas.
- (h) \77\ Annual Reports.--Each annual report required by section 634(a) of this Act shall include, in a separate volume, a report on the implementation of this section.

ANNEX E: BIOGRAPHICAL SKETCHES OF THE ASSESSMENT TEAM

This Tropical Forestry and Biodiversity Analysis Update for Bangladesh was conducted as part of a larger effort to complete the “Bangladesh Environment Sector Assessment and Strategic Analysis.” USAID/Bangladesh’s “Bangladesh Environment Sector Assessment and Strategic Analysis” has the following objectives:

- Identify the overall needs of the Bangladesh environment sector.
- Assess USAID’s comparative advantage.
- Propose programmatic priorities given various funding levels to match with the Mission’s overarching comparative advantage and goal of promoting responsible pro-poor and equitable economic growth.
- Assist the Arannayk Foundation to develop a program strategy.

A series of reports were produced to fulfill these objectives, and the Tropical Forestry and Biodiversity Analysis Update (“Update”) draws heavily from research conducted to produce this series of reports as well as the previous Tropical Forestry and Biodiversity Analysis (2005). The Team that completed and contributed their expertise to this series of reports is presented below:

Peter Whitford – Team Leader

Dr. Peter Whitford is a natural resource management specialist with excellent leadership and expertise in water resource management and planning, rural development, and environmental policy, assessment and program evaluation expertise. Dr. Whitford’s professional career spans over 40 years and includes long-term and short-term assignments for various funding agencies throughout the world. From January 1984 till June 1987, Dr. Whitford served as the World Bank’s Head of Agriculture in Bangladesh where he was jointly responsible for about 25 projects in the rural development, fisheries, flood control, irrigation, research extension, credit, forestry, and poverty alleviation sectors. Returning again to Bangladesh from March to June 2006, Dr. Whitford was Team Leader on the USAID-funded Evaluation of the USAID/Bangladesh Environment Program. Dr. Whitford is a well organized Team Leader with superb analytical skills and keen insight into Bangladesh’s environment.

Marlon Flores – Environment and Global Climate Change Specialist

Mr. Flores is a skilled professional with over 15 years of progressive experience in international protected areas (PA) management, ecosystem-based revenue mechanisms (including payments for ecosystem services, REDD (Reducing Emission from Deforestation and Forest Degradation), PA Climate Change mitigation and adaptation), PA financial planning, environmental trust funds (under the USAID-TFCA Tropical Forestry Conservation Act), PA business planning and environmental fiscal reform. Mr. Flores has extensive experience in establishing complex high-level institutional partnerships and all aspects of project/program management. He is an effective facilitator of organizational change with exceptional problem solving skills and ability to work effectively under pressure. Mr. Flores has extensive and well-established connections with the donor community (bilateral and multilateral), national governments, and the global network of conservation finance practitioners. He just returned from a mission in August 2009 as Secondary Revenue Sharing Specialist for ECODIT on the Afghanistan Biodiversity Support Program Mr. Flores was responsible for developing sustainable funding source plans for the Band-i-Amir National Park, Afghanistan’s first national park.

Mr. Flores is currently Senior Advisor at the Institute for International and European Environmental Policy in Washington, DC where he serves as a contact on conservation finance and funding institutions including international NGOs, bilateral and multilateral funding agencies and governments focusing on biodiversity finance, climate change adaptation and mitigation and REDD. From 2001 until 2009, Mr. Flores was the Lead Conservation Finance & Policy Advisor of The Nature Conservancy since February. Among other projects, Mr. Flores led the implementation of TNC's protected area (PA) sustainable finance and policy strategy and developed Trust Funds supported by the USAID/Tropical Forestry Conservation Act (TFCA). His has also worked with organizations such as The World Bank (GEF Programs), UNESCO, UNDP, WBI-GDLN, CARE International, Danida, COWI Consulting Engineers & Planners of Denmark.

Richard Salter – International Biodiversity Specialist

Mr. Salter is a biodiversity expert with over 35 years of experience in international development and conservation organizations and in the private sector. He specializes in assessment, planning and management of protected areas; biodiversity inventories and habitat assessments; assessment of environmental impacts of land use activities (water management, agriculture, oil and gas development, forestry, roads and other access); training needs assessment and curriculum development; and project planning, implementation, evaluation and management. Mr. Salter is familiar with planning and working principles of the United Nations, World Bank, Asian Development Bank, international NGOs and developing country governments. He is often responsible for project teams of specialists and support staff, and for budget oversight and reporting. From January 2005 till September 2008 Mr. Salter served as International Team Leader for the UNDP/GEF-funded Tonle Sap Conservation Project in Cambodia, where he developed biodiversity conservation within a sustainable use context in the Tonle Sap Biosphere Reserve (a globally significant wetland/floodplain ecosystem). As ECODIT's Biodiversity Strategy Specialist starting on several missions, Mr. Salter is helping to develop Afghanistan's first National Biodiversity Strategy and Action Plan under the USAID-funded Afghanistan Biodiversity Support Program.

Mr. Salter was the Institutional Development Specialist that helped establish the Tropical Forest Conservation Foundation (Arannayk Foundation) in Bangladesh. In this role he assessed the training needs and prepared a curriculum for NGO training in conservation and management of tropical forest biodiversity, contributed to the development of a public awareness strategy, and assisted with the development of an implementation strategy for the Foundation's activities (for Chemonics International/USAID). Mr. Salter's professional field experience includes tropical and temperate wetlands; tropical, subtropical, temperate and boreal forest areas; tropical and Arctic coastal and marine ecosystems; karst ecosystems; temperate and Arctic deserts; and Arctic and alpine tundra.

Parvin Sultana – Bangladesh Environmental Policy and Institutions Expert

Dr. Sultana is an international environmental management specialist with over 30 years experience in participatory natural resources management (fisheries, water, and forests), community development, and impact assessment. Her recent work has included a wide range of evaluations of environment related projects in Bangladesh including those involved with water management, fisheries, forestry, and rural development. Since 1998 she has worked on a series of projects facilitating community-based co-management of fisheries and wetlands mainly in Bangladesh but also in Vietnam and Zimbabwe. Between 1999 and 2000 Dr. Sultana facilitated the participatory planning process for UNDP/Chittagong Hilltracts National Environmental Management Action Plan (NEMAP) to address environmental issues through all 3 districts of the Chittagong Hilltracts as an extension of the earlier NEMAP.

Recently, Dr. Sultana has been networking organizations of impoverished fishers and other floodplain users in Bangladesh to adopt more coordinated ecosystem level management actions across adjacent floodplain wetlands such as fisheries conservation and management and integrated pest management. She has also conducted research and development on integrated floodplain management, supported institutional

development for integrated water management, developed methods for consensus building and participatory planning for natural resource management, supported gender development in the Bangladesh Department of Fisheries, and conducted socio-economic and household consumption surveys. Dr. Sultana was formerly Sustainable Development Advisor for UNDP Bangladesh (1995 - 1996) and is currently a part time senior research fellow at Middlesex University in the UK. Dr Sultana is Bangladeshi and fluent in English and Bangla.

Monirul Khan – Local Biodiversity Expert, Fauna

Dr. Khan is a wildlife biology expert with over 15 years experience actively researching, monitoring, and managing biodiversity conservation (particularly wildlife) in Bangladesh. Dr. Khan is Assistant Professor of Zoology at Jahangirnagar University in Dhaka and has working relationships with International Resources Group (IRG), Zoological Society of London (ZSL), and IUCN among others. As Senior Program Officer under the USAID-funded Nature Conservation Management (NACOM) project Dr. Khan analyzed data and prepared reports on nature conservation and management. As Wildlife Expert from 2005 – 2008 on the NACOM project Dr. Khan conducted participatory bird studies in five protected areas covered by the Nishorgo Support Project. Dr. Khan is currently conducting a participatory bird survey to assess protected area management impacts in protected areas under the USAID-funded Integrated Protected Area Co-management Project.

Khairul Alam – Local Biodiversity Expert, Flora

Dr. M. Khairul Alam has over 31 years professional research experiences in Tropical Forestry, particularly in Forest Botany, Ecology, Biodiversity Conservation and Management, Indigenous Knowledge, Agroforestry and Technology Transfer. Dr. Alam worked as Project Manager at The World Bank-funded Agricultural Research Management Project: BFRI component (March 1998 - January 1999). He was the Project Manager in developing the National Biodiversity Strategy and Action Plan (NBSAP) for Bangladesh funded by GEF/UNDP and implemented by IUCN Bangladesh Country Office.

Dr. Alam has proven experience in biodiversity project planning and successfully completed an assessment report on Conservation Values of Chunati Wildlife Sanctuary and Identification of Critical Conservation Areas for Inclusion in the Nishorgo Support Project in 2005. Dr. Alam was team member in Evaluation of the USAID/Bangladesh Environment Program (MACH and NSP projects) in 2006. He wrote reports on the Assessment of Forest Departments Institutional Organization and Capacity to Manage the Protected Area systems of Bangladesh under Nishorgo Support Project supported by USAID in 2004 and Capacity Building for Promoting and Implementing Co-Management of Protected Areas in Bangladesh under IPAC project in May 2009. Recently he worked in an Appraisal Mission of GTZ (German Government) for reforestation project of Chunati Wildlife Sanctuary in Bangladesh (July – August 2009). He is also involved as a Specialist in evaluating project proposals for the Arannayk Foundation.