Profile on Environmental and Social Considerations in Bangladesh

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Japan International Cooperation Agency

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Abbreviation List

ADB	Asian Development Bank
AECEN	Asian Environmental Compliance and Enforcement Network
AIA	archaeological impact assessments
APs	Affected Persons
AQ	Air Quality
AQI	Air Quality Index
AQMP	Air Quality Monitoring Programme
BAEC	Bangladesh Atomic Energy Commission
BBA	Bangladesh Bridge Authority
BBS	Bangladesh Bureau of Statistics
BCAS	Bangladesh Center for Advanced Studies
BCL	Bangladesh Consultants Ltd.
BETS	BETS International
BNP	Bangladesh Nationalist Party
BOD	Biological Oxygen Demand
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CAI	Clean Air Initiative
CAMS	Continuous AQ Monitoring Station
CASE	Clean Air and Sustainable Environment
CBD	Convention on Biological Diversity
CBN	Cost of Basic Needs
CBO	Community Based Organization
CHT	Chittagong Hill Tracts
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
CR	Critically Endangered
CSC	Construction Supervision Consultant

CWASA	Chittagong Water Supply and Sewerage Authority
CZMP	Coastal Zone Management Plan
DCI	Direct Calorie Intake
DFID	Department for International Development, UK
DG	Director General
DoE	Department of Environment
DPHE	Department of Public Health Engineering
DTCB	Dhaka Transport Coordination Board
DWASA	Dhaka Water Supply and Sewerage Authority
EA	Environmental Assessment
ECA	Environment Court Act
ECA	Environment Conservation Act
ECA	Ecologically Critical Area
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EMP	Environmental Management Plan
EN	Endangered
ETP	Effluent Treatment Plant
EU	Environmental Unit
EW	Extinct in the Wild
EX	Extinct
FAO	Food and Agriculture Organization of the United Nations
FEI	Food Energy Intake
FI	Financial intermediary
FY	financial year
GED	General Economics Division
GEF	Global Environment Facility
GIS	Geographic Information System
GMO	Genetically Modified Organism
GOB	Government of Bangladesh
GR	Game Reserve
GSMB	Geological Survey and Mines Bureau
HIES	Household Income and Expenditure Survey
HNP	Health Nutrition and Population

IBA	Important Bird Area
IEE	Initial Environmental Examination
ILO	International Labour Organisation
IMF	International Monetary Fund
IPAP	Indigenous Peoples Action Plan
IPP	Indigenous Peoples Plan
IPRA	Indigenous Peoples Rights Act
IPs	Indigenous Peoples
IROW	Infrastructure Right-of
IUCN	International Union for Conservation of Nature
IZ	Intermediate Zones
JICA	Japan International Cooperation Agency
JILAF	Japan International Labour Foundation
JN	Jumma Net
LAO	Legal Affairs Office
LAP	Land Acquisition Plan
LAPRAP	Land Acquisition Plan and Resettlement Action Plan
LARF	Land Acquisition and Resettlement Framework
LDC	Least Developed Countries
MDG	Millennium Development Goal
MEA	Multilateral Environmental Agreements
MHFW	Ministry of Health and Family Welfare
MoEF	Ministry of Environment and Forests
MOFA	Ministry of Foreign Affairs of Japan
MWCA	Ministry of Women and Children Affairs
NAMIC	National Arsenic Mitigation Information Center
NBSAP	National Biodiversity Strategy and Action Plan
NCS	National Conservation Strategy
NDWQS	National Drinking Water Quality Survey
NEMAP	National Environmental Management Action Plan
NGO	Non-Governmental Organisation
NOC	No Objection Certificate
NP	National Park
NSAPR	National Strategy for Accelerated Poverty Reduction
NSAPR II	Second National Strategy for Accelerated Poverty Reduction
PAPs	Project Affected Persons

PC	Public Consultation
PIU	Project Implementation Unit
PM	Particulate Matters
PMO	Project Management Office
PMS	Poverty Monitoring Survey
PRSP	Poverty Reduction Strategy Paper
R&R	Resettlement and Rehabilitation
RAJUK	Rajdhani Unnayan Kartripakkha
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SPM	Suspended Particulate Matters
SPS	Safeguard Policy Statement
SWM	Solid Waste Management
TSP	Total Suspended Particle
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN-HABITAT	United Nations Human Settlements Programme
UNICEF	United Nations Children's Fund
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
VU	Vulnerable
WB	World Bank
WB OP	World Bank Operational Policy
WFCL	Worst Forms of Child Labour
WHO	World Health Organization
WS	Wildlife Sanctuary
WSP	Water and Sanitation Program

Chapter 1

Country Overview

1 Country Overview

1.1 Overview

1.1.1 Map of the Country

Figure 1.1.1: Map of Bangladesh

1.1.2 Location and Topology

Bangladesh, officially known as the People's Republic of Bangladesh, achieved independence from Pakistan in 1971. It is bordered by India to the west, north and north-east, and by Myanmar to the south-east.

Bangladesh is one of the largest deltas in the world formed by the congruence of three Himalayan rivers—the Ganges (the Padma in Bengali), the Brahmaputra (the Jamuna in Bengali) and the Meghna—with a long coastline along the Bay of Bengal. Floodplains (80%), terraces (8%) and hills (12%) cover the land area. The hill zone is relatively small and mainly located in the southeast (Chittagong Hill tracts, the highest point of 1,230 m is at Mt. Keokradong) and in the northeast (Sylhet division). With plenty of water resources and fertile soil, the majority of the land is sufficiently fertile for rice-paddy cultivation. However, it is also flood prone.

1.1.3 Climate

The country has a subtropical monsoon climate, characterised by high temperatures and heavy rainfall and, often, very high humidity. The three seasons are distinct: a mild winter (November to February), a hot, humid summer (March to June) and a humid, warm monsoon with heavy rainfall (June to October). Bangladesh is the coldest from late December to early January, with average temperatures dipping as low as 4–7 °C. The temperature then increases until April, and the temperature at this time ranges from 27–30 °C in most parts of the country, except for areas such as the Rajshahi and Kushtia districts where the maximum temperature can rise up to 40 °C or more. The annual average temperature of Dhaka, the capital of Bangladesh, is 25 °C and the monthly temperature varies from 18 °C in January and 29 °C in August.

Approximately 80% of the annual average rainfall of 1,854 mm occurs between May and September. Chittagong has a completely tropical monsoon climate with hot, wet summers and dry, cool winters. The maximum temperatures are between 29 °C and 35 °C, and the minimum temperatures are between 12 °C and 17 °C. Generally, the total annual rainfall throughout the city is between 2,059 mm and 3,048 mm. For details, refer to Section 2.1 (Overview).

1.2 Legislation and Policies Related to Environmental and Social Considerations

Bangladesh has 185 environmental laws, including those directly and indirectly concerned with the environment and those that are interim measures (Hassan 2001). Basic laws were enacted before 1947 during the British colonial period. In the early 1970s, globally, an increasing emphasis was placed on solving environmental problems. Bangladesh had just gained independence when the 1972 United Nations Conference on the Human Environment was held in Stockholm, Sweden. Some of the laws and other legal instruments enacted and amended in Bangladesh since then include the 1974 Bangladesh Wildlife Act, 1977 Environmental Pollution Control Ordinance, 1979 Factory Rules, 1982 Protection and Conservation of Fish Act, 1983 Agricultural Pesticides Ordinance, 1983 Motor Vehicles Ordinance, 1989 Bangladesh Environmental Prevention Ordinance and 1990 Forest Act (Miyake 2009). For a schedule of major domestic environmental laws in Bangladesh, see Table A-2 in the Appendix.

Since the 1992 Rio de Janeiro summit, Bangladesh has created comprehensive policies and laws which, unlike the individual laws created previously, consider the entire environment. In the same year, the government also announced the Environmental Policy and the Environmental Action Plan. The former covered environmental policies in 15 fields, along with harmonisation of legal frameworks and institutions. One special feature of the policy was that it stated the grounds for implementing environmental impact assessments. The Environmental Action Plan set forth action plans in 17 fields to serve as specific vehicles to apply environmental policy, including designation of ministries and agencies to be involved in policy fulfilment. A very important part of this plan was that it required the preparation of an environmental white paper every five years (Miyake 2009).

In 1995, the government drew up the National Environmental Management Action Plan (NEMAP) with the cooperation of the United Nations Environment Programme. Its stated purposes included increasing awareness of serious environmental problems in Bangladesh, reducing environmental deterioration as much as possible, improving the environment and conserving biodiversity, and deciding on the actions needed to facilitate sustainable development and to improve the qualitative indicators for human livelihoods (MoEF 1995). NEMAP covers four categories: institutional issues, sectoral issues, location-specific issues and long-term issues, and it was developed while holding citizen-participation workshops attended not only by administrative authorities but also by NGOs and involved citizens. It manages matters such as the understanding of environmental problems in each region and

measures to contend with them (Miyake 2009).

Also in 1995, the Bangladesh Environment Conservation Act (ECA) was passed to repeal the 1989 Bangladesh Environment Prevention Ordinance. Its 21 articles comprehensively covered the basic sectors of environmental conservation. The law was partially amended in 2000 and again in 2002.

The main objectives of ECA are as follows:

- Conservation and improvement of the environment
- Control and mitigation of pollution of environment
- Declaration of ecologically critical areas
- Restriction on the operation and process that can or cannot be carried out in ecologically critical areas
- Environmental clearance
- Regulation of the industries and discharge permit for other development activities
- Promulgation of standards for the quality of air, water, noise and soil for different areas and for different purposes
- Promulgation of standard limits for the discharge and emission of waste
- Formulation and declaration of environmental guidelines

This Act is implemented by the Department of Environment (DoE), which is a department of the Ministry of Environment and Forest and is headed by a Director General (DG), who has complete control over the DoE. The power of the DG, as given in the Act, may be outlined as follows:

- The DG has the power to close down activities considered harmful to human life or to the environment. The operator of the DoE has the right to appeal the decision of the DG, and there are procedures are in place for this. However, if the incident is considered an emergency, there is no opportunity for appeal.
- The DG has the power to declare an area affected by pollution as an ecologically critical area. The type of work or process that can take place in such an area is governed by the DoE.

Before going for any new development project, the proponent is required to obtain Environmental clearance from the DoE, as mentioned later in Chapter 5. Failure to comply with any part of ECA 1995 may result in punishment by a maximum of five years imprisonment or a maximum fine of Tk. 100,000, or both.

In 1997, the government enacted the Bangladesh Environment Conservation Rules (ECR) to supplement the ECA. The rules specify environmental standards for, among others, air and water quality and noise and foul odours. These were partially amended in 2002 and again in 2003. The Act stipulates the Environmental Impact Assessment (EIA) process within the framework of Environment Clearance Certificate (ECC).

In 2000, the Environmental Court Act was enacted especially for court cases involving pollution. Environmental courts were established at six sites throughout the country and granted rights such as the right to enter premises and conduct investigations. Although environmental laws have gradually been enacted they are still insufficient in terms of applying precise regulatory power and assuring the implementation of policy measures for solving environmental problems. Deficiencies include missing items, no methodology specified for the enactment of regulation, articles that allow expanded interpretations and items that leave no room for administrative guidance (Miyake 2009).

1.3 Overview and Contact Details of Relevant Organisations

1.3.1 Governmental Organisations and Research Institutions

Table 1.3.1 presents a list of governmental organisations and research institutions relevant to the environmental and social sectors in Bangladesh.

Table 1.3.1: List of Governmental Organisations and Research Institutions Related to Environmental and Social Considerations in Bangladesh

Organisations	Assigned Role	Contact Address
Government of the People's Republic of Bangladesh		Address: Old Sangsad Bhaban Tejgaon, Dhaka-1215, Bangladesh info@pmo.gov.bd http://www.bangladesh.gov.bd/
Ministry of Agriculture	Policy formulation, planning, monitoring and administration of agriculture related projects	Administration and Input Tel: +880-2-9540015 Fax: +880-2-7163799 Email: addsecyai@moa.gov.bd http://www.moa.gov.bd/
Ministry of Cultural Affairs	The ministry is primarily responsible for preservation,	Phone: +880-2-7168977 Fax: +880-2-7169008,

Organisations	Assigned Role	Contact Address
	research and development of national cultural heritage, fine arts of Bangladesh.	+880-2-7162104 http://www.moca.gov.bd/
Ministry of Chittagong Hill Tracks Affairs	Special ministry responsible of the region of Chittagon Hill Tracks Affairs, the most culturally and environmentally diverse region of the country	Address: Dhaka 1000, Bangladesh E-mail: info@mochta.gov.bd Telephone: +880 2 7162255 Fax: +880 2 7160781 http://www.mochta.gov.bd/
Ministry of Education	Ministry of Education is the apex policy making institution of the Government regarding administration and development of post-primary education sector.	Address: Dhaka-1000, Bangladesh Telephone: 7168711 Fax: 88-02-9514114 E-mail: info@moedu.gov.bd http://www.moedu.gov.bd/
Ministry of Environment and Forests	Responsible of planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. MOEF oversees all environmental matters in the country and is a permanent member of the Executive Committee of the National Economic Council.	Address: Government of the People's Republic of Bangladesh Building # 6, Level # 13 Telephone: +88-02-7160393 Fax: +88-02-7160166 Bangladesh Secretariat, Dhaka http://www.moef.gov.bd/
Department of Environment	Department responsible of ensuring sustainable environmental governance	Address: Poribesh Bhaban E-16, Agargaon, Shere Bangla Nagar Dhaka 1207, Bangladesh Telephone: +88-02-8121793 http://www.doe-bd.org/
Ministry of Fisheries and Livestock	To preserve fisheries resources, increase socio-economic conditions of fishermen, create employment opportunities for rural unemployed and landless people, expand foreign exchange earnings by exporting fish and fishery products and to innovate new technologies through research for fisheries development	Address: Building No. 6 Floor 5th & 14th Bangladesh Secretariat Segun Bagicha, Dhaka-1000. http://www.mofl.gov.bd/

Organisations	Assigned Role	Contact Address
	and preservation.	
Ministry of Religious Affairs	he vision of the Ministry is to improve the religious affairs. It works to contribute in the national development through human resource development and working in encouragement of brotherhood, values, religious belief in both national and international level.	Secretary, Ministry of Religious Affairs Telephone: +88-02-7165800 Fax: 7165040 http://www.mora.gov.bd/
Ministry of Water Resources	The Ministry of Water Resources is the apex body of the Government of the People's Republic of Bangladesh for development and management of the whole water resources of the country. It formulates policies, plans, strategies, guidelines, instructions and acts, rules, regulations, etc. relating to the development and management of water resources, and regulation and control of the institutions reporting to it.	Address: Government of the People's Republic of Bangladesh Bangladesh Secretariat Dhaka-1000 http://www.mowr.gov.bd/
Ministry of Women and Children Affairs	The Ministry of Women Affairs was established in 1978 under the initiative of Shaheed President Ziaur Rahman, to fulfil government commitments toward women development	Address: Government of the People’s Republic of Bangladesh. Bangladesh Secretariat Dhaka, Bangladesh. Tel: +8802-7160568. Fax: +8802-7162892.
Planning Commission	Responsible for the preparation of development plans and allocating funds to individual ministries responsible for implementing specific projects. Authorized to supervise and coordinate cross-sectoral and inter-ministerial activities affecting	Address: Ministry of Planning Sher-e-Bangla Nagar, Dhaka-1207 http://www.plancomm.gov.bd/about.asa

Organisations	Assigned Role	Contact Address
	the use of natural resources and the environment.	
Department of Livestock	Works for improvement of livestock resources and production	Address: Ministry of Fisheries & Livestock Government of the Peoples Republic of Bangladesh Krishi Khamar Sarak Farmgate, Dhaka-1215, Bangladesh Email:info@dls.gov.bd Phone: 880-2-8115532, 880-2-9117736
Local Government Engineering Department (LGED)	Planning, designing and implementing rural infrastructure development projects, Thana/Union drainage and embankment planning and irrigation planning. Land and water use planning, small scale water schemes, canal digging programs and town protection schemes	Address: Level-5, LGED Bhaban; Agargaon, Shere Bangla Nagar Dhaka-1207. Phone: +88.02.811 4804, +88.02.815 2010 Fax: +88.02.811 6390 E-mail: info@lged.gov.bd
Roads and Highway Department	Constructing and maintaining primary and secondary roads	http://www.rhd.gov.bd/
Department of Public Health Engineering (DPHE)	Rural and urban water supply and sanitation	Address: DPHE Bhavan, 14, Shaheed Captain Mansur Ali Sarani, Kakrail, Dhaka-1000, Bangladesh. Telephone:+ 88-02-9343358 (Office) Fax: + 88-02-9343375 E-mail: ce@dphe.gov.bd http://www.dphe.gov.bd/index.php
Bangladesh Bureau of Statistics (BBS)	Environmental statistical data compilation	Address: Parishankhyan Bhaban, E-27/A, Agargaon Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh Telephone : +88-02-9112589, +88-02-8115942

Organisations	Assigned Role	Contact Address
		Fax No : 88-02-9111064 E-Mail Address : dg@bbs.gov.bd http://www.bbs.gov.bd/Home.aspx
Barind Multipurpose Development Authority	Responsible for improvement of the Barind Tract	http://www.bmda.gov.bd/
Others		
Sundarbans Tiger Project	The Sundarban Tiger project is a Bangladesh Forest Department initiative that effectively started its field activities in February 2005. The project is administered by the Forest Department and it utilizes wildlife consultants from the University of Minnesota and the Zoological Society of London to advice on project strategies and train staff.	Managed by Forest Department under Ministry of Environment and Forests Telephone +88-02-8181145 http://www.sundarbanstigerproject.info/
Sustainable Development Networking Programme (SDNP)	It is a global catalytic initiative launched by the United Nations Development Program (UNDP) in response to Agenda 21, which articulated the need for improved information dissemination to support sustainable development. The program is geared towards facilitating communication between users and suppliers of sustainable development information in developing countries.	Address: E-17 Agargaon BIDS, Sher-e-Bangla Nagar Dhaka-1207, Bangladesh. Phone: 880-2-8126204 Fax: 880-2-9118543, 8113023 Email: info@sdnbd.org http://www.sdnbd.org/
Botanical Garden and Zoo	Maintains in-situ floral and faunal diversity controlled by the Ministry of Environment and Forests	Managed by Forest Department under Ministry of Environment and Forests
State University of Bangladesh	Private university in Dhaka. Established in 2002 under the	Address: Main Campus 77 Satmasjid Road, Dhanmondi,

Organisations	Assigned Role	Contact Address
	Private University Act 1992.	Dhaka – 1205, Bangladesh Tel: 880-2-8151783-5, 9128329, 9125671, 8126272-3, 8156520 Email: info@sub.edu.bd http://www.sub.edu.bd
University of Dhaka	The oldest university in Bangladesh. It is a multidisciplinary research university and is among the top universities in South Asia.	Address: Registrar Building, 1st Floor University of Dhaka. Dhaka-1000. Tel: (880)-2-8614150 Fax:(880)-2-8615583 Email:duregstr@bangla.net http://www.univdhaka.edu/
Bangladesh University of Engineering and Technology (BUET)	The oldest institution for the study of Engineering and Architecture in Bangladesh.	Address: Dhaka-1000, Bangladesh Fax : (880 2) 8613046 Tel: (880 2) 9665650-80, 8616833-38, 8614640-44, 8618344-49 http://www.buet.ac.bd/
Bangladesh Center for Advanced Studies (BCAS)	Independent, non-profit, non-government, policy, research, and implementation institute working on sustainable development (SD) at local, national, regional and global levels.	Dr. A. Atiq Rahman, Executive Director Address: House No.10, Road No. 16A, Gulshan-1, Dhaka, Bangladesh Tel: (880-2) 8851237, 8852217, 8851986 Fax: (880-2) 8851417 Email: atiq.rahman@bcas.net Web: www.bcas.net

1.3.2 Donors

Donors active in the environmental sector in Bangladesh since 1990 are shown in Table 1.4.2.

Table 1.3.2: Major Donors in Bangladesh

Organisations	Assigned Role	Contact Address
International Donors		
United Nations Development	United Nations Development Programme (UNDP) is the UN's	Address: UN Offices, 18th Floor IDB Bhaban Agargaon, Sher-e-Bangla

Organisations	Assigned Role	Contact Address
Programme (UNDP) Bangladesh	global development network, an organisation advocating for change and connecting countries to knowledge, experience and resources to assist people build a better life.	Nagar, Dhaka 1207, Bangladesh Tel: + (880-2) 8150088 Fax: + (880-2) 8113196 <Contact address in Dhaka> C/O UNDP G.P.O Box No. 224 Dhaka 1000, Bangladesh E-mail: registry.bd@undp.org http://www.undp.org.bd/
The World Bank (WB) Bangladesh	The World Bank is a vital source of financial and technical assistance to developing countries around the world.	Address: 3A Paribagh, GPO Box 97, Dhaka 1000. Tel:+880-2-8159001 +880-2-3894004000 Fax: +880-2-8159029 +880-5-3894004998 to 99 <Contact address in Dhaka> Mehrin A. Mahbub Telephone: (880-2) 8159001, (880-2) 0389 400 4000 Fax: (880-2) 8159029, (880-2) 0389 400 4998-99 Email: mmahbub@worldbank.org http://www.worldbank.org.bd
Asian Development Bank (ADB) Bangladesh	Weak governance and structural problems continue to constrain Bangladesh's development. ADB's country partnership strategy (CPS), 2011–2015, emphasizes the need to design projects that are better prepared for implementation.	Address: Bangladesh Resident Mission Plot No. E-31, Sher-e-Banglanagar, GPO Box 2100, Dhaka 1207. Tel: +880-2-8156000 to 8 +880-2-8156009 to 16 Fax: +880-2-8156018 to 19 http://www.adb.org/Bangladesh
Bilateral Donors		
JICA Bangladesh Office		Address: UDAY TOWER(7th floor), Plot No.57 & 57/A, Gulshan Avenue (south), Circle-1, Dhaka-1212,

Organisations	Assigned Role	Contact Address
		Bangladesh (Banani P.O. Box No.9030, Dhaka-1213) Tel: 880-2-9891897, 9891899, 9891073, 9893106, 8826547 Fax: 880-2-9891689, 9891753 Email:jicabd@jica.go.jp http://www.jica.go.jp/bangladesh/index.html
Embassy of Japan in Bangladesh		Address: Plot No. 5 & 7, Dutabash Road, Baridhara, Dhaka 1212 Tel: 8810087 Fax: 8826737 Email:eojbd@embjp.accesstel.net http://www.bd.emb-japan.go.jp/
United States Agency for International Development (USAID) Bangladesh	American assistance to this moderate Muslim-majority nation includes support for free, fair and credible elections and more transparent and accountable governance; support for a better educated, healthier and more productive population; and resources to increase economic opportunities through equitable economic growth, improved food security and disaster mitigation and preparedness.	Address: Madani Avenue, Baridhara, Dhaka-1212 Tel: 8855500 Fax: 8823648 E-mail idhaka@usaid.gov http://www.usaid.gov/
German International Cooperation (GIZ) GmbH	On behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), GIZ concentrates on three priority areas in Bangladesh: -reform of the health system, family planning and HIV/AIDS -good governance, human rights and local development.	Address: Road 90, House 10/C Gulshan 2, Dhaka Tel :882 30 70 Fax : 882-30 99 E-mail: olaf.handloegten@giz.de http://www.giz.de/en/worldwide/351.html

(1) World Bank

The World Bank's Country Assistance Strategy (CAS) for the fiscal years 2011–2014 builds on Bangladesh's surprisingly strong track record of growth and human development over the past decade. The new strategy supports the country's ambitious aspirations by contributing to accelerated, sustainable and inclusive growth, underpinned by stronger governance at the central and local levels. Additional dimensions that cut across all the objectives of CAS include fostering regional cooperation, strengthening gender mainstreaming and partnering for aid effectiveness (WB 2010).

(2) ADB

The overarching objective of ADB support is to contribute to the government's Sixth Five-Year Plan goals and commitments for enhancing growth and reducing poverty. Towards this objective, ADB's Country Partnership Strategy (CPS) will provide assistance within Strategy 2020's development agendas of inclusive economic growth, environmentally sustainable growth, and regional cooperation. The key thematic drivers are as follows: (i) good governance and capacity development, (ii) environmental sustainability and climate resilience, (iii) regional cooperation, (iv) private sector development, (v) gender equity, (vi) knowledge solutions and (vii) partnerships (ADB 2011).

(3) USAID

The United States Agency for International Development (USAID) programs assist Bangladeshi organisations and communities in addressing their needs in the areas of health and family planning, income generation, agriculture and food security, disaster management, democracy and human rights, and education. Principal partners are non-governmental organisations (NGOs). USAID works closely with the Government of Bangladesh and other donors.

1.3.3 NGOs

Bangladesh is one of the countries where many NGOs conduct various types of activities. NGOs are active in the field of biodiversity conservation, reforestation, environmental education, and livelihood improvement. The major NGOs are shown in Table 1.4.3.

Table 1.3.3: NGOs in the Field of Environmental and Social Considerations in Bangladesh

NGOs	Assigned Role	Contact Address
Environmental Considerations		
Bangladesh Environmental Lawyers Association (BELA)	The Bangladesh Environmental Lawyers Association (BELA), a non-profit and non-governmental organisation of lawyers with the objective of establishing a sound environment and ecological order for all using law as tool.	Syeda Rizwana Hasan Advocate, Supreme Court of Bangladesh & Chief Executive Address: House No. 15A, Road No. 3, Dhanmondi Residential Area, Dhaka-1205 GPO Box 3015, Dhaka, Bangladesh Tel: 88-02-8614283, 8618706 Fax: 8612957 E-mail: bela@bangla.net www.belabangla.org
Bangladesh Poribesh Andolan (BAPA)	Bangladesh Poribesh Andolon (BAPA) is a common forum of citizens and organisations concerned with the environment of Bangladesh.	Address: 9/12, Block-D, Lalmatia, Dhaka-1207, Bangladesh Tel: +880-2-8128024, +880-2-8113469, +880-11-076142 Email address: bapa@sdnbd.org, mohid@bangla.net http://www.bapa.info
Bangladesh POUSH	To facilitate sustainable livelihood through participatory natural resources towards sustainable development. Areas of expertise: wetland research and NGO management Links to: Director, Forum of NGOs in Bangladesh	Mr. Sanowar Hossain, President Email: sanowar@bdpoush.org Address: 10/10 Iqbal Road, Block-A, Mohammadpur, Dhaka-1207, Bangladesh. Tel:880-02-8112430 Fax:880-02-8115386 http://www.bdpoush.org/
International Union for Conservation of Nature (IUCN)	Bangladesh aligns its activities with the current areas: Conserving the diversity of life, changing the climate forecast, naturally energizing our future, managing nature for human well-being, and greening the world	IUCN Bangladesh Country Office House 11, Road 138, Gulshan 1 Address: Dhaka 1212, Bangladesh Tel: (+8802) 9890423, 9890395 Fax: (+8802) 9892854 Email: info.bangladesh@iucn.org http://www.iucn.org/about/union/secre

NGOs	Assigned Role	Contact Address
	economy.	tariat/offices/asia/asia_where_work/bangladesh/
Nature Conservation Management (NACOM)	The pioneer, non-government, pro-environment organisation in Bangladesh, founded in 1987 as Nature Conservation Movement (NACOM) and renamed in 1998 with broader mandate of activities in the area of natural resources management and livelihood.	Address: House: 41/1 (5th floor), Road No-1, Block-A, Niketan, Gulshan Dhaka, -1212, Bangladesh Tel: 880-2-8832073 Fax: 880-2-8832103 www.nacom.org
Waste Concern Union	Contribute to waste recycling, environmental improvement, renewable energy, poverty reduction through job creation and sustainable development.	Address: House-21 (Side B), Road-7, Block-G, Banani Model Town, Dhaka-1213, Bangladesh Tel: +880-2-9873002, +880-2-9873067, +880-2-9873110 Fax: +880-2-9884774 Email: office@wasteconcern.org http://www.wasteconcern.org/
World Wide Fund For Nature (WWF)	International NGO working on issues related to the conservation, research and restoration of the environment.	No offices in Bangladesh http://wwf.panda.org/
Social Considerations		
ASA	Non-governmental organisation based in Bangladesh which provides microcredit financing.	Address: ASA Tower, 23/3, Bir Uttam A.N.M. Nuruzzaman Sharak, Shyamoli, Mohammadpur, Dhaka-1207, Bangladesh Tel: (+ 880-2) 811 0934 - 5, 811 9828, 815 5083 Fax: (+ 880-2) 912 1861, 811 6205 Email: asa@asabd.org http://www.asa.org.bd/index.html
Bangladesh Red Crescent Society	Works to improve the situation of the vulnerable people by mitigating their sufferings caused by diseases and disasters in accordance with	Address: 206, Deputy Secretary General's Office 272, Conference Room 208, Training Room 234, Board Room 229, CPP Control Room 254,

NGOs	Assigned Role	Contact Address
	the fundamental principles of the Movement by mobilizing the power of humanity.	Main gate 227
Bangladesh Rural Advancement Committee (BRAC)	BRAC is a development organisation dedicated to alleviating poverty by empowering the poor to bring about change in their own lives.	BRAC Centre 75 Mohakhali, Dhaka-1212, Bangladesh Tel: + 880-2-9881265, 8824180-7 Ext: 3155, 3158, 3107, 3161 Fax: +880-2-8823542 E-mail: info@brac.net http://www.brac.net/
Christian Commission for Development in Bangladesh (CCDB)	Founded in 1973, immediately after the Liberation War and conducts aid in relief and rehabilitation for mid and long-term development activities. The major activities include rural development, people-managed savings and credit, work with ethnic/indigenous communities, women's development and gender awareness programmes.	Address: 88, Senpara Parbatta, Mirpur – 10, Dhaka 1216 Tel: +880 2 8011971-3 Fax: +880 2 803556 Email: ccdb@bangla.net www.ccdb-bd.org/
National Human Rights Commission	Preservation of human rights, development and guarantee	Address: GulFeshan Plaza (11th Floor) 8,Sohid Sangbadik Saleena Parvin Sorok, Mogbazar Dhaka-1217, Bangladesh Tel:+ 88-02-831492 Fax:+ 88-02-8333219; Email : nhrc.bd@gmail.com http://www.nhrc.org.bd/
NGO Forum For Drinking Water Supply and Sanitation	NGO Forum coordinates and represents more than 650 NGO' active in Bangladesh with the central government in Dhaka, working to ensure the basic needs of safe potable water, sound	Address: 4/6 Block E, Lalmatia, 1207 Dhaka, Bangladesh Tel: +880 2 815 42 73 / +880 2 815 42 74 FAX: +880 2 811 79 24 E-mail: ngof@bangla.net

NGOs	Assigned Role	Contact Address
	sanitation practice and maintenance of personal hygiene for the distressed population.	http://www.ngof.org/
Proshika	NGO working on a broad range of programmes in organisation building, education and training leading to income and employment generation, health education, health infrastructure building, as well as environmental protection and regeneration.	Address: I/1-Ga, Section-2, Mirpur Dhaka 1216, Bangladesh Tel: 8015812, 8016015, 8016759, 8015945, 8015946, 9005797, 9005795 Fax: +88028015811 Email: info@proshika.org http://www.proshika.org/
RDRS Bangladesh	NGO operating programmes aimed at achieving: civil empowerment, quality of life (health, education), food security, environment and disaster risk reduction, economic empowerment. It focuses on 11 districts and 60 Upazilas (sub-districts) mainly in northern Bangladesh, far from the over centralized economic and political powerbase of Dhaka, Chittagong, even Rajshahi.	Address: Rangpur Dinajpur Rural Service House 43, Road 10, Sector 6, Uttara, Dhaka-1230 Tel: 880-2-895 4384 - 86 Fax: 880-2-895 4391 E-mail: rdrs@bangla.net www.rdrsbangla.net
Taungya	An Organisation for Indigenous Culture, Environment and Socio-Economic Advancement	Address: Kalyanpur (Opposite of Petrol Pump), Rangamati – 4500. http://www.taungya.org.bd/
World Conservation Union, IUCN	Influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.	Address: House #11, Road #138, Gulshan #1, Dhaka-1212, Bangladesh Tel: +880-2-8852743, +880-2-9890395, +880-2-9890423 Fax: +880-2-9892854 Email: info@iucnbd.org http://www.iucnbd.org/

Chapter 2

Natural Environment

2 Natural Environment

Latest Development/Issues Regarding the Natural Environment

- Protected areas have not increased recently, except Ecologically Critical Areas (Section 2.3).
- The status of coral reefs and mangrove wetlands in Bangladesh are described in Sections 2.5.1 and 2.5.2.
- The Ministry of Environment and Forest (MoEF) formulated the Climate Change Strategy and Action Plan in 2008 (Section 2.7).

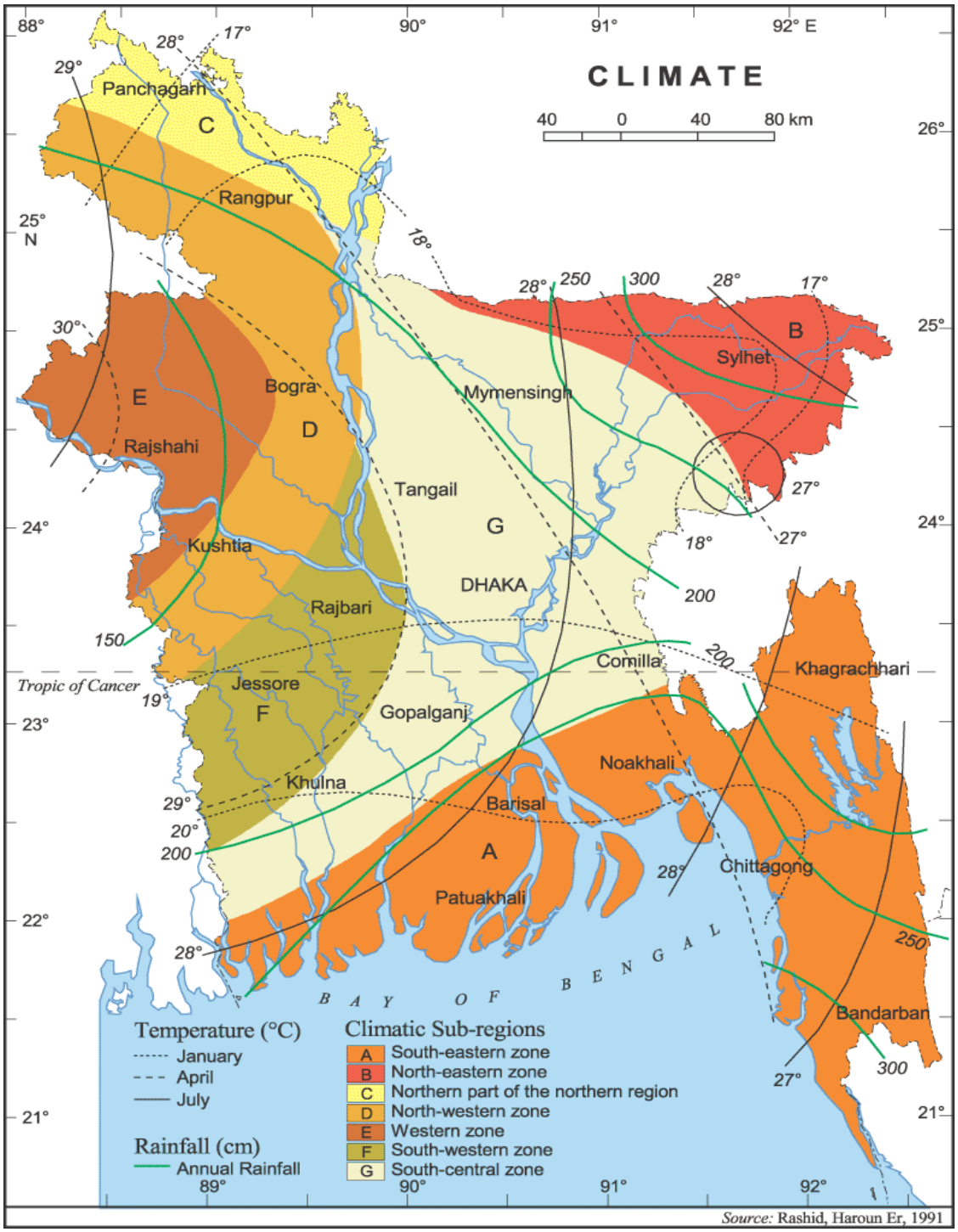
2.1 Overview (General Features)

Bangladesh, with an area of approximately 147,570 km^2, is located in the tropics between latitudes 20° 34'–26° 38' North and longitudes 88° 1'–92° 41' East. It is bounded by India to the west, the north and the northeast and by Myanmar in the southeast. It is one of the largest deltas in the world, formed by the congruence of three Himalayan rivers—the Ganges (the Padma in Bengali), the Brahmaputra (the Jamuna in Bengali) and the Meghna—and has a long coastline along the Bay of Bengal. Floodplains (80%), terraces (8%) and hills (12%) cover the land area (ADB and CAI-Asia Center 2006). The hill zone is relatively small and mainly located in the southeast (Chittagong Hill Tracts; highest point: Mt. Keokuradon, 1,230 m) and in the northeast (Sylhet Division). With plenty of water resources and fertile soil, most of the land is fertile enough for rice paddy cultivation; however, it is also flood prone.

The country has a subtropical monsoon climate characterised by high temperatures and heavy rainfall and, often, very high humidity. The three seasons are distinct: a mild winter (November to February), a hot, humid summer (March to June) and a humid, warm, rainy monsoon (June to October). Bangladesh is coldest in late December and early January, with temperatures dipping as low as an average of 4°C–7°C. The temperature then increases towards April, when it varies from 27°C–30°C in most parts of the country, except for some areas such as the Rajshahi and Kushtia districts where the maximum temperature rises to 40°C or more. Dhaka has an annual average temperature of 25°C and a monthly mean varying from 18°C in January to 29°C in August. Approximately 80% of the average annual rainfall of 1,854 mm occurs between May and September. Chittagong has a complete tropical monsoon climate with hot, wet summers and

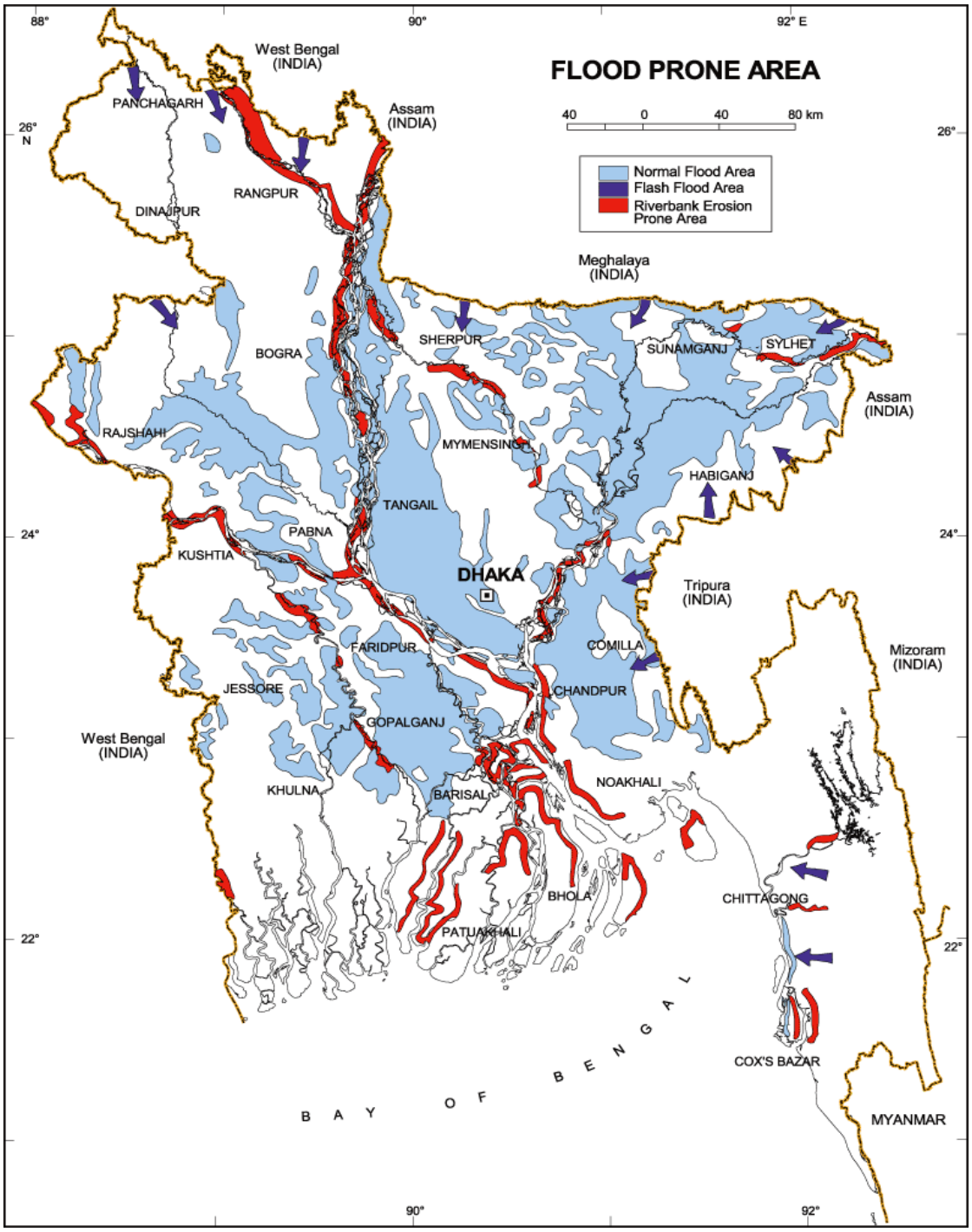
dry, cool winters. The average maximum temperatures are between 29°C and 35°C, and the average minimum temperatures are between 12°C and 17°C. The city's average annual rainfall is 2,870 mm. On average, approximately 80% of the annual rainfall occurs during the May to September monsoon (ADB and CAI-Asia Center 2006).

Cyclones hit Bangladesh almost every year during two seasons: from April to June and from August to November.



Source: http://www.poribesh.com/Maps/Climate.htm

Figure 2.1.1: Climatic Regions of Bangladesh

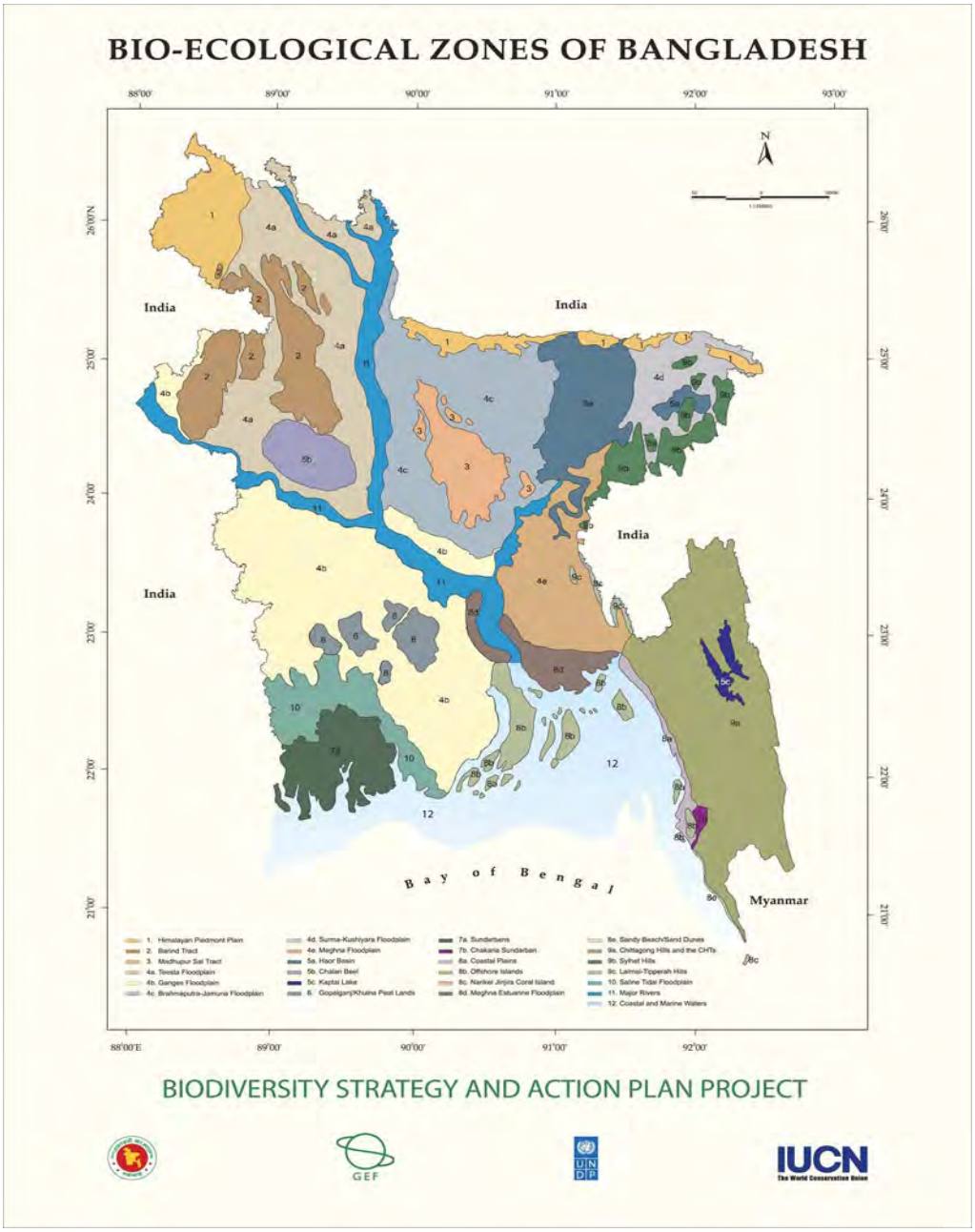


Source: http://www.poribesh.com/Maps/Flood.htm

Figure 2.1.2: Flood Prone Areas of Bangladesh

2.1.1 Bio-ecological Zones

In 2002 the International Union for Conservation of Nature (IUCN), Bangladesh, classified the country into 12 bio-ecological zones (25 sub-bio-ecological zones) according to factors such as fauna and flora, geographical characteristics, annual average rainfall, administrative regions, soil types, water level in flooding and land use. For a detailed description of the bio-ecological zones of Bangladesh, see Table A-12 in the Appendix.



Source: http://www.poribesh.com/Maps/Bio-ecological_Zones.htm

Figure 2.1.3: Bio-ecological Zones of Bangladesh

2.2 Relevant Regulations and Policies

2.2.1 Status of Ratification and Application of International Treaties and Conventions

Bangladesh has signed a number of international treaties, conventions and protocols related to the protection of the natural environment and wildlife as Table 2.2.1 summarises.

Table 2.2.1: International Conventions, Protocols and Treaties Signed by Bangladesh

No.	International Conventions, Protocols and Treaties
1.	International Plant Protection Convention (Rome, 1951)
2.	Plant Protection Agreement for the South East Asia and Pacific Region (Rome, 1956)
3.	Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971)
4.	Protocol to Amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1982
5.	Amendments to Articles 6 and 7 of the Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1987
6.	Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)
7.	Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)
8.	United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (Paris, 1994)
9.	Convention on Biological Diversity, (Rio De Janeiro, 1992)
10.	International Convention to Combat Desertification, (Paris 1994)
11.	Cartagena Protocol on Biosafety to the Convention on Biological Diversity (Cartagena, 2000)
12.	Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)
13.	Convention on Persistent Organic Pollutants (Stockholm, 2001)

For further details of the status of the ratification and the application of international treaties and conventions concerned with the conservation of the natural environment and biodiversity, see Table A-2 in the Appendix.

2.2.2 Domestic Laws and Policies

To protect wildlife in Bangladesh, the Wildlife (Preservation) Order was established in 1973 and

amended in 1974. In the enactment of this order, three acts were replaced: the 1932 Bengal Rhinoceros Preservation Act, the 1912 Wild Birds and Animals Preservation Act and the 1879 Elephant Preservation Act. The Wildlife (Preservation) Order regulates the trading, dealing and hunting of wildlife animals and designates game animals and protected animals (see Table A-18 in the Appendix). It also covers the classification of protected areas: national parks, wildlife sanctuaries, game reserves and private game reserves. To protect fishes inhabiting the waters of Bangladesh, the Protection and Conservation of Fish (Amended) Ordinance was established in 1982.

In 1987, the National Conservation Strategy (NCS) was formulated by the Bangladesh Agricultural Research Council in cooperation with the IUCN. It aims (1) to assess the usage patterns of natural resources and the future needs and possibilities of major development activities in order to set a feasible and sustainable strategy to conserve limited natural resources and (2) to reconcile development and the environment in order to ensure the sustainable use of resources, species and ecosystems in the future. In particular, it underlines the importance of ecosystems in coastal areas, hilly forests and the Shundorubon wetland.

In 1995 the Ministry of Environment and Forests developed the National Environmental Management Action Plan (NEMAP) to address environmental problems from 1995 to 2005. It summarized the major challenges by every institution, sector and region concerned with environmental problems and offered prescriptions for these. In terms of the protection of wildlife species and biodiversity, it highlighted the importance of activities such as the promotion of research, dissemination and enlightenment, the completion of inventories, the regulation of hunting and the development of networks among protected areas (MoEF 1995).

In 2004, funded by the Global Environment Facility (GEF) and the UNDP, the Ministry of Environment and Forests, in cooperation with the IUCN, developed the National Biodiversity Strategy and Action Plan (NBSAP). This plan, which was developed in response to the adoption of the Convention on Biological Diversity (CBD) at the Earth Summit held in Rio De Janeiro, Brazil, in 1992, provides a framework for the sustainable use of resources, the conservation of biodiversity and the fair and equitable distribution of benefits. Moreover, the NBSAP is expected to function as a framework for reducing poverty in the country by improving the natural environment. The major objectives of the NBSAP are as follows:

- to conserve and restore the biodiversity of the country for the well-being of the present and future generations;

- to ensure that the long-term food, water, health and nutritional security of the people are met through the conservation of biological diversity;
- to maintain and improve the environmental stability of the ecosystems;
- to preserve the unique biological heritage of the nation for the benefit of the present and future generations;
- to guarantee the safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country;
- and to stop the introduction of invasive alien species, genetically modified organisms (GMOs) and living modified organisms (MoEF 2004).

TO achieve these objectives, the NBSAP advocates several strategies, for example, education about the importance of biodiversity and the conservation of ecosystems, species, and gene resources, and education about the protection of threatened species; it also advocates capacity building, the establishment of institutions to implement the NBSAP, and public involvement in the management of protected areas. The NBSAP is a 'living document' in the sense that it is intended to be responsive, flexible and practical. The implementation and monitoring of the NBSAP will run simultaneously with provisions for periodical reporting and reviews. Revision of the NBSAP is needed at least every six years to respond to changing conditions (MoEF 2004).

In response to the Catargena Protocol on Biosafety signed in 2000 and the CBD, the Biosafety Guidelines were documented by the MoEF in 2005. Taking account of the biological risk to humans and animals, the guidelines set regulations on research, field testing and commercial trade relating to GMOs to ensure their safety when they are used and transported internationally. According to the guidelines, although there are a number of biotechnology laboratories and research institutions in Bangladesh, no guidelines related to biosafety have been formulated, making it difficult for them to implement joint research with international research institutions. The scope of the guideline covers all government research institutions, state-owned companies, universities, branches of international organisations, private companies and NGOs in Bangladesh (MoEF 1995).

2.3 Protected Areas and Regulations of Development Activities in These Areas

There are several different types of protected areas in Bangladesh. They can be mainly divided

into four groups according to their basis laws.

Table 2.3.1: Taxonomy of Protected Areas in Bangladesh

	Legal provision	Taxonomy
1	None	Botanic garden
		Eco-park
2	Forest Act, 1927	Forest reserve
		Protected forest
3	Wildlife (Preservation) Act, 1973	National park
		Wildlife sanctuary
		Game reserve
4	Environment (Conservation) Act, 1995	Ecologically critical area (ECA)

Three types of protected area were defined under the Wildlife (Preservation) Act of 1973 (amended 1974) with the objective of conserving biodiversity (in situ) and the natural environment of various forest types.

Table 2.3.2: Protected Areas
Defined under the 1973 Bangladesh Wildlife Preservation Act (amended in 1974)

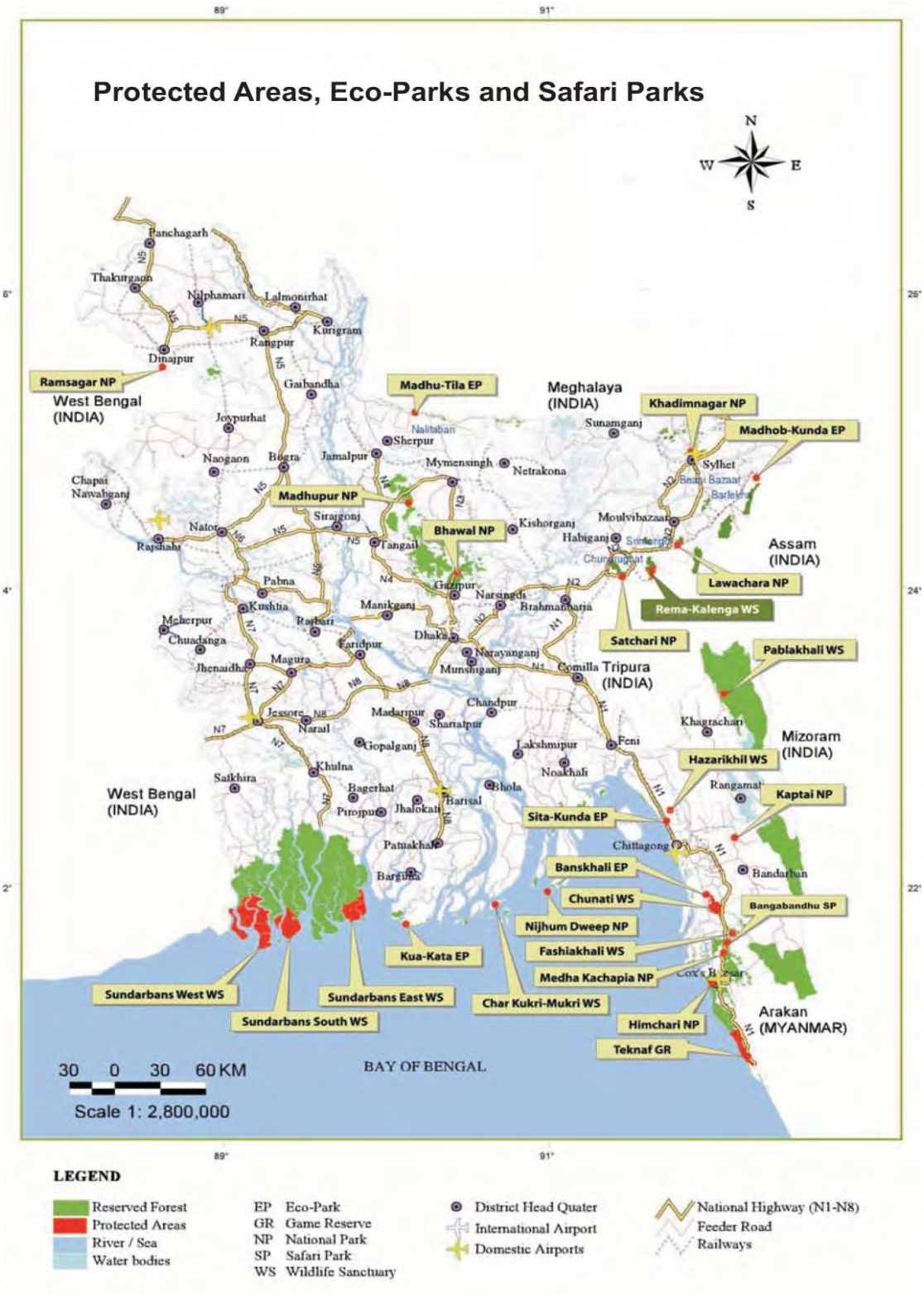
Type of protected area	Description
National park	A comparatively large area of natural beauty to which members of the public have access for recreation, education and research and in which the wildlife is protected.
Wildlife sanctuary	An area maintained as an undisturbed breeding ground for wild fauna and where the habitat is protected for the continued well-being of the resident or migratory fauna.
Game reserve	Normally comprised of a relatively isolated area set aside for protecting wildlife in general and for increasing the population of particular species.

In Bangladesh, there are 10 national parks, seven wildlife sanctuaries and one game reserve.

Table 2.3.3: National Park, Wildlife Sanctuary and Game Reserve in Bangladesh

No.	Protected areas	Forest types	Location	Area (ha)	Established (Extended)
National park (IUCN category V)					
1	Modhupur NP	Sal forest	Tangail	8,436	1962 (1982)
2	Bhawal NP	Sal forest	Gazipur	5,022	1974 (1982)
3	Himchari NP	Hill forest	Cox's Bazar	1,729	1980
4	Lawachara NP	Hill forest	Maulvibazar	1,250	1996
5	Kaptai NP	Hill forest	Rangamati	5,464	1999
6	Ramsagar NP	Sal forest	Dinajpur	27.75	2001
7	Nijhum Dweep NP	Coastal mangrove	Noakhali	16,352.23	2001
8	Medha Kachapia NP	Hill forest	Cox's Bazar	395.92	2004
9	Satchari NP	Hill forest	Habiganj	242.82	2005
10	Khadimnagar NP	Hill forest	Sylhet	679	2006
Wildlife sanctuary (IUCN category IV)					
1	Sundarban (East) WS	Natural mangrove	Bagerhat	31,226.94	1960 (1996)
2	Pablakhali WS	Hill forest	Rangamati	42,087	1962 (1983)
3	Char Kukri Mukri WS	Coastal mangrove	Bhola	40	1981
4	Chunati WS	Hill forest	Chittagong	7,761	1986
5	Rema-Kalenga WS	Hill forest	Habiganj	1,975.54	1996
6	Sundarban (South) WS	Natural mangrove	Khulna	36,970.45	1996
7	Sundarban (West) WS	Natural mangrove	Satkhira	71,502.13	1996
Game reserve					
1	Teknaf GR	Hill forest	Cox's Bazar	11,615	1983

Source: Mukul et al. 2008. Protected Areas of Bangladesh: Current Status and Efficiency for Biodiversity Conservation. *Proceedings of the Pakistan Academy of Sciences* 45(2): 59–68.



Source: DoE and MoEF. 2010. *Fourth National Report to the Convention on Biological Diversity*.

Figure 2.3.1: Map of Protected Areas in Bangladesh

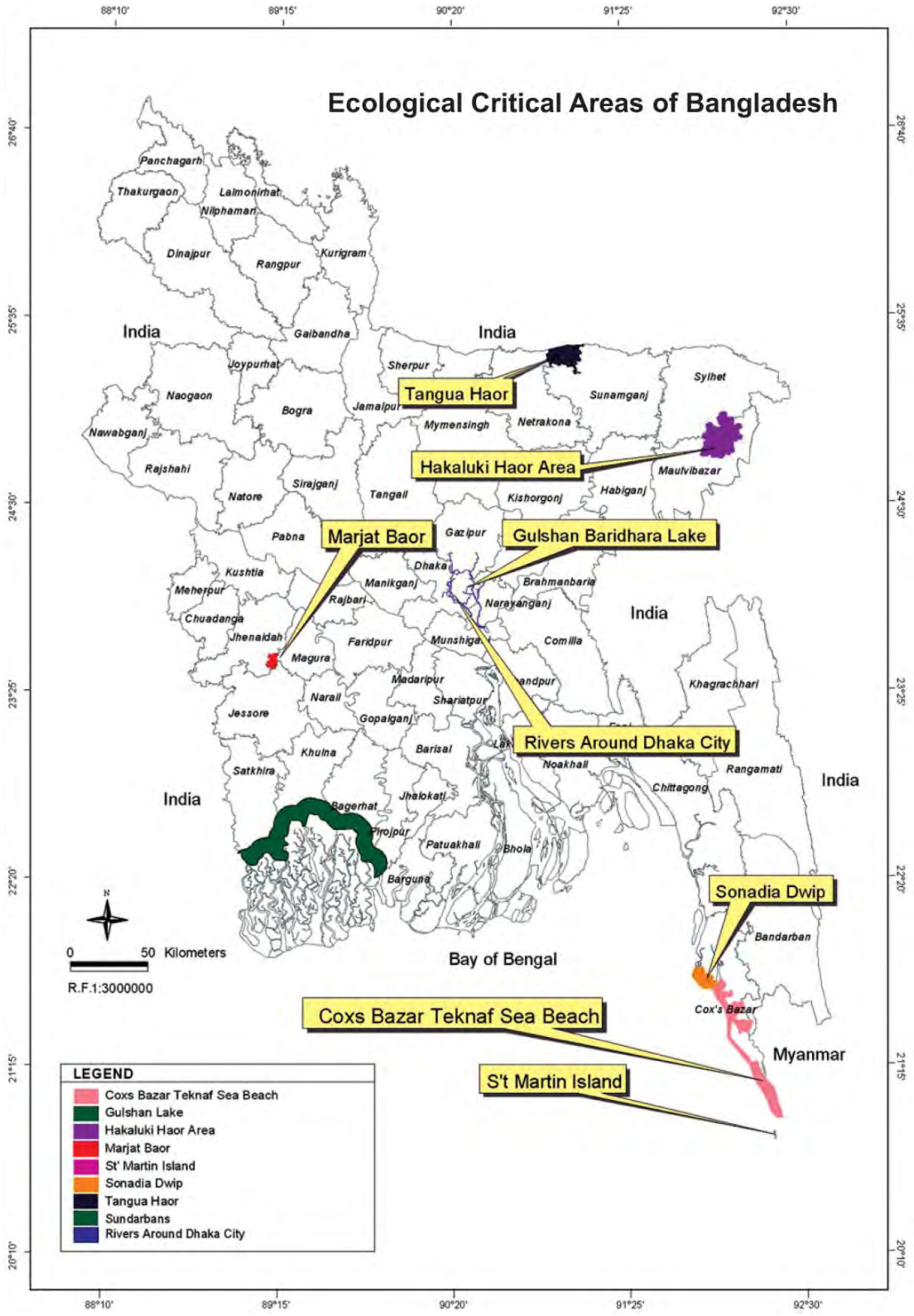
2.3.1 Ecologically Critical Area

In addition to protected areas, the 1995 Bangladesh Environment Conservation Act includes provision for Ecologically Critical Area (ECA) declarations by the director general of the Department of the Environment in certain cases where the ecosystem is considered to be in danger of reaching a critical state. If the government is satisfied that due to the degradation of the environment, the ecosystem of any area has reached or is danger of reaching a critical state, the government may, by notification in the official gazette, declare that area an ECA. The government shall specify, through the notification provided in subclause (1) or by separate notification, which of the operations or processes cannot be initiated or continued in the ECA.

Table 2.3.4: Ecologically Critical Areas

No.	Name	District(s)	Area (ha)
1	The Sundarbans	Bagerhat, Khulna, Satkhira	762,034
2	Cox's Bazar (Teknaf, Sea beach)	Cox's Bazar	10,465
3	St. Martin Island	Cox's Bazar	590
4	Sonadia Island	Cox's Bazar	4,916
5	Hakaluki Haor	Maulavi Bazar	18,383
6	Tanguar Haor	Sunamganj	9,727
7	Marjat Baor	Jhinaidha	200
8	Gulshan-Banani-Baridhara Lake	Dhaka	n.a.

Source: General Economics Division, Planning Commission and UNDP. 2009. *A Situation Analysis Report on Environment (MDG 7) Bangladesh: A Baseline for Needs Assessment and Costing*.



Source: DoE and MoEF. 2010. *Fourth National Report to the Convention on Biological Diversity*.

Figure 2.3.2: Ecologically Critical Areas of Bangladesh

2.4 Wildlife Species

Distinct physiographic characteristics, variations in hydrological and climatological conditions and differences in soil properties in Bangladesh contribute to the development of diverse ecosystems that are enriched with a great diversity of flora and fauna (DoE and MoEF 2010). The tropical semi-evergreen forests in the country are botanically amongst the richest in the Indian subcontinent, and they also support a good diversity of mammals and a great diversity of birds. For a small country like Bangladesh, the species richness is relatively large, but the population size of most of the species has declined drastically (DoE and MoEF 2010).

2.4.1 Endemic Species

Previous studies have reported that there are 3,611 species of angiosperm in Bangladesh. Of these, 2,623 species in 158 families are dicotyledons and 988 species in 41 families are monocotyledons. As no systematic and complete survey has been done recently, it is very likely that the total number of angiosperm species may reach approximately 5,000. Although endemism is relatively low in the country, the records suggest the existence of at least 16 endemic species of flowering plants in Bangladesh (DoE and MoEF 2010).

Table 2.4.1: Number of Plant Species Identified in Bangladesh

Plant group	Number
Algae	1988 +
Fungi	275
Lichen	n.a.
Bryophytes	248
Pteridophytes	195
Gymnosperms	7
Angiosperms	3,611

Source: DoE and MoEF. 2010. *Fourth National Report to the Convention on Biological Diversity*.

A total of 653 fish species have been recorded, of which 251 are freshwater fishes belonging to 61 families, and 402 are estuarine and marine fishes, including sharks and rays. A total of 650 bird species have been reliably recorded in the country. 34 amphibian and 154 reptile species also inhabit the country. The mammalian species diversity in Bangladesh is represented by 121 species of mammals, many of which are now endangered (DoE and MoEF 2010).

It is important to note that research into the diversity of the fauna and the flora in Bangladesh has yet to be completed and that these figures may underestimate the present situation.

Table 2.4.2: Diversity of Faunal Species in Bangladesh

Taxonomic group	Number
Protozoa	175
Porifera	29
Cnidaria	102
Ctenophora	10
Rotifera	76
Gastrotricha	4
Platyhelminthes	126
Nematoda	176
Collusca	479
Echinodermata	46+
Arthopoda	5000+
Fish	653
Amphibians	34
Reptiles	154
Birds	650
Mammals	121

Source: DoE and MoEF. 2010. *Fourth National Report to the Convention on Biological Diversity*.

Table 2.4.3: Endemic Species in Bangladesh

Family	Number	Species
Mammal	0	
Bird	0	
Reptile	1	*Aspideretes nigricans* (Testudines-Trionychidae)
Amphibian	1	*Fejervarya frithii* (Anura-Ranidae)
Freshwater fish	8	*Badis chittagongis* (Badidae)
		Psilorhynchus gracilis (Psilorhynchidae)
		Nangra bucculenta (Sisoridae)

Family	Number	Species
		Nangra ornata (Sisoridae)
		Pseudolaguvia inornata (Erethistidae)
		Pseudolaguvia muricata (Erethistidae)
		Psilorhynchus rahmani (Psilorhynchidae)
		Gogangra laevis (Sisoridae)
Marine fish	0	
Insect	0	
Vascular plant	16+	N/A

Source: Animals and Plants Unique to Bangladesh. http://lntreasures.com/bangladesh.html (Accessed on May 16, 2012); DoE and MoEF. 2010. *Fourth National Report to the Convention on Biological Diversity*.

2.4.2 Endangered Species

The world's most comprehensive inventory of the global conservation status of biological species has been compiled by the IUCN. It regularly revises the IUCN Red List of Threatened Species. As of February 2011, 106 species of animals and 16 species of plants were categorised as critically endangered (CR), endangered (EN) or vulnerable (VU) in Bangladesh. For details of IUCN categories and criteria, and the species in the Red List, see Tables A-13 and A -14 in the Appendix.

Table 2.4.4: The Conservation Status of Biological Species in Bangladesh

	EX	EW	CR	EN	VU
Fauna	0	1	15	31	60
Flora	0	0	5	3	8

Note: EX: Extinct; EW: Extinct in the wild; CR: Critically endangered; EN: Endangered; VU: Vulnerable

Source: IUCN Red List, version 2011.2, Summary Statistics.
http://www.iucnredlist.org/about/summary-statistics (Accessed on April 26, 2012).

2.4.3 Species Protected by International Conventions and Agreements

There are several treaties and conventions related to the conservation and protection of species. In the next section, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention and the Convention on the Conservation of Migratory

Species of Wild Animals (CMS) are discussed.

2.4.3.1 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

As of December 22, 2011, roughly 5,000 species of animals and 29,000 species of plants were protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) against over-exploitation through international trade (CITES 2011a). Within the species listed in Appendix I of the Convention, there are 68 species of animals and two species of plants in Bangladesh (CITES 2011b). For the details of the species in Bangladesh designated by CITES, see Table A-16 in the Appendix.

2.4.3.2 Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals (CMS), also known as the Bonn Convention, was signed in 1979 in Bonn and came into force in 1983. Its aim is to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty concluded under the aegis of the United Nations Environment Programme and concerned with the conservation of wildlife and habitats on a global scale. Since the CMS came into force, its membership has grown steadily and now includes over 100 parties from Africa, Central and South America, Asia, Europe and Oceania. For more detailed information of CMS-designated species in Bangladesh, see Table A-17 in the Appendix.

2.5 Important Ecosystems and Habitats

2.5.1 Coral Reefs

The corals in Bangladesh have been damaged mainly by rapid source depletion, souvenir collection, sedimentation, pollution and physical damage. The only coral communities in Bangladesh are found around St. Martin's Island. A fringe of rocky substrate and coral communities extends about 200 m from the island, with a total reef area of less than 50 km^2. The area is influenced by freshwater influx, monsoons and frequent disturbances such as cyclones and storm surges, resulting in high sedimentation, as well as mechanical damage. Pressure from human activities, mainly resource exploitation, tourism and coastal development, is high. A shallow reef area about 15 km west of St. Martin's Island, locally known as Marphati bandth is not currently under any form of management, but is less damaged due to its inaccessibility to coral poachers (Wilkinson 2004).

The rocky substrate reefs have a coral cover of 7%, with 66 species of hard corals, dominated by branching (*Acroporidae*) and massive (*Faviidae* and *Pristidae*) species. There are 86 species of reef fish with damselfish, surgeonfish and parrotfish being the most common. The most abundant molluscs, e.g. *Monodonta*, *Thais*, *Cyprea*, *Conus* and *Trochus* species, are heavily traded. There is a large market for coral and associated fauna in the Cox's Bazar district, including gastropod and bivalve shells, and marine turtles. The merchandise is indiscriminately harvested from around St. Martin's Island and other coastal areas of Bangladesh. At least some of the coral skeletons on sale are thought to come from the Mergui area in Myanmar. The government of Bangladesh declared St. Martin's Island a protected area in 1999 under its national conservation strategy, but little action has been taken to manage the area mainly due to lack of resources and development priorities. Land ownership is largely private, and indiscriminate coastal construction and increased tourism pressure pose a potential threat to the reefs. Construction of a large tourist hotel in 1999 has led to increased sewage runoff. The construction of jetties and passenger ship operation facilities commenced in 2002 (Wilkinson 2004).

2.5.2 Mangrove Wetlands

Most mangroves in Bangladesh are found in the south-western Khulna Division, which makes up about 62% of the Sundarbans: the vast delta of the Ganges, Brahmaputra and Meghna rivers. This forest is contiguous with the Indian sector of the Sundarbans, and together they form one of the largest continuous tracts of mangrove in the world—over 6,500 km^2 on our maps, but totalling over 9,400 km^2, including water bodies and small areas of flooded or barren land, and other habitats. Linked to regional tectonic subsidence over recent centuries, freshwater flows in the delta have been shifting eastwards, resulting in greater marine influence and increasing salinities to the west (Spalding et al. 2010).

The Sundarbans (literally meaning 'beautiful forests') probably derive their name from one species, *Heritiera fomes* (locally called sundan), which dominates the flora in most areas, either in monospecific stands or in combination with other species, notably *Excoecaria agallocha*. Other important species include *Xylocarpus moluccensis*, *Bruguiera gymnorrhiza*, *Ceriops decandra*, *Avicennia officinalis* and *Sonneratia apetala*. Much of the Sundarbans has been utilised and managed for over 120 years, so any descriptions of the ecology and biodiversity are those of a managed system. Canopy heights average between 5 m and 15 m, with some trees reaching 25–30 m. The fauna of the Sundarbans is diverse, with 315 bird species, 120 fish

species, 42 mammal species, 35 reptile species and eight amphibian species. Mammals include the spotted deer, barking deer, macaque monkeys, jungle cats, Indian fishing cats and the Gangetic dolphin. The tiger population, including that of the adjacent Indian Sundarbans, is probably the largest remaining in the world, with several hundred individuals. Reptiles include the threatened batagur, or river terrapin, estuarine crocodiles and olive ridley turtles, which nest along the coast. The critically endangered Ganges shark frequents the rivers and channels. Threatened birds include the Pallas fishing eagle and masked finfoot (Spalding et al. 2010).

Another large mangrove area was once found in the Chakaria Sundarbans at the mouth of the Matamuhuri River, although this has now almost completely disappeared. Smaller natural mangrove areas are still found along the Naf River on the border with Myanmar and around some of the near-shore islands. Today, however, almost all the mangroves away from the Sundarbans are plantations, which are most extensive along coastlines and islands where there is active sediment accretion. The first plantations, dating back to 1966, were established to mitigate the impacts of tropical storms. Other benefits have subsequently been recognised, including timber production, conservation, employment generation and land reclamation, and these have encouraged further plantation. One relatively comprehensive assessment estimated that some 1,485 km^2 of new plantations were established between 1960 and 2001. Of this figure, some 27% were lost to erosion and 12% to encroachment; but the remaining area of over 900 km^2 is still the largest area of plantations of any country. Plantations have involved trials of various species. However, most recent plantations have focused on *Sonneratia apetala*, with some *Avicennia officinalis* in eastern areas (Spalding et al. 2010).

An estimated four million people in Bangladesh depend on mangroves for their livelihoods. The Sundarbans are the only remaining significant source of timber in this poor and densely populated country. *Heritiera*, as well as *Xylocarpus* and *Bruguiera*, all yield high-value timber, which is used for the construction of boats, furniture and other products. *Nypa* is used for thatching. Other species are used in newsprint and matchstick production, and local use for fuel wood is considerable. Fisheries are perhaps equally important, with mangrove-linked artisanal fisheries accounting for some 95% of total marine production since the mid-1980s. Commercial offshore capture fisheries, notably prawn fisheries, are also highly dependent on mangroves. A large proportion of the country's aquaculture is also dependent on wild-caught fry. Declines in overall artisanal fish yields since the mid-1980s may well be linked to mangrove losses. Honey production is also important, with an estimated 185 tonnes of honey produced each year (Spalding et al. 2010).

The coastlines of Bangladesh are highly dynamic, with large areas of new land accreting each year. There are also high rates of erosion. Across the Sundarbans, including India, it has been estimated that losses and gains from erosion and accretion were relatively well balanced between 1970 and 1990. However, from 1990 to 2000, losses to erosion (4,151 ha) have greatly exceeded gains from accretion (only 59.2 ha), which may be linked to reductions in sediment supply resulting from the building of barrages upstream (Spalding et al. 2010).

Bangladesh has suffered more than most from tropical storms. Some 140,000 people were killed in a cyclone in 1991 and, in November 2007, Cyclone Sidr killed some 3,500 people. The latter was considered a relatively low death toll considering the intensity of the storm, thanks in part to the evacuation of some 2.7 million people from the most vulnerable areas. Sidr passed directly over the eastern Sundarbans, and the mangroves clearly buffered the impacts of the storm on adjacent populated areas. Unfortunately, the storm still caused widespread exfoliation and some uprooting, with estimates of damage between 5 and 25% of mangrove areas in the Bangladeshi Sundarbans. Recovery of these areas is hindered by human interference, including timber extraction and poaching by some of the many thousands of people who once relied on these mangroves, and who lost their homes and livelihoods (Spalding et al. 2010).

The areal extent of mangroves in the Sundarbans has remained relatively constant since at least the 1970s; however, wide areas have become degraded. There have been marked declines in the standing volumes of valuable timber since 1959, and canopy closure has been greatly reduced. In 1959, 78% of forests showed greater than 70% crown closure, but this was reduced to only 0.2% by 1996. While poor planning and inadequate law enforcement have undoubtedly played a role in this degradation, one of the greatest factors has been a disease known as ‘top-dying’ on the dominant *Heritiera fomes*. Symptoms commence with the death of the crown and outer branches, but the whole tree is often killed. By 1995, some 200 km^2 of *H. fomes*, or 20 million trees, were affected. More recently, it has been estimated that some 20% of the mangroves have been lost, raising concerns about the future of this regionally endemic species. The exact cause of the disease is unknown, but *Heritiera* is intolerant of high salinities, so losses may be linked both to reductions in freshwater input and to rising sea levels, which have led to increased salinity in the southern and western regions (Spalding et al. 2010).

Away from the Sundarbans, the greatest direct threat to mangroves has come from their conversion to shrimp farms. The Chakaria Sundarbans originally covered an estimated 182 km^2. In 1903, 75 km^2 were designated as a mangrove forest reserve, but even this area was gradually lost as portions were leased for settlement and shrimp farming. Between 1995 and 1996, the

final section of the forest was leased and, today, almost the entire area has been cleared for shrimp farming, salt pans and settlement, leaving just a few remnant stands. In addition, many coasts are also directly exposed to erosion and storms. Unfortunately, the benefits from the Chakaria shrimp ponds are limited, with productivity roughly half the national average due to hyper-salinisation, and there has been a net loss of employment in the region, which has led to marked declines in artisanal and offshore commercial shrimp fisheries. Conservation efforts in Bangladesh have focused on the Sundarbans. The entire forest is reserved and is managed for sustainable production, while providing a valuable area for wildlife. Large areas of the southern Sundarbans are incorporated within three wildlife sanctuaries, which include a world heritage site, and the entire forest reserve of the Sundarbans is recognised as a Ramsar site. Elsewhere in the country, two other wildlife sanctuaries contain mangroves (Spalding et al. 2010).

2.5.3 Areas Designated by International Conventions and Agreements

2.5.3.1 Wetlands of International Importance

In Bangladesh, there are two sites designated as wetlands of international importance under the Convention on Wetlands of International Importance, especially as Waterfowl Habitat (also known as the Ramsar Convention).

Table 2.5.1: Wetlands of International Importance in Bangladesh

Site	Date of designation	Region	Area (ha)	Coordinates
Tanguar Haor	10 July 2000	Sunamganj	9,500	25°09’N 091°04’E
Sundarbans Reserved Forest	21 May 1992	Khulna	601,700	22°02’N 089°31’E

Source: Ramsar Convention 1971. The List of Wetlands of International Importance. http://www.ramsar.org/pdf/sitelist.pdf (Accessed 9 May 2012).

Figure 2.5.1: Map of Wetlands of World Importance in Bangladesh

2.5.3.2 Biodiversity Hotspots

The western part of Bangladesh near the country's border includes an Indo-Burma hotspot designated by Conservation International (CI), a nonprofit environmental organisation headquartered in Arlington, Virginia. The organisation's mission is to protect nature and its biodiversity for the benefit of humanity. It mainly works for the conservation of biodiversity hotspots, tropical primary forests and valuable coastal ecosystems. A biodiversity hotspot is a biogeographic region with a significant reservoir of biodiversity, which is under threat from human activities. CI designates the hotspots according to various criteria including (1) an area that has the world's highest biodiversity, and (2) an ecosystem damaged severely by human activities, including development. The biodiversity hotspots hold especially high numbers of endemic species, yet their combined area of remaining habitat covers only 2.3% of the Earth's land surface. Each hotspot faces extreme threats and has already lost at least 70% of its original natural vegetation. Over 50% of the world's plant species and 42% of all terrestrial vertebrate

species are endemic to 34 biodiversity hotspots (Conservation International 2012).

2.5.3.3 Important Bird Area

An Important Bird Area (IBA) is an area recognised as being a globally important habitat, especially for the conservation of birds. Currently there are about 10,000 IBAs all over the world. The IBA programme was developed by BirdLife International and, in Bangladesh, 19 areas are designated as IBAs by the organisation. Table 2.5.2 and Figure 2.5.1 show the names, locations and areas of IBAs in Bangladesh.

Table 2.5.2: Important Bird Areas in Bangladesh

No.	Name	No.	Name
1	Madhupur National Park	11	Ganges-Brahmaputra-Meghna Delta
2	Tanguar Haor and Panabeel	12	Muhuri Dam
3	Aila Beel	13	Hazarikhil Wildlife Sanctuary
4	Hakaluki Haor	14	Pablakhali Wildlife Sanctuary
5	Lawachara/West Bhanugach Reserved Forest	15	Rampahar-Sitapahar Wildlife Sanctuary
6	Hail Haor	16	Patenga Beach
7	Rajkandi Reserved Forest	17	Sangu Matamuhuri
8	Rema-Kalenga Wildlife Sanctuary	18	Himchari National Park
9	Jamuna-Brahmaputra River	19	Teknaf Game Reserve
10	East, South and West Sundarbans Wildlife Sanctuaries		

Source: BirdLife International. 2004. *Important Birds Areas in Asia: Key Sites for Conservation*.

Source: United Nations, Cartographic Section. 2004. http://www.un.org/Depts/Cartographic/map/profile/banglade.pdf.; BirdLife International. 2004. *Important Bird Areas in Asia: Key Sites for Conservation.*

Figure 2.5.2: Locations and Areas of Important Bird Areas in Bangladesh

2.6 Forests (Primary Forest, Other Naturally Regenerated Forest and Planted Forest)

According to the *Global Forest Resources Assessment 2010 Main Report*, the total forest area in Bangladesh in 2010 was estimated at about 14,420 km^2, which is 11% of the land, excluding the inland water areas. However, these figures have been on the decline. Around 30 km^2 of forest were converted to other uses or lost through natural causes per year from 2005 through 2010.

Table 2.6.1: Trends in the Extent of Forest, 1990–2010

Forest Area (km^2)				Annual Change Rate					
1990	2000	2005	2010	1990-2000		2000-2005		2005-2010	
				km^2/yr	%	km^2/yr	%	km^2/yr	%
14,940	14,680	14,550	14,420	-30	-0.18	-30	-0.18	-30	-0.18

Source: FAO 2010. *Global Forest Resource Assessment 2010*.

Table 2.6.2: Types of Forests

Primary forest		Other naturally regenerated forest			Planted forest		
km^2	% of FA	km^2	% of FA	% of which IS	km^2	% of FA	% of which IS
4,360	30	7,690	53	–	2,370	16	17

Notes: FA: Forest Area; IS: Introduced Species

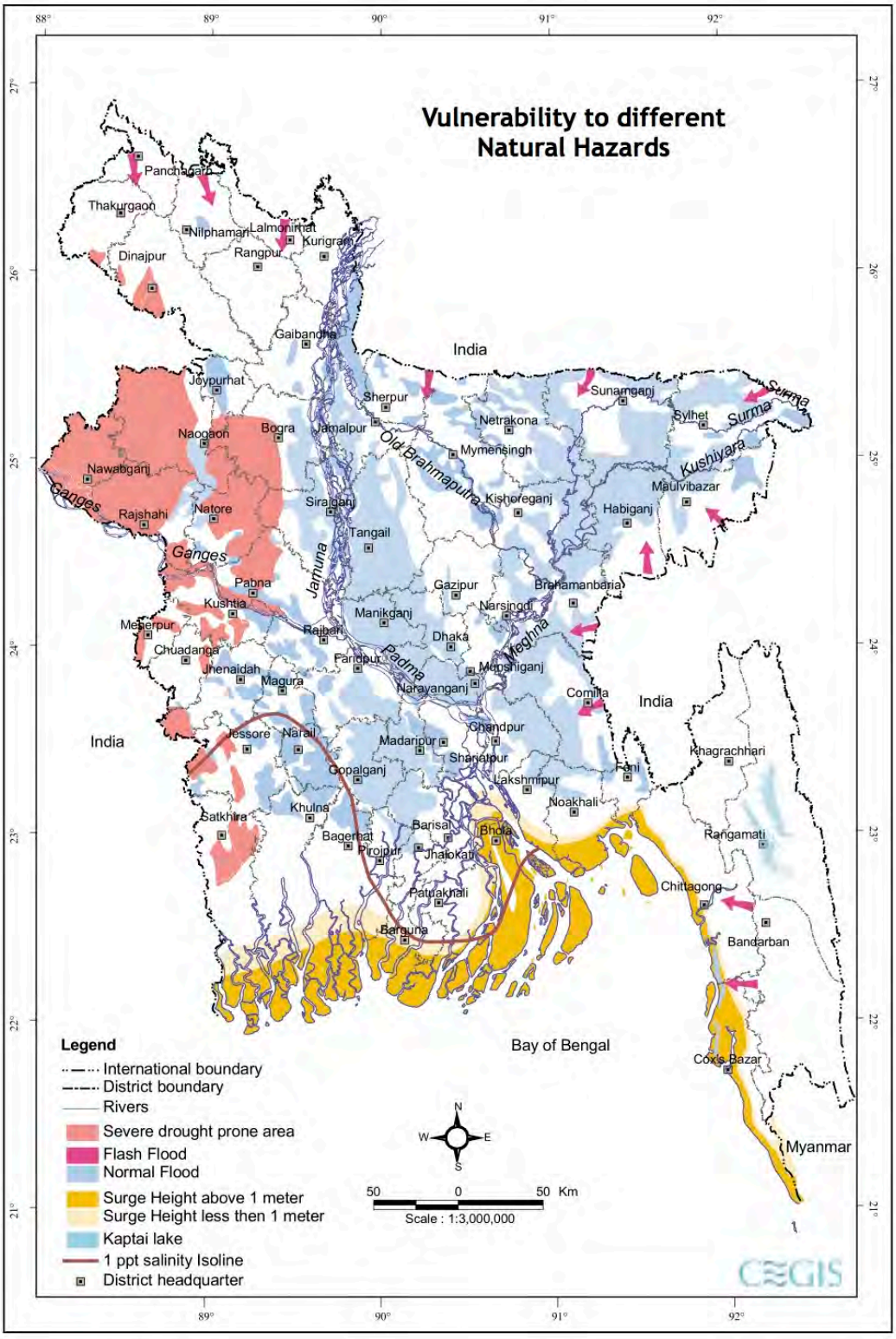
Source: FAO 2010. *Global Forest Resource Assessment 2010*.

The forest ownership patterns in Bangladesh show that 62% of the forests are publicly owned, whereas 36% are privately owned. 33% of the private owners are individuals, while local indigenous and tribal communities represent 67% of the private ownership. Permanent forest estates account for 85% of the total forest areas and only 60% of the forests register management plans. Forests within protected areas represent 17% of total forests. At the same time, 7,690 km^2 of the forests are naturally generated forests, which represent 53% of total forests. On the other hand, planted forests account for only 16% or 2,370 km^2 of the total forested area, and primary forests make up 30% of all forests or 4,300 km^2 (FAO 2010).

During the period between 2005 and 2010, the area of planted forests in Bangladesh declined 3.14%, showing a reverse in the increases reported during the period between 1990–2000 and 2000–2005. A significant increase in the total volume of wood fuel occurred from 1990 to 2005.

2.7 Climate Change

Climate change is affecting global temperatures, sea level and precipitation. It has been predicted that, even if greenhouse gas concentrations were to be stabilised, this warming, along with the rise in sea levels, will continue for centuries due to the timescales associated with climate processes. Bangladesh is already one of the most flood-prone countries of the world; however, the sea level rise due to climate change will worsen the condition.



Source: MoEF. 2008. *Bangladesh Climate Change Strategy and Action Plan.*

Figure 2.7.1: Vulnerability to Different Natural Hazards

The forecast is that world temperatures could rise between 1.1°C and 6.4°C this century, with sea levels predicted to rise by 18 to 59 cm. If the sea level rises by 50 cm, about 5,500,000 people in Bangladesh are affected. In addition, there will be more frequent warm spells and heavy rainfall, and an increase in droughts, tropical cyclones and extreme high tides. These climatic changes will have an impact on the environment and will affect various sectors including agriculture, biodiversity, human health, water, poverty and the economy.

Bangladesh has joined the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. In accordance with these agreements, the Ministry of Environment and Forest (MoEF) formulated the Climate Change Strategy and Action Plan in 2008. The Strategy and Action Plan is built on six pillars:

- Food security, social protection and health to ensure that the poorest and most vulnerable in society, including women and children, are protected from climate change, and that all programmes focus on the needs of this group for food security, safe housing, employment and access to basic services, including health.
- Comprehensive disaster management to further strengthen the country's already proven disaster management systems to deal with increasingly frequent and severe natural calamities.
- Infrastructure to ensure that existing assets, e.g. coastal and river embankments, are well-maintained and fit-for-purpose, and that urgently needed infrastructure, e.g. cyclone shelters and urban drainage, is put in place to deal with the likely impacts of climate change.
- Research and knowledge management to predict the likely scale and timing of climate change impacts on different sectors of the economy and socio-economic groups, to underpin future investment strategies, and to ensure that Bangladesh is networked into the latest global thinking on climate change.
- Mitigation and low carbon development to evolve low carbon development options and implement these as the country's economy grows over the coming decades.
- Capacity building and institutional strengthening to enhance the capacity of government ministries and agencies, civil society and the private sector to meet the challenge of climate change (MoEF 2008).

Chapter 3
Pollution and Environmental Contamination

3 Pollution and Environmental Contamination

Latest Development/Issues Regarding the Pollution and Environmental Contamination

- Recent data on air, water (surface and ground), and soil quality in Bangladesh are included.
- Recent efforts to address groundwater contamination and solid waste problems are described in Sections 3.4.2 and 3.6.
- The situation of noise pollution is described in Section 3.7.

3.1 Overview (General Features)

Bangladesh has a number of serious environmental problems, such as air pollution, surface water pollution, a solid waste problem, noise and offensive odours, especially in the Dhaka capital region. Although the population has grown remarkably rapidly, the provision of infrastructure has been so slow that a number of serious problems have arisen due to overpopulation, such as housing shortages, slum expansion, and illegal migration. Because of these problems, environments in urban areas have severely deteriorated. Industrial development and an increased number of motor vehicles have caused air and water pollution in urban areas. Moreover, frequent floods and water detention, which can be attributed mainly to the terrain characteristics of the land and to climate conditions, have exacerbated the water contamination problem and have triggered the spread of waterborne diseases. The inability to properly dispose of solid waste is another issue from which the country suffers. Yet another matter of grave concern is the contamination of groundwater by arsenic that has accumulated in the soil through natural processes. The mechanism through which arsenic transfers from soil to groundwater is still uncertain, but arsenic-polluted groundwater has caused health problems among people living in high-risk areas that do not have access to alternative safe water sources.

3.2 Legal Framework and Administrative Organizations Related to Pollution and Environment Contamination

3.2.1 Status of Ratification and the Application of International Treaties and Conventions

The Government of Bangladesh (GoB) has signed several international treaties, conventions and protocols dealing with pollution control. An overview of the relevant international treaties and conventions signed by the GoB is shown in the table below. For further details of the status of ratification of international treaties, conventions and protocols, see Table A-2 in the Appendix.

Table 3.2.1: Relevant International Treaties, Conventions and Protocols Signed by the Government of Bangladesh

No.	International Conventions, Protocols and Treaties
1.	Convention on Persistent Organic Pollutants (Stockholm, 2001)
2.	International Convention for the Prevention of Pollution of the Sea by Oil (London, 1954)
3.	Vienna Convention for the Protection of the Ozone Layer (Vienna, 1985)
4.	Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987)
5.	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (London, 1990)
6.	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (Copenhagen, 1992)
7.	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer adopted by the Ninth Meeting of the Parties (Montreal, 1997)
8.	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (Beijing, 1999)
9.	United Nations Framework Convention on Climate Change (New York, 1992)
10.	Kyoto Protocol to the United Nations Framework Convention on Climate Change (Kyoto, 2001)
11.	Basel Convention on the Control of Transboundary Movements of Wastes and their Disposal (Basel, 1989)
12.	Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Paris, 1993)

3.2.2 Domestic Legal Framework and Key Institutions

As stated in Chapter 1, the major laws that directly relate to the prevention and control of pollution and environmental contamination are the 1995 Environmental Conservation Act (ECA) and the 1997 Environmental Conservation Rules (ECR). The laws are implemented and administered mainly by the Ministry of Environment and Forests (MoEF). The MoEF was founded in 1989, as was the Department of the Environment (DoE). It is headquartered in Dhaka, and has branches in Chittagong, Khulna, and Rajshahi. Although the MoEF is charged with administrative tasks under the National Environmental Management Action Plan (NEMAP), which was enacted six years after its founding, no department is empowered to adequately support the MoEF's work, it lacks sufficient basic data, it does not have enough technical personnel capable of properly performing environmental impact assessments, it has insufficient facilities and equipment, it lacks an information management system, and it does not have a regular training programme. The Ministry has not even filled all its positions (MoEF 1995).

For policy to be effectively implemented at the local level, a system capable of providing the necessary roles at the administrative level must be developed. In Bangladesh, the delay in reforming local administration means that in the case of the rural development administration, for example, there are 20 central ministries and agencies, but administrative resources gradually diminish down the chain of administrative levels through districts and sub-districts until at the end level, the union, fewer than 20 people are supposed to provide extension services for a population of about 30,000 people. To realise environmentally friendly development under these conditions, policy would have to give priority to creating administrative agencies and a legal system that constitutes the foundation for such agencies (MoEF 1995).

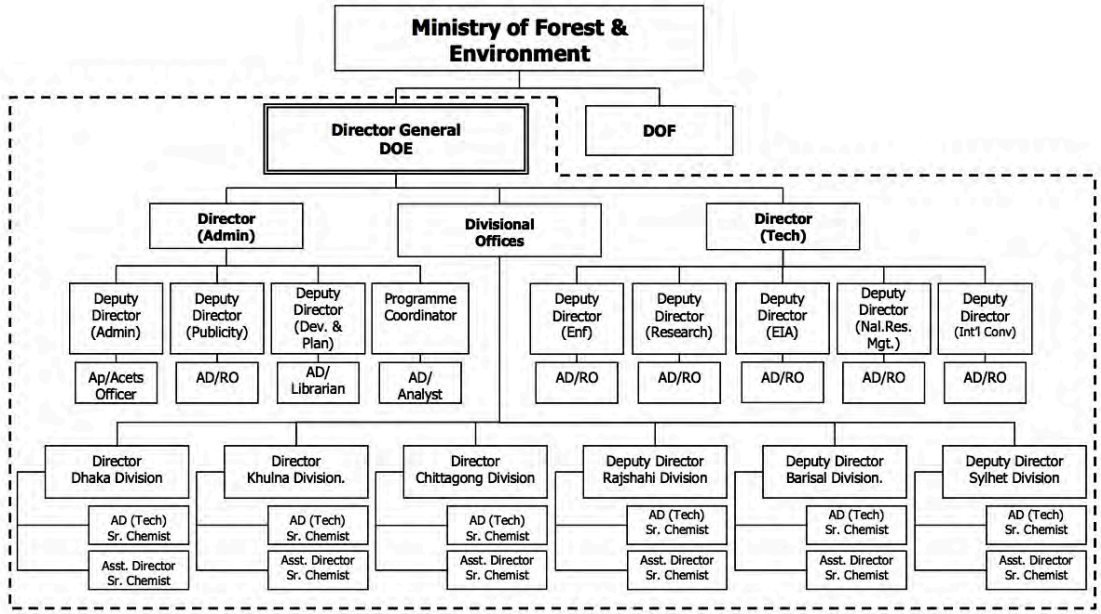


Figure 3.2.1: Organisation Chart for the Department of the Environment

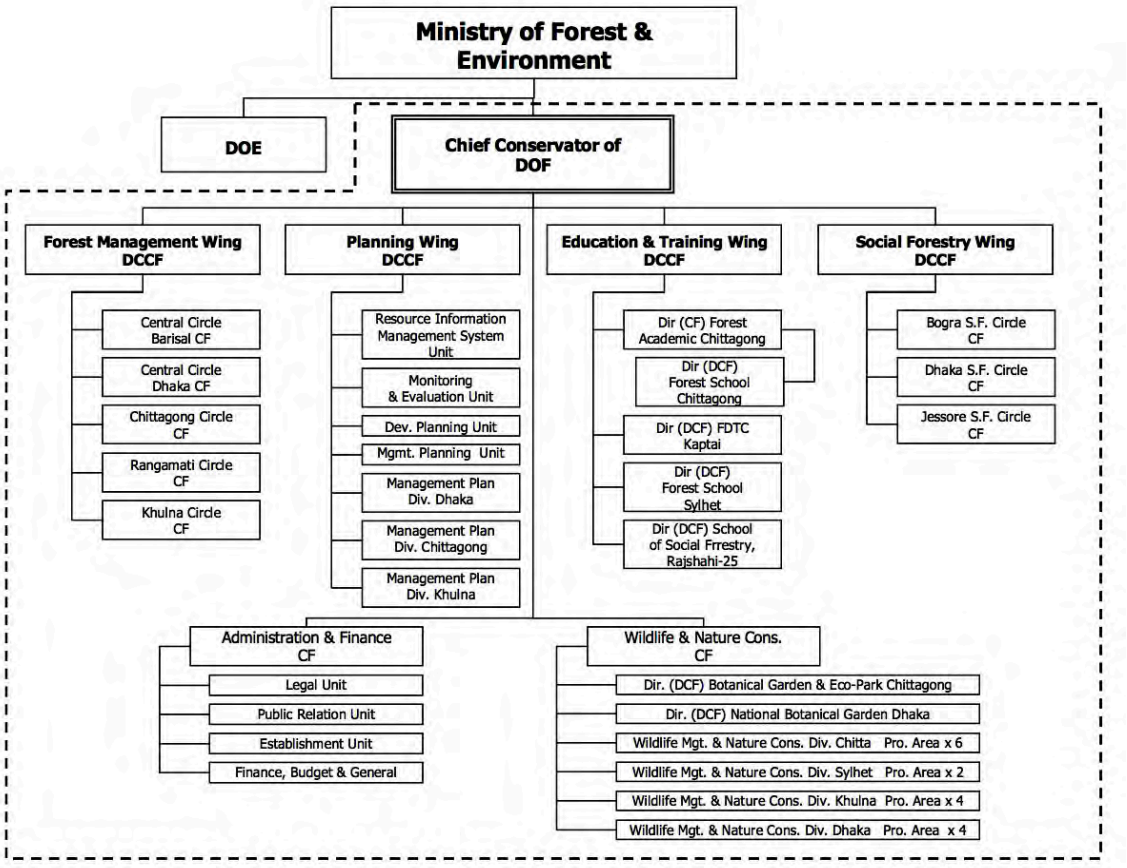


Figure 3.2.2: Organisation Chart for the Department of Forestry

3.3 Air Pollution

3.3.1 Current Situation

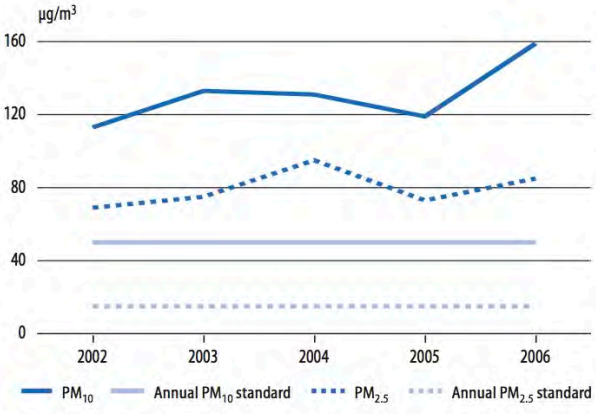
Air quality (AQ) has deteriorated due both to human activities and natural phenomena, such as wind-blown dust particles, etc. There are two major sources of air pollution in Bangladesh — vehicular emissions and industrial emissions — however, these are mainly concentrated in the cities. Additionally, there are numerous brick-making kilns used seasonally (in the dry season) all over Bangladesh. Almost all of these kilns use coal and wood as sources of energy, resulting in the emission of particulate matter, oxides of sulphur, and volatile organic compounds. In addition to these usual sources of fuel, spent or used rubber wheels of vehicles are also burnt, emitting black carbon and toxic gases. These practices are hazardous to human health. The emissions caused by these sorts of practices sometimes exceed the mechanisms for the natural rate of purification of the local atmosphere, giving rise to severe episodes of local air pollution.

Until recently, ambient AQ monitoring in Bangladesh was conducted on an intermittent and project-related basis. In the past, most AQ monitoring efforts were undertaken in the capital city of Dhaka. Now, with support from the World Bank and the country's Department of Environment (DoE), Bangladesh has some capacity to monitor AQ in several locations, using continuous AQ monitors. The DoE has set up monitoring stations in four divisional towns: Dhaka, Chittagong, Khulna, and Bogra. The parameters measured are particulate matter (PM, usually expressed as PM with a diameter of 10 microns or smaller: PM_{10}, or 2.5 microns or smaller: $PM_{2.5}$), sulphur oxides (SOx), nitrogen oxides (NOx) and carbon monoxide (CO). Other institutions, such as the Bangladesh Atomic Energy Commission (BAEC) and the Bangladesh University of Engineering and Technology (BUET), conduct monitoring of ambient AQ for research purposes. Data from these institutions are published in the form of theses or publications in international and national journals, and are available for further study. Some data are also published in leading newspapers and magazines aimed at generating awareness among citizens (ADB and CAI-Asia Center 2006).

In 2002, a continuous AQ monitoring station (CAMS) was established on the premises of the national parliament building, the Jatiya Sangsad, located at the heart of the capital city, Dhaka, under the World Bank-financed AQ Management Project (AQMP). Continuous monitors — meeting United States Environmental Protection Agency Federal Reference Method specifications — measure NOx, CO, SOx, ozone (O_3), methane and non-methane hydrocarbons (NMHCs) continuously for 24 hours. The data are recorded as hourly averages from which 8-hour, 24-hour, and other averaging periods can be generated. The equipment used to measure

PM is the PM_{10} inlet equipped high volume sampler for PM_{10} and the Partisol sampler for $PM_{2.5}$. The performance of the equipment for size fractionated air PM was validated against the GENT air sampler used by the BAEC. In 2006, another CAMS was set up on the premises of the Bangladesh Television Centre in the port city of Chittagong. The station also monitors criteria pollutants like SOx, NOx, CO, O_3, NMHC, PM_{10}, and $PM_{2.5}$. Similar CAMS were later set up in the towns of Rajshahi and Khulna, and additional CAMSs were set up at hot spots in Dhaka in 2007 (ADB and CAI-Asia Center 2006).

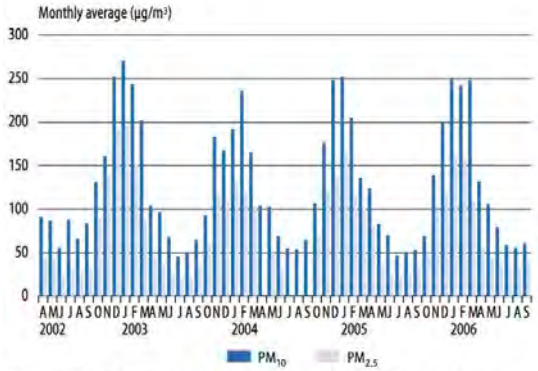
The country's AQ data is available for the capital city, Dhaka, but monitoring results from other cities are still limited. Since AQ monitoring data has only been consistently gathered at constant locations in Dhaka for five years, they are inadequate for indicating long-term trends in the AQ of the city; they can only indicate tendencies. However, sufficient data has been provided to determine variations in AQ based on seasonal changes (ADB and CAI-Asia Center 2006). Figures 3.3.1 to 3.3.4 depict the ambient AQ in Dhaka.



PM_{10} = particulate matter with a diameter of not more than 10 microns; $PM_{2.5}$ = particulate matter with a diameter of not more than 2.5 microns; µg/m³ = micrograms per cubic meter
Source: Nasiruddin, 2006.

Source: ADB and CAI-Asia Center. 2006. *Bangladesh: Country Synthesis Report on Urban Air Quality Management (Discussion Draft)*.

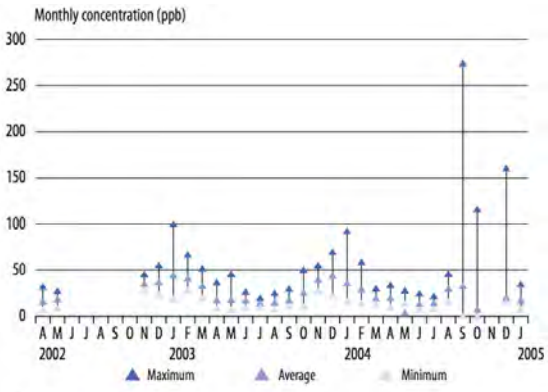
Figure 3.3.1: Annual Average PM_{10} and $PM_{2.5}$ in Dhaka



PM_{10} = particulate matter with a diameter of not more than 10 microns; $PM_{2.5}$ = particulate matter with a diameter of not more than 2.5 microns; µg/m³ = micrograms per cubic meter
Source: Nasiruddin, 2006.

Source: ADB and the CAI-Asia Center. 2006. *Bangladesh: Country Synthesis Report on Urban Air Quality Management (Discussion Draft)*.

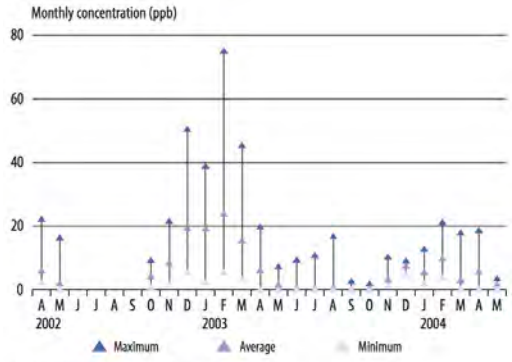
Figure 3.3.2: Seasonal Variations in PM_{10} and $PM_{2.5}$ Concentrations



NO_2 = Nitrogen dioxide; ppb = parts per billion
Source: Nasiruddin, 2006.

Source: ADB and CAI-Asia Center. 2006. *Bangladesh: Country Synthesis Report on Urban Air Quality Management (Discussion Draft)*.

Figure 3.3.3: Seasonal Variations in NO_2 in Dhaka



SO_2 = Sulfur dioxide; ppb = parts per billion
Source: Nasiruddin, 2006.

Source: ADB and CAI-Asia Center. 2006. *Bangladesh: Country Synthesis Report on Urban Air Quality Management (Discussion Draft)*.

Figure 3.3.4: Monthly Concentrations of SO_2 in Dhaka

According to the data collected, the main air pollutants in Dhaka are nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), ozone (O_3), volatile organic compounds (VOCs), and lead (Pb). Annual PM concentrations (as PM_{10} and $PM_{2.5}$) in the city of Dhaka indicate a slightly increasing tendency from April 2002 to July 2006 (2002 data is an average of concentrations from April to December, and 2006 data is an average of concentrations from January to July) (see Figure 3.3.2). Both PM_{10} and $PM_{2.5}$ concentrations exhibit levels exceeding World Health Organization (WHO) guidelines as well as amounting to more than twice the national standards for annual PM_{10} (50 $\mu g/m^3$) and $PM_{2.5}$ (15 $\mu g/m^3$). Plotting the average concentrations by month from April 2002 to June 2006 shows a consistent trend in the seasonal variation of PM concentrations. From 2003 to 2006, the highest concentrations of PM_{10} and $PM_{2.5}$ occurred in January. High concentrations of PM generally occur from November to February, when the country experiences mild winters. On the other hand, concentrations are generally lower from May to September, when most rainfall occurs (ADB and CAI-Asia Center 2006).

Long-term nitrogen dioxide (NO_2) data are not as readily available as PM data. To date, there is limited information to indicate a long-term annual trend in NO_2 concentrations, but the annual average concentration of NO_2 for 2003 of 27.6 parts per billion (ppb) indicates that NO_2 does not exceed the annual ambient standards of 53 ppb. A seasonal variation is also observed, similar to that of the PM, in which NO_2 concentrations are highest from November to February (ADB and CAI-Asia Center 2006).

As with other pollutants, sulphur dioxide (SO_2) peaks are also observed during the same months, starting in November (Figure 3.3.4). Current available AQ monitoring results do not allow for long-term analysis of annual concentration trends. The annual average concentration for 2003 (6.67 ppb) is within the national ambient AQ standard of 30 ppb (ADB and CAI-Asia Center 2006).

Results from AQ monitoring conducted in other cities are listed in Tables 3.1 and 3.2. Since the monitoring for the different areas was conducted for limited periods only, it is difficult to accurately assess the AQ problem in these cities. The information, however, indicates high levels of PM (in TSP) for other cities (ADB and CAI-Asia Center 2006).

Table 3.3.1: Results of Ambient AQ Analysis at Various Areas in Chittagong

Place	Date	TSP (μg/m^3)	SO_2 (μg/m^3)	NOx (μg/m^3)
Chandgaon residential area	25 Feb 2003	208.4	20.2	28.3
	2 Sep 2002	172.6	18.9	20.2
Khulshi residential area	12 Mar 2003	308.4	42.2	54.8
	14 Feb 2002	213.1	51.3	60.2
	16 Jan 2003	312.5	81.6	92.4
	19 Nov 2002	282.8	46.7	54.4
	10 Oct 2002	317.8	58.5	61.9
Nasirabad industrial area	11 Mar 2003	904.0	120.0	128.0
Agrabad commercial area	9 Apr 2003	804.0	111.0	115.0

Note: NOx: Nitrogen oxide; SO_2: Sulphur dioxide; TSP: Total Suspended Particulates

Source: ADB and CAI-Asia Center. 2006. *Bangladesh: Country Synthesis Report on Urban Air Quality Management (Discussion Draft).*

According to the analysis of ambient AQ, motor vehicles and traditional brick kilns are the major contributors to air pollution (DTCB 2011). During the dry season, which runs for half the year, from October through March, about 4,000 brick kilns operate in and near Dhaka. They do not operate during the monsoon season because the kilns and their nearby clay mining areas are normally under water. Collectively, these kilns consume about 2 million tons of coal and 7,500 to 30,000 kg of wood for fuel each year. Besides causing pollution, this use of fuel wood is also said to be the main cause of the 2% annual loss of forested areas in the country. According to reports, the kilns also use old tires and plastic waste as fuel. Just as importantly, the number of brick kilns is thought to be three times larger than the approximately 10,000 that the government knows about. This statistic illuminates the reality that, despite requirements for factories to register to operate, administrative authorities tend to overlook illegal acts due to structural collusion and corruption (Miyake 2009).

Motor vehicles are another major source of the PM pollution that contributes to the risk of development of cardiovascular and respiratory diseases, as well as lung cancer. Most of the PM pollution (more than 80%) comes from diesel-run vehicles. Hundreds of brick kilns operate during the dry season, from November to April, in the low agricultural land surrounding Dhaka city, and these generate smoke dust that includes SO_2, NOx, and hydrocarbons, which contribute to the worsening of the ambient AQ and to damage to public health. Motorization has grown rapidly in Dhaka in recent years. The total number of registered vehicles in Bangladesh has increased from 0.07 million in 1970 to 0.53 million in 2009. Dhaka has more than 3,000 old

minibuses, which run on diesel fuel. Eighty per cent of these buses are unfit to roll over the city roads because of their high emissions. Even though aging trucks are not allowed to run into Dhaka city during the daytime, the trucks contribute significantly to the worsening of the city's AQ, particularly during the dry winter months (DTCB 2011).

Despite the phasing out of two-stroke, three-wheeler baby taxis in 2003, the AQ benefit could not be sustained because of the great number of smoky diesel vehicles. In recent years, Dhaka has also witnessed tremendous growth in the number of vehicles that run on compressed natural gas (CNG). A sizeable number of gasoline-run vehicles have been converted to CNG vehicles. The refitted engines, which run on dual fuel, pose a real threat to the already polluted city's air and to the safety and security of commuters (DTCB 2011).

An emission inventory of mobile sources in Dhaka shows that the emissions from different vehicles contribute the dominant amounts of specific types of pollutants. Petrol-fuelled, light-duty vehicles and autorickshaws contribute most of the CO, while diesel-fuelled buses and trucks contribute most of the NOx. Two- and three-wheeled autorickshaws contribute about half of the hydrocarbon emissions. PM emission comes mostly from diesel buses and trucks (45%) and from autorickshaws (40%). According to a study conducted by the BAEC, approximately 55% of the PM_{10} emissions can be attributed to suspended soil and to motor vehicles (31%), and $PM_{2.5}$ is mostly attributable to motor vehicles (29%) and to natural gas/diesel burning (46%) (DTCB 2011).

3.3.2 Relevant Laws and Organisations

The primary pieces of legislation instituted to mitigate air pollution were the 1995 Bangladesh Environmental Conservation Act (ECA) and the 1997 Environmental Conservation Rules (ECR). The DoE, under the MoEF, is the institution primarily responsible for AQ monitoring and management in Bangladesh. The DoE's air pollution responsibilities include the control and analysis of ambient AQ, the identification of polluting industries, and the provision of support for the implementation of pollution prevention and control. Other core functions and activities of the DoE include policy analysis, planning and evaluation of environmental requirements, monitoring and evaluation, compliance and enforcement, and environmental clearances and processing of environmental impact assessments (ADB and CAI-Asia Center 2006).

As stated above, although Bangladesh has general laws to protect air quality (ECA and ECR), it does not have a clean air act or law that specifically addresses air pollution and its management

and control — nor are there clear indications whether one will be legislated in the coming years. A number of sector-specific policies (e.g. transport and industry sectors) and regulations that impact air pollution, however, have been adopted. For details of the standards for gaseous emission from industries or projects, see Table A-5 in the Appendix.

The first set of ambient AQ standards for Bangladesh was defined in the ECR of 1997. These 1997 standards were replaced in July, 2005 by a new set based on the proposal of the World Bank-funded AQM Project, which reviewed the old standards. The new standards for PM (PM_{10}, $PM_{2.5}$), NO_2, SO_2, CO, and ozone (O_3) are the same as the ambient AQ standards set by the US EPA; the standard for Pb is equivalent to the guideline value set by WHO. Bangladesh is the only country in South Asia that has set $PM_{2.5}$ in its national ambient AQ standards. The standards for CO, NO_2, SO_2, and O_3 are seen to be more lenient than those in the guidelines set by WHO. Table 3.3.2 details the updated ambient AQ standards for Bangladesh (ADB and CAI-Asia Center 2006).

Table 3.3.2: Bangladesh National Ambient AQ Standards vs. WHO Guidelines

Pollutant	Averaging Period	Bangladesh Standards	WHO Guidance Values
CO ($\mu g/m^3$)	8 hrs	10,000	10,000
	1 hr	40,000	30,000
Pb ($\mu g/m^3$)	1 yr	0.5	0.5
NO_x ($\mu g/m^3$)	1 yr	100	40 (as NO_2)
TSP ($\mu g/m^3$)	8 hrs	200	-
PM_{10} ($\mu g/m^3$)	1 yr	50	20
	24 hrs	150	50
PM_{25} ($\mu g/m^3$)	1 yr	15	10
	24 hrs	65	25
O_3 ($\mu g/m^3$)	1 hr	235	-
	8 hrs	157	100
SO_2 ($\mu g/m^3$)	1 yr	80	-
	24 hrs	365	20

Source: GoB. 2005. Statutory Rules and Order No. 220; WHO. 2000. Air Quality Guidelines for Europe, 2nd ed.; WHO. 2006. WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide.

3.3.3 Approaches and Efforts

City-specific action plans, such as the Action Plan to Improve Air Quality developed under the 2001 ADB-funded Urban Transport Environment Improvement Project, have also helped improve the AQM framework in the cities (ADB and CAI-Asia Center 2006).

Bangladesh has adopted an AQ index (AQI) system to be used for raising the awareness of the public about the quality of air that they breathe. The AQI for Bangladesh is primarily based on the US EPA system. Ideally, the AQI should be made available to the public daily; however, due to the lack of infrastructure and equipment, the DoE will initially present the AQI three times a week (ADB and CAI-Asia Center 2006).

The AQ Management Project reviewed the US EPA's AQI system and recommended it for adoption in Dhaka, with some modifications. The number of categories was reduced from six to four, in order to simplify the AQI and make it easier to understand. In addition, appropriate Bengali terms were used to describe the AQI categories. These AQI categories are presented in Table 3.3.3, but are again under revision.

Table 3.3.3: Proposed AQI for Bangladesh

AQI Range	Category	Colour
0 to 100	Good	Green
101 to 200	Unhealthy	Orange
201 to 300	Very Unhealthy	Purple
>301	Extremely Unhealthy	Red

Source: ADB and the Clean Air Initiative for Asian Cities Center. 2006. *Bangladesh: Country Synthesis Report on Urban Air Quality Management (Discussion Draft)*.

3.4 Water Pollution

Surface water and groundwater pollution must be considered separately when examining water pollution in Bangladesh. In the case of surface water, the causes of pollution and the remedial measures being taken are about the same as those in other developing countries. Industrialisation and urbanisation started rapidly, under circumstances defined by the insufficiency of environmental laws and their deficient implementation, by the public's weak sense of crisis, and by obsolete pollution control technology. These factors led to pollution, such as the discharge of untreated wastewater from factories and domestic wastewater from

residences, rural water containing chemical fertilizer and pesticides, and ocean and river water polluted with oil discharges from ships in ports (Miyake 2009).

The problem that has received the most attention in Bangladesh, but which is not observed very often in other developing countries, is the contamination of groundwater by arsenic. Health damage from arsenic, now considered to be a serious environmental problem, was first reported in Bangladesh in 1996, in the three south-western districts of Bagerhat, Satkhira, and Kushtia. Since that time, the government has announced that arsenic contamination exists in 61 of 64 districts, affecting about 65% of the population. Prior to its discovery in Bangladesh, arsenic pollution had been reported in the neighbouring Indian state of West Bengal as early as 1978. Initially, the sources of this pollution were believed to be insecticides, herbicides, and metallic filters used for factory effluent, but research by Jadavpur University in West Bengal found the presence of arsenic in mud 20 to 60 meters underground, over an area of 35,000 km^2, thereby revealing the true source of the contamination. Although this problem did not become apparent until the 1970s, it is said that years of heavy pumping of groundwater by farmers for the irrigation of summer crops induced chemical changes in soil composition (Miyake 2009).

Although they are linked to each other, surface water pollution and groundwater pollution are different in several aspects, such as their causes, effects, and the measures to control them. For this reason, they are separately described in this section.

3.4.1 Surface Water Pollution

3.4.1.1 Current Situation

Dhaka is surrounded by rivers and interconnected canals, which have formed a lifeline for city residents. In the last 20 years, serious pollution of surface water has been caused by population migration from rural to urban areas, by the earth filling the rivers, by unregulated industrial expansion, overloaded infrastructure, confusion about institutional responsibility for the quality of the water bodies, and by the ineffective enforcement of environmental regulations (Miyake 2009).

There is only one sewage treatment plant, located at Pagla, and it is currently operating below capacity because of sewage system failures and because of the few factories operating effluent treatment systems in the Dhaka Metropolitan Area. Almost all waste produced by residents, industry, millions of farm animals, and by pesticides and fertilizers is dumped into Dhaka's

surface water. These wastes infiltrate the ground and pollute the groundwater (Miyake 2009).

Dhaka surface water is in very poor condition, especially in the dry season. For some six months of the year, the flow rate of the rivers is negligible or often only occurs during a tidal pulse, but the volume of effluent flowing into the canal and river systems remains about the same as during the wet season. Consequently, dilution of contaminants is drastically reduced in the dry season. From the viewpoint of biochemical oxygen demand (BOD) and ammonia levels, the most polluted bodies of water are the Buriganga and Sitalakhya Rivers, Tongi Khal, and the canal system in Dhaka East, where very low devolved oxygen levels of 1.5 to 4 mg/l reflect contamination caused by organic waste, domestic sewage, and chemical residues from factories. These bodies of water are biologically dead during the dry season. The high levels of BOD (standard 6 mg/l), which are 10 to 30 mg/l in the Buriganga and Sitalakhya Rivers, mainly reflect the high density of the untreated industrial wastewater being discharged into the rivers. Some tidal backflow of relatively clean water from the Meghna and Dhaleswari Rivers results in dilution of contaminants in the southern reaches of both the Buriganga and Sitalakhya, but the extent of this positive effect is limited. The very high ammonia levels, particularly in the canal system in Dhaka East, the Balu River, and the southern reaches of the Buriganga River, reflect the discharge of sewage into these waterways. Ammonia in the Dhaka East area increases from about 0.3 mg/l in October to greater than 20 mg/l in March–April, which is twenty times higher than the national environmental quality standard (1.2 mg/l) for ammonia in surface water (Miyake 2009).

Through the environmental impact assessment of a Japan International Corporation Agency (JICA) project in Bangladesh, water quality analyses of three bodies of water along the proposed area were surveyed on 2 October and 12 December in 2010. The surveyed pH values at the three different points met the environmental standard. The channel and the drain in the urban area were severely polluted by organic matter. The surveyed total coliform values, which indicate contamination by domestic wastewater, far exceeded the standard value at all locations. Table 3.4.1 shows the results (DTCB 2011).

Table 3.4.1: Results of Water Quality Analysis by JICA

No.	Location	Date	pH	DO (ppm)	COD (ppm)	TSS (g/l)	TC (number/100ml)
1.	Pond in Northern Pallabi	2 Oct	7.5	5.8	45.6	288	500,000
2.		12 Dec	7.6	7.2	64	149	1,000
3.	Mirpur Khal	2 Oct	7.3	0.6	164.0	636.4	500,000
4.		12 Dec	7.7	UDL	480	392	910,000
5.	Begunbari Drain	2 Oct	7.6	1.4	141.6	502.1	1,100,000
6.		12 Dec	7.7	UDL	448	367	960,000
Bangladesh Standards			6.5–8.5	>5	–	–	5,000 or less

Notes: DO: dissolved oxygen; COD: chemical oxygen demand; TSS: total suspended soils; TC: total coliforms; UDL: under detection limit.

Source: DTCB. 2011. *Dhaka Urban Transport Network Development Project: Environmental Impact Assessment Study*.

3.4.1.2 Relevant Laws and Organisations

Similar to the efforts for the prevention of air pollution, the prevention of water pollution is conducted based on the 1995 Bangladesh ECA. The Act, including 21 articles, stipulates (1) the conservation of the environment, (2) the authority to regulate development and environmental pollution, (3) the setting of ambient and discharge standards, (4) clearance certificates, (5) inspection of factories and production facilities, and (6) violation penalties.

The 1997 ECR stipulates (1) the setting of national standards for air and water quality, discharges of gas and water for industries, and noise and vehicle exhaust; (2) the process of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA); and (3) the designation of specific areas that are important for environment conservation.

The laws, rules, and ordinances related to water quality are shown below:

- National Environment Policy (1992)
- EIA Guidelines for Water Resources (1992)
- Environment Conservation Act (1995)

- National Environment Management Action Plan (1995)
- Environment Conservation Rules (1997)
- EIA Guidelines for Industries (1997)
- National Policy for Safe Water Supply and Sanitation (1998)
- National Fisheries Policy (1998)
- Environment Conservation Act (1998)
- Environment Court Act (2000)

Table 3.4.2: Bangladesh National Drinking-water Standards vs. WHO Guideline Values

No.	Parameter	Unit	Bangladesh	WHO
1.	Aluminium	mg/l	0.2	0.2 (A)
2.	Ammonia	mg/l	0.5	0.06
3.	Arsenic	mg/l	0.05	0.01 (P)
4.	Barium	mg/l	0.01	0.07
5.	Benzene	mg/l	0.01	0.01
6.	BOD_5 (20°C)	mg/l	0.2	
7.	Boron	mg/l	1.0	0.5 (T)
8.	Cadmium	mg/l	0.005	0.003
9.	Calcium	mg/l	75	
10.	Chloride	mg/l	150-600*	
11.	Chlorinated alkanes	mg/l	0.01	
	carbontetrachloride	mg/l	0.001	
	1.1 dichloroethylene 1.2 dichloroethylene	mg/l	0.03	
	tetrachloroethylene	mg/l	0.03	
	trichloroethylene	mg/l	0.09	
12.	Chlorinated phenols -pentachlorophenol -2.4.6 trichloropehnol	mg/l	 0.03 0.03	 0.02 0.02
13.	Chlorine (residual)	mg/l	0.2	5
14.	Chloroform	mg/l	0.09	0.3
15.	Chromium (hexavalent)	mg/l	0.05	0.05 (P)
16.	Chromium (total)	mg/l	0.05	0.05 (P)
17.	COD	mg/l	4	
18.	Coliforms (faecal)	n/100 ml	0	

No.	Parameter	Unit	Bangladesh	WHO
19.	Coliforms (total)	n/ 100 ml	0	
20.	Colour	Hazen	15	
21.	Copper	mg/l	1	2.0
22.	Cyanide	mg/l	0.1	0.07
23.	Detergents	mg/l	0.2	
24.	DO	mg/l	6	
25.	Fluoride	mg/l	1	1.5
26.	Hardness (as $CaCO_3$)	mg/l	200-500	300 (A)
27.	Iron	mg/l	0.3-1.0	0.3 (A)
28.	Kjeldhl Nitrogen	mg/l	1	
29.	Lead	mg/l	0.05	0.01
30.	Magnesium	mg/l	30-35	
31.	Manganese	mg/l	0.1	0.4 (C)
32.	Mercury	mg/l	0.001	0.006
33.	Nickel	mg/l	0.1	0.07
34.	Nitrate	mg/l	10	50 short term exposure
35.	Nitrite	mg/l	<1	3 short term exposure
36.	Odour	mg/l	Odourless	
37.	Oil and grease	mg/l	0.01	
38.	pH		6.5-8.5	6.5-8.5 (A)
39.	Phenolic compounds	mg/l	0.002	
40.	Phosphate	mg/l	6	
41.	Phosphorus	mg/l	0	
42.	Potassium	mg/l	12	
43.	Radioactive materials (gross alpha activity)	Bq/l	0.01	0.5
44.	Radioactive materials (gross beta activity)	Bq/l	0.1	1
45.	Selenium	mg/l	0.01	
46.	Silver	mg/l	0.02	
47.	Sodium	mg/l	200	

No.	Parameter	Unit	Bangladesh	WHO
48.	Suspended particulate matters	mg/l	10	
49.	Sulfide	mg/l	0	
50.	Sulfate	mg/l	400	500 (A)
51.	Total dissolved solids	mg/l	1000	600
52.	Temperature	°C	20-30	
53.	Tin	mg/l	2	
54.	Turbidity	JTU	10	10
55.	Zinc	mg/l	5	4.0 (A)

Notes: (A) Normal threshold value, no health-based guideline in WHO Guidelines for Water Quality, 3rd ed.; (C) Concentration of the substrates at this level or below may affect taste or odour resulting in consumer complaints; (P) Provisional guideline, evidence of hazard exists but limited information on health effects are available.

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.; WHO. 2008. *Guidelines for Drinking-water Quality*, 3rd ed.

For details of other standards, such as for sewage and industrial waste discharged into inland surface water, see Tables A-6 and A-8 in the Appendix.

3.4.2 Groundwater Pollution

3.4.2.1 Current Situation

It was thought that Bangladesh had succeeded in offering safe drinking water to the vast majority of its population through tube wells with hand pumps by the early 1990s. However, during the same decade, this success was challenged by the discovery of widespread arsenic contamination exceeding the Bangladesh drinking water standard of 50 µg/l. Several screening campaigns determined the extent and severity of arsenic contamination. Tens of millions of people were at risk, reducing the safe water coverage of Bangladesh from nearly universal to about 80%. The GoB, together with stakeholders, has undertaken a range of arsenic mitigation strategies guided by the National Policy for Arsenic Mitigation issued in 2004, and the Implementation Plan for Arsenic Mitigation. Both the public and the private sectors have made significant progress towards mitigation (FAO, UNICEF, WHO and WSP 2010).

A water quality survey in 2009, by the Bangladesh Bureau of Statistics and UNICEF, found that 12.6% of drinking water samples collected from 13,423 households around the country did not

meet the Bangladesh drinking water standard for arsenic. This is equivalent to approximately 20 million people still being exposed to excessive quantities of arsenic. Recent knowledge of the health threats posed by arsenic, as well as evidence of arsenic penetration into the food chain, makes urgent action absolutely essential. In recognition of the continuing challenge posed by arsenic, the present GoB committed in its election manifesto that 'the arsenic problem will be tackled and measures will be taken to supply drinking water for all by 2011' (FAO, UNICEF, WHO and WSP 2010).

In 2009, UNICEF conducted the National Drinking Water Quality Survey (NDWQS) in Bangladesh. The NDWQS shows that the size of the population exposed to high levels of arsenic in Bangladesh is considerably smaller than in some earlier estimates, but the number remains massive. Assuming a population of 164 million in 2010–11, 22 million people are exposed to more than 0.05 mg/l of arsenic through drinking water, and 52 million are exposed to more than 0.01 mg/l, the provisional WHO Guideline value. A staggering 5.6 million are exposed to more than 0.2 mg/l and face a high risk of developing arsenicosis and suffering the most severe health consequences (UNICEF 2011).

Survey respondents who reported taking drinking water from wells that had been tested and marked safe (green) had drinking water in the home that met the Bangladesh standard of 0.05 mg/l in 89% of cases. Similarly, 87% of those who reported taking water from a source that had been tested and marked unsafe (red) had drinking water that exceeded the WHO Guideline value of 0.01 mg/l, though only 67% of these samples exceeded the Bangladesh standard (UNICEF 2011).

In addition, high levels of iron are widespread, with approximately 40% of the population exposed to more than the Bangladesh limit of 1.0 mg/l. The situation is even worse for manganese, which also has health impacts: more than 60% of the population consumes drinking water above the Bangladesh limit of 0.1 mg/l, and approximately one-third of the population drinks water exceeding the less stringent WHO Guideline value of 0.4 mg/l (UNICEF 2011).

No significant problems were seen with other elements that have health impacts, including Ba, B, F, Ni, Se, U, and Zn. This survey is the largest fluoride survey to date in Bangladesh, and it shows that geogenic fluoride is not a major issue. There have been no previous national surveys of selenium in drinking water, though small-scale studies have found low levels in groundwater and in soils. This survey confirms that selenium levels in water are low throughout the country. In fact, in Bangladesh, selenium deficiency is more likely than selenium toxicity (UNICEF

2011). Table 3.4.3 summarises the results of NDWQS.

Table 3.4.3: Summary of Household Drinking Water Quality in Bangladesh, 2009

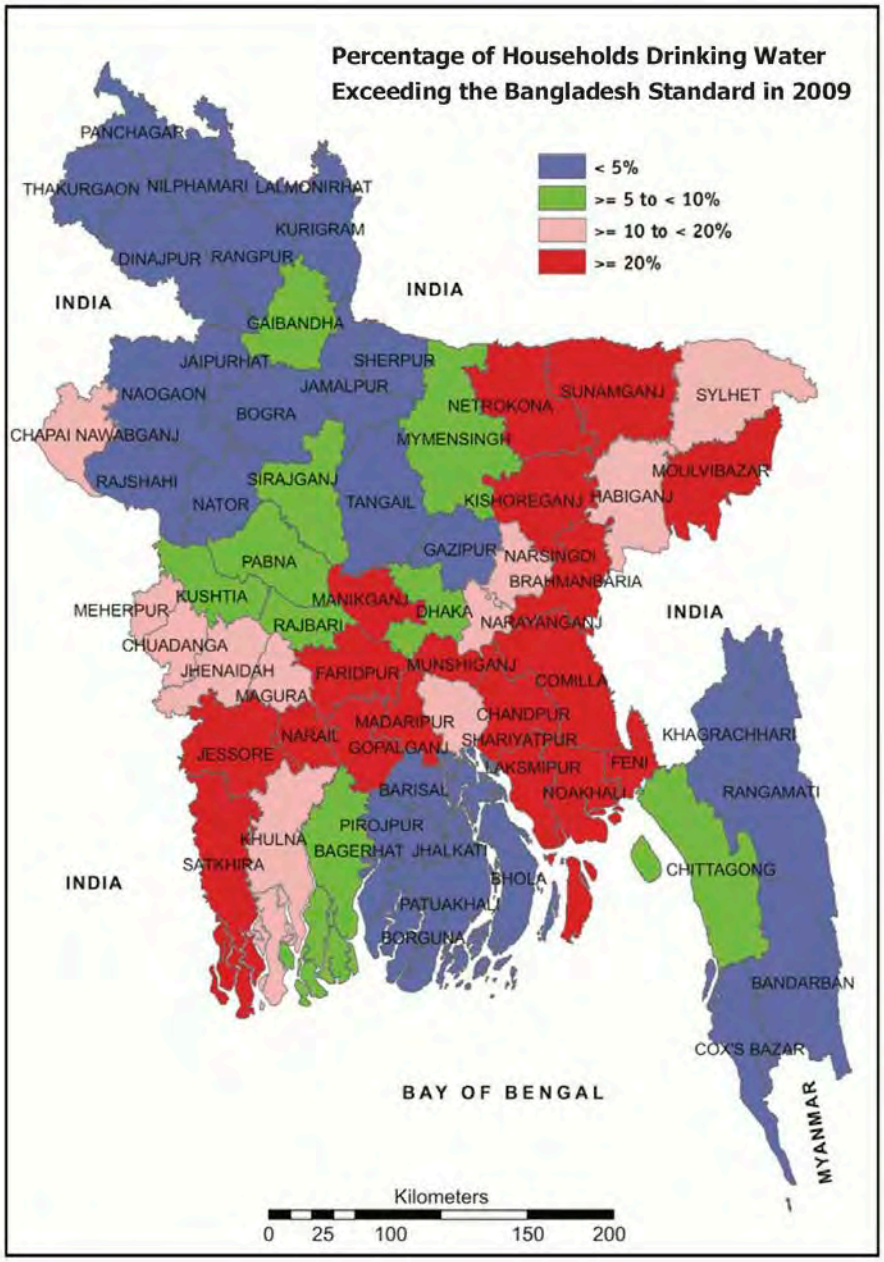
Analyte	25th %ile	Median	75th %ile	90th %ile	Maximum	Average	Below MDL	Below LOD	Below WHO GV	Below BD Standard
Major elements (median > 1 mg/L)										
Calcium (Ca)	14	30	70	110	520	47	0.000	0.174	n.a.	0.773
Chloride (Cl)	4	12	42	180	1900	74	0.013	0.165	n.a.	0.877
Magnesium (Mg)	6	13	24	36	210	18	0.000	0.040	n.a.	0.894
Hardness (as CaCO3)	65	138	289	434	1409	196	0.000	0.088	n.a.	0.936
Potassium (K)	2	3	5	9	520	5	0.001	0.029	n.a.	0.927
Silicon (Si)	13	17	22	27	40	18	0.000	0.740	n.a.	n.a.
Sodium (Na)	14	27	77	250	1700	87	0.000	0.036	n.a.	0.867
Minor elements (median 0.01 - 1.0 mg/L)										
Aluminium (Al)	0.035	0.051	0.087	0.160	16.0	0.098	0.021	0.875	n.a.	0.938
Barium (Ba)	0.05	0.09	0.15	0.26	1.50	0.13	0.001	0.731	0.992	n.a.
Boron (B)	0.012	0.027	0.094	0.330	3.0	0.110	0.217	0.737	0.939	0.993
Fluoride (F)	0.05	0.15	0.20	0.40	1.5	0.20	0.328	0.869	1.000	0.989
Iron (Fe)	0.24	0.71	2.30	6.10	43.0	2.22	0.109	0.324	n.a.	0.598
Manganese (Mn)	0.04	0.20	0.63	1.30	9.2	0.49	0.022	0.243	0.647	0.389
Phosphorus (P)	0.15	0.24	0.44	1.40	13.0	0.54	0.134	0.621	n.a.	0.935
Strontium (Sr)	0.09	0.16	0.31	0.47	2.50	0.23	0.000	0.033	n.a.	n.a.
Zinc (Zn)	0.009	0.015	0.034	0.077	5.5	0.046	0.078	0.825	n.a.	1.000
Trace elements (median < 0.01 mg/L)										
Arsenic (As)	0.001	0.001	0.004	0.041	0.910	0.018	0.559	0.605	0.821	0.915
Arsenic (As, Arsenator)	0.001	0.001	0.018	0.077	0.900	0.027	0.590	0.658	0.680	0.866
Cobalt (Co)	0.0003	0.0003	0.0005	0.0010	0.130	0.0006	0.741	0.740	n.a.	n.a.
Copper (Cu)	0.0003	0.0003	0.0005	0.0010	0.130	0.0006	0.741	0.740	1.000	1.000
Lithium (Li)	0.003	0.003	0.006	0.010	0.088	0.005	0.708	0.707	n.a.	n.a.
Nickel (Ni)	0.001	0.001	0.002	0.003	0.190	0.002	0.520	0.959	0.997	0.999
Molybdenum (Mo)	0.001	0.001	0.001	0.002	0.023	0.001	0.814	0.813	1.000	n.a.
Selenium (Se)	0.001	0.001	0.001	0.001	0.015	0.001	0.978	0.974	0.999	0.999
Titanium (Ti)	0.003	0.003	0.003	0.003	0.096	0.003	0.910	0.925	n.a.	n.a.
Tungsten (W)	0.001	0.001	0.001	0.001	0.022	0.001	0.917	0.946	n.a.	n.a.
Uranium (U)	0.0001	0.0001	0.0006	0.0041	0.063	0.0013	0.582	0.630	0.989	n.a.
Vanadium (V)	0.001	0.001	0.002	0.003	0.019	0.001	0.660	0.730	n.a.	n.a.

Notes: Yellow shading in the above table indicates that the value is below the Limit of Detection (LOD). Blue shading indicates that either a Bangladesh standard or a WHO Guideline value is exceeded. Darker blue shading indicates both are exceeded, or that one is exceeded by a factor of ten. Several trace elements were measured, but are not included in this table because most or all results were below the LOD.

Source: UNICEF. 2011. *Bangladesh National Drinking Water Quality Survey of 2009*.

The risk of arsenic-polluted groundwater is not equally spread geographically. As shown in Figure 3.4.1, the areas in which more than 20% of households were exposed to drinking water

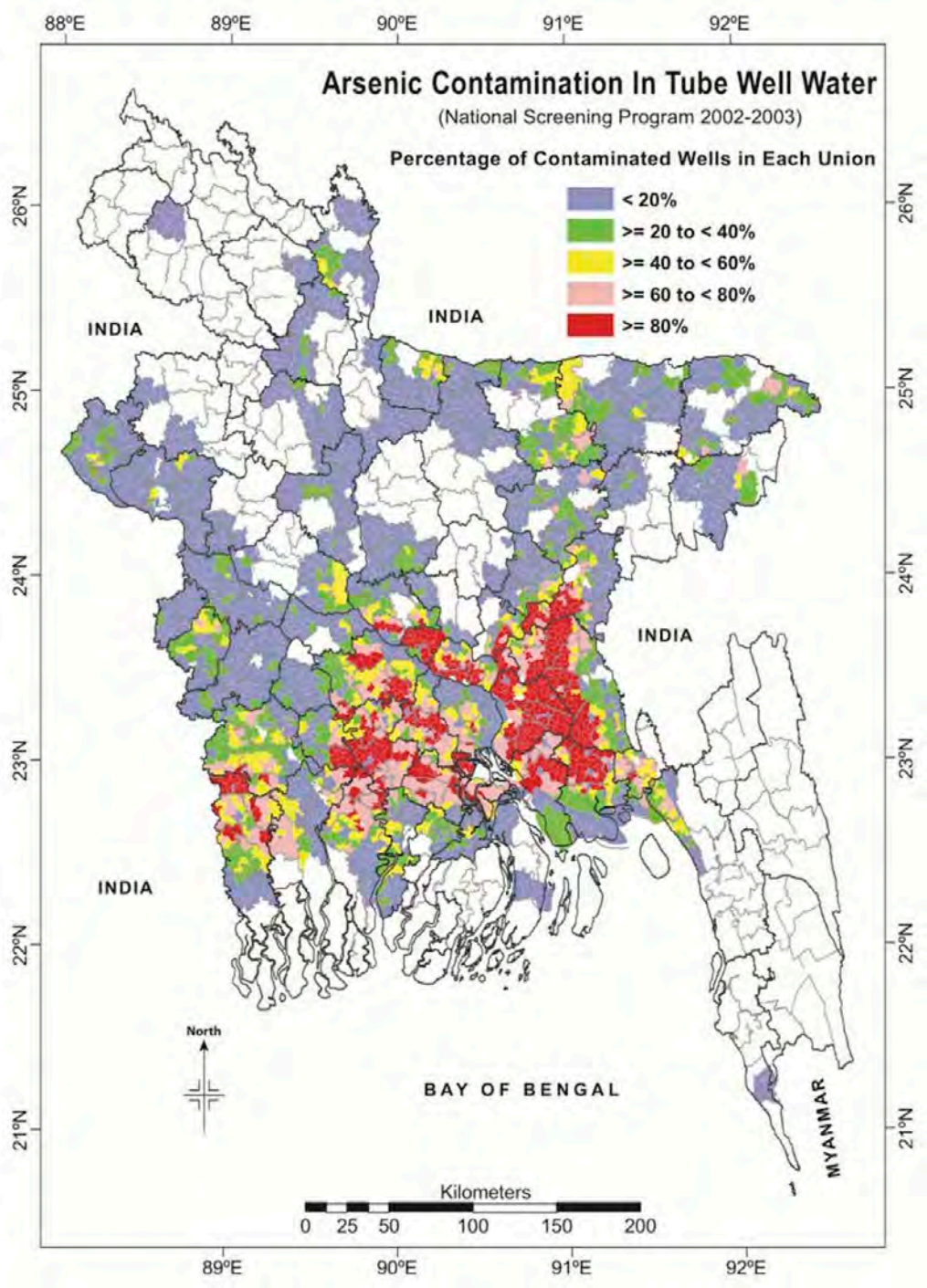
contaminated by arsenic (> 50 ppb) generally concentrates along the rivers and the northeastern part of the country, in Shatkhira, Jessore, Narail, Magura, Gapalganj, Faridpur, Munshiganj, Manikganj, Chandpur, Lakshmipur, Noakhali, Feni, Comilla, Brahmanbaria, Kishoreganj, Netrokona, Sunamganj, and Maulvibazar.



Source: FAO, UNICEF, WHO and WSP. 2010. *Towards an Arsenic Safe Environment in Bangladesh: Executive Summary*.

Figure 3.4.1: Percentage of Households Drinking Water Exceeding the Bangladesh Standard in 2009

Among the areas stated above, the risk of arsenic is the highest in those located in the southern inland part of the country as Figure 3.4.2 indicates.



Source: FAO, UNICEF, WHO and WSP. 2010. *Towards an Arsenic Safe Environment in Bangladesh: Executive Summary*.

Figure 3.4.2: Percentage of Contaminated Wells in Each Union

3.4.2.2 Relevant Laws and Organisations

In addition to the ECA and the ECR, which stipulate the standards for air quality, major domestic acts, ordinances, policies and strategies related to water supply and sanitation are listed below.

- Groundwater Management Ordinance (1985): An ordinance to manage the groundwater resources for agricultural production.
- National Water Policy (1998): provides direction to all agencies working with the water sector, and institutions that are related to the water sector in one form or another.
- National Policy for Safe Water Supply and Sanitation (1998): A basic policy document governing the water supply and sanitation sector.
- Draft Poverty Reduction Strategy Paper (2002): ensures adequate funds for accessible water supply and sanitation services for all in Bangladesh.
- National Policy for Arsenic Mitigation (2004): provides a guideline for mitigating the effect of arsenic on people and the environment in a realistic and sustainable way.
- National Water Management Plan (2004): appropriates sanitation to all by 2010 and has also made a provision for waterborne sanitation and storm water drainage in major cities.
- Sector Development Framework (2004): guides planning, coordination, and monitoring of all future sector development activities.
- Sanitation Related Policy Decisions (2004): The GoB allocated 20% of the annual development programme fund to Upazillas (sub-districts) for improving sanitation coverage.
- Pro-Poor Strategy for Water and Sanitation Sector (2005): provides the operational definition of hard core poor households, basic minimum service level, and so forth.

The administration of water supply and sanitation are managed by the following entities:

- The Department of Public Health Engineering (DPHE)
- Dhaka Water Supply and Sewerage Authority (DWASA)
- Chittagong Water Supply and Sewerage Authority (CWASA)
- The Ministry of Water Resource
- Water Development Board (WDB)
- Inland Water Transport Authority
- National Arsenic Mitigation Information Center (NAMIC; currently operating under the Bangladesh Water Supply Program Project by World Bank, mentioned later)

To mitigate arsenic contamination, the government's Department of Public Health Engineering generally uses the following methods: (1) testing the water quality of wells and then painting

uncontaminated wells green and contaminated wells red; (2) raising the public's consciousness about arsenic poisoning; (3) identifying people with arsenic poisoning; and (4) finding and securing sources of drinking water to substitute for groundwater. Although no sure treatment for arsenic poisoning has been discovered, victims can typically restore their health by drinking uncontaminated water and eating nutritious food. In rural areas, however, alternative drinking water sources and adequate nutrition are sometimes difficult to come by (Miyake 2009).

In Dhaka and Chittagong, local authorities administer water supply and sewerage in the regions. The responsibilities of the DWASA, CWASA, and DPHE are shown in the table below.

Table 3.4.4: The Responsibilities of DWASA, CWASA and DPHE

Location	Environmental health facility	Organisation		
		DWASA	CWASA	DPHE
Dhaka	Water service	√		
	Sewer service	√		
	Drainage and solid waste			√
Chittagong	Water service		√	
	Sewer service		√	
	Drainage and solid waste			√
Other areas	Water service			√
	Sewer service			√
	Drainage and solid waste			√

3.4.2.3 Approaches and Efforts

A number of projects have been implemented to prevent and control groundwater pollution. It is impossible to mention all of these projects, so only an outline of the major projects is provided here.

Table 3.4.5: Major Recent Projects Aided by International Organisations Related to the Problem of Arsenic

Organisation	Project	Year
World Bank	Mitigation of Arsenic in Groundwater Project	Unknown
	Bangladesh Water Supply Program Project	2004–2010
UNICEF	Arsenic Mitigation and Measurement Project	Unknown
NGO Forum	Integrated Community-Based Arsenic Mitigation Project	2010–2012

Organisation	Project	Year
JICA	Strengthening Water Quality Examination System in Bangladesh	2005– (on-going)
	Sustainable Arsenic Mitigation Under the Integrated Local Government System	2005–2008
	Strengthening Water Quality Analysis and Monitoring System	2006–2007

Despite massive efforts to provide safe water supplies in arsenic-affected areas, this problem is far from resolved as of today. Fortunately, the data indicating the current situation have been collected and compiled, which enable us to determine how to manage and address this problem.

3.5 Soil Pollution

3.5.1 Current Situation

Along with water, soil contamination is a major problem in Bangladesh. As mentioned above, the most serious instance of soil contamination in Bangladesh is arsenic impact, which induces groundwater pollution. In addition to the arsenic pollution, some scientific researches have suggested that soils in industrial areas and around waste disposal sites are especially contaminated by heavy metals from industrial facilities and waste deposal sites. Results from one analysis are shown in the following table.

Table 3.5.1: Total Heavy Metal Contents in Soil in Industrial and Municipal Waste Disposal Sites in Chittagong

Waste disposal site	Soil depth (cm)	Parameter (mg/kg)				
		Cd	Pb	Cu	Mn	Zn
BSD	0–15	1.5 ± 0.28	58 ± 17	41 ± 27	252 ± 66	325 ± 185
	15–30	1.5 ± 0.37	51 ± 9	35 ± 15	200 ± 77	255 ± 140
	30–45	1.6 ± 0.16	54 ± 2	30 ± 5	331 ± 53	202 ± 40
MLF	0–15	2.0 ± 0.18	88 ± 13	73 ± 17	409 ± 29	325 ± 117
	15–30	1.9 ±0.12	65 ± 16	49 ± 20	458 ± 40	232 ± 40
	30–45	1.7 ± 0.08	49 ± 1	27 ± 4	439 ± 46	153 ± 15
PMC	0–15	0.5 ± 0.05	70 ± 32	37 ± 29	248 ± 31	256 ± 130
	15–30	0.6 ± 0.21	49 ± 11	20 ± 14	299 ± 116	178 ± 77
	30–45	0.3 ± 0.04	51 ± 9	19 ± 9	349 ± 79	183 ± 73
FMC	0–15	1.2 ± 0.44	82 ± 11	42 ± 6	420 ± 96	317 ± 60

Waste disposal site	Soil depth (cm)	Parameter (mg/kg)				
		Cd	Pb	Cu	Mn	Zn
	15–30	1.3 ± 0.37	86 ± 28	44 ± 9	516 ± 76	347 ± 164
	30–45	1.3 ± 0.12	90 ± 26	45 ± 14	521 ± 60	325 ± 172
CMC	0–15	1.1 ± 0.22	70 ± 5	39 ± 1	679 ± 36	248 ± 31
	15–30	0.9 ± 0.07	64 ± 4	34 ± 4	677 ± 157	198 ± 24
	30–45	0.8 ± 0.02	56 ± 3	35 ± 3	517 ± 128	165 ± 28

Note: BSD: biosolids (sewage sludge) disposal site; MLF: municipal open pit landfill; PMC: paper mill complex; FMC: fertiliser manufacturing complex.

Source: Alam, S. S., K. T. Osman and G. Kibria. 2011. Heavy metal pollution of soil from industrial and municipal wastes in Chittagong, Bangladesh. Archives of Agronomy and Soil Science, 1–12.

3.5.2 Relevant Laws and Organisations

As with other forms of pollution, the Bangladesh Environment Conservation Act (ECA) No. 1 of 1995 also covers soil contamination. To date, no clear standards that are directly related to soil quality have been established. Soil quality in Bangladesh is protected indirectly by the standards that have been set for air and/or water quality discharged from industries or households, for soil pollution is induced by these contaminants.

The relevant administrative organisations to soil pollution are considered to be the Ministry of Environment and Forest (MoEF) and the Department of Environment (DoE), which is under the former.

3.6 Solid Waste

3.6.1 Current Situation

Especially in Dhaka, the waste management problem is increasingly serious. Dhaka faces many problems, including a low trash collection rate in relation to the amount of waste generated (illegal dumping is rampant and collection is lax, which results in deteriorating public health conditions and clogged drainage channels that lead to flooding) and the difficulty of securing final disposal sites (Miyake 2009). Waste generation in Dhaka is summarised in Table 3.6.1.

Table 3.6.1: Waste Generation Volume and Quality

Waste generation site	Domestic	Business	Street	Average
Estimated volume of generation (t/d)	1,950	1,050	200	–
Generation rate (kg/d/person)	0.34	–	–	0.56
Bulk density (t/m^3)	–	–	–	0.24 (t/m^3)
Calorific value (kcal/kg)	–	–	–	550–850

Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 1: Summary*.

In details of the sources of solid waste, households account for nearly half of the wastes generated in the city while markets or commercial centres contribute one fifth, industrial waste accounts for about 24% and hospitals and clinic contribute about 7%.

Table 3.6.2: Total Solid Waste Generation per Day

Types	Amount (tonnes)	Percentage
Residential	1,718	49.08
Commercial	722	20.86
Industrial	835	23.86
Hospital and Clinical	255	7.29
Total	3,500	100.00

Source: Bhuiyan, M.A.H., N. E. Huq and M. M. Hossain. 2002. Unplanned Waste Disposal and its Possible Impact on Subsurface Environment of Dhaka City, Bangladesh. In M. F. Ahmes, S. A. Tanveer and A. B. M. Badruzzaman, eds, *Bangladesh Environment*, Vol. 2, 723–31.

The amount of solid waste varies according to the seasons: dry season and wet season. Generally speaking, the amount of solid waste in the dry season is much larger than that of in the wet season, as Table 3.6.3 shows.

Table 3.6.3: Incoming Waste Amount and Estimated Waste Generation Amount

Survey Time	Matuail		Berri Band		Uttara		Total	
	WAC (t/d)	NIV (unit/d)	WAC (t/d)	NIV (unit/d)	WAC (t/d)	NIV (unit/d)	WAC (t/d)	NIV (unit/d)
Dry Season	649	226	313	122	6	2	969	350
Wet Season	913	338	399	153	104	33	1,416	525
Average	781	282	356	138	55	18	1,193	437
	65%	65%	30%	32%	5%	4%	100%	100%

Notes: WAC: waste amount carried; NIV: numbers of incoming vehicles.

Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 3: Supporting Report*.

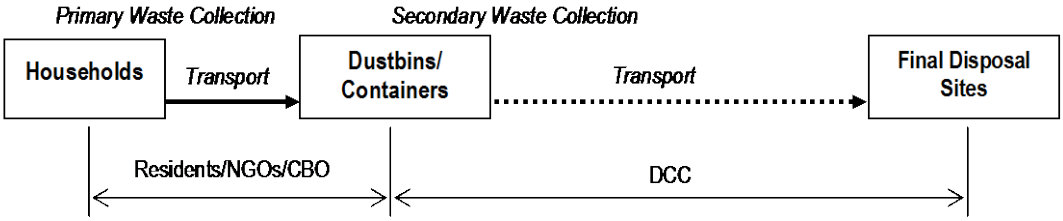
In terms of components of solid waste, food and vegetables account for about 60% of the entirety.

Table 3.6.4: Components of Solid Waste and Their Proportions in Dhaka

Components	Percentage
Food and vegetables	59.91
Plastic, rubber, wood and leather	17.67
Paper products	11.21
Garden wastes & etc.	8.76
Rock, dirt, debris & misc.	2.3
Metals	0.15
Total	100.00

Source: Huda, N. K. M. 2002. Municipal Solid Waste Management: Dhaka City Perspective. In M. F. Ahmes, S. A. Tanveer and A. B. M. Badruzzaman, eds, *Bangladesh Environment*, Vol. 2, 732–46.

The collection of solid waste is generally divided into two stages: primary waste collection and secondary waste collection.



Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 3: Supporting Report*.

Figure 3.6.1: Waste Collection System in Dhaka City

Residents are responsible for bringing their waste to collection points of Dhaka City Corporation (DCC) where dustbins/containers are located. NGOs, community-based organisations (CBOs) and the private sector provide primary collection services to collect waste door to door and transport the waste to dustbins/containers, or sometimes to vacant lands, by rickshaw vans. At present, NGOs, CBOs and private initiative primary collection services are prevalent in Dhaka City (DCC and JICA 2005). According to a study, however, nearly 50% of the daily generated waste remains uncollected in the cities of Bangladesh (Bhuiyan 2005).

Dhaka City Corporation (DCC) is responsible for secondary waste collection to remove waste from DCC's dustbins/containers, and for transporting the waste to final disposal sites. At present, open trucks and container carriers are the main vehicles for waste collection and transport operation. These vehicles are operated in linkage with the storage facilities, dustbins and waste containers. The aging of waste-collecting trucks and shortages of the financial and personnel resources are serious problems (DCC and JICA 2005). The organisation chart of DCC is shown in Figure 3.6.2.

The solid waste collected and transported by DCC and/or contractors was disposed at Matuail, Berri Band and Uttara as of March 2004, as shown in the table below. As of July 2004, the Matuail and Berri Band sites were also operating but the Uttara site was not operating because the site is inundated in the wet season (DCC and JICA 2005).

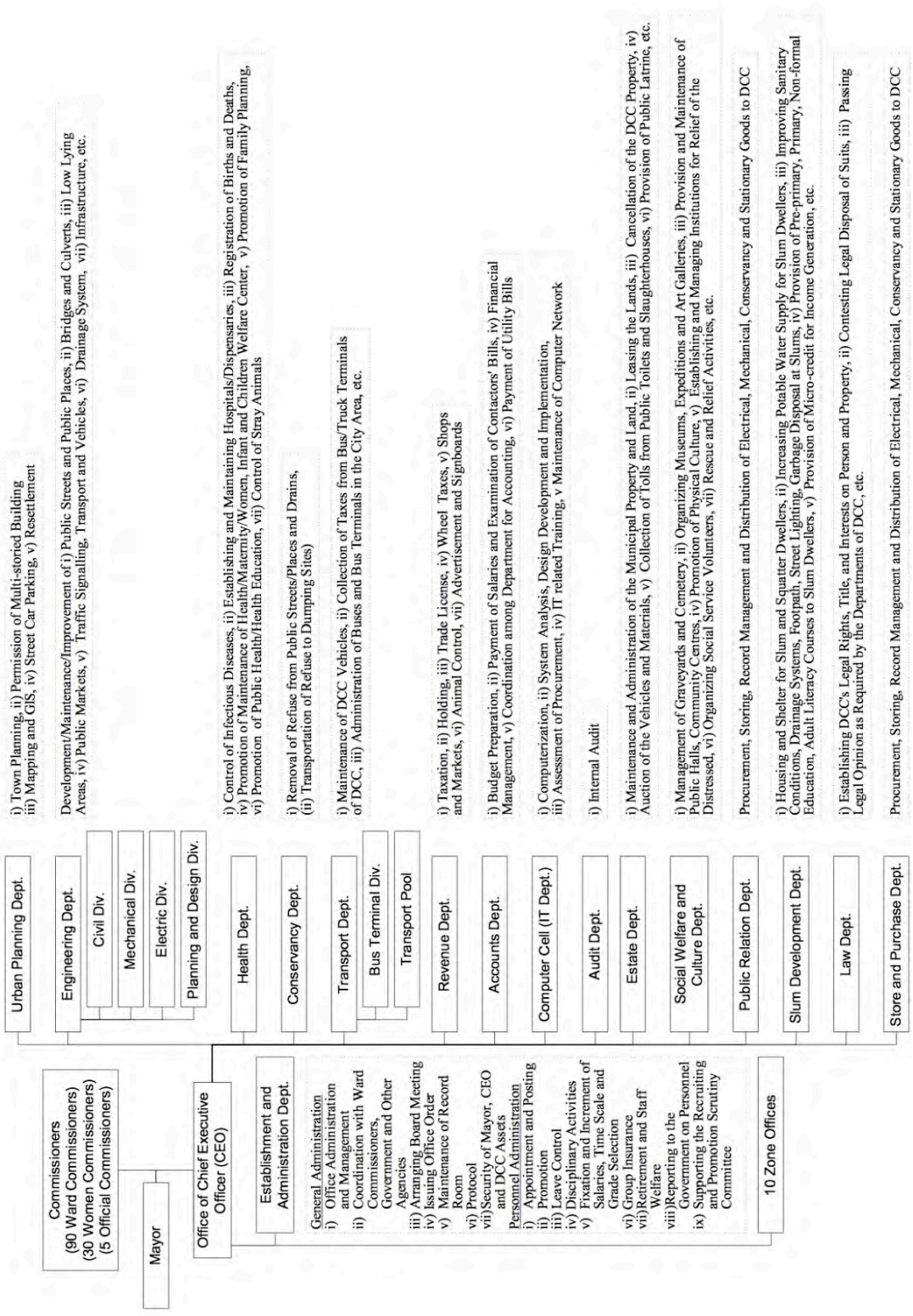
Table 3.6.5: Final Disposal Sites

Name	Operation in March 2004	Operation in July 2004
1. Matuail (Official)	Landfill from central platform Constructing surrounding road 6 pieces of heavy equipment were working	Landfill from surrounding road Flood in July, 2004 5 pieces of heavy equipment

Name	Operation in March 2004	Operation in July 2004
		were working 890 tonnes/day and 338 trips/day
2. Berri Band (Temporary)	Landfill at the block protected from river 2 pieces of heavy equipment were working	Landfill at the adjacent block but it was open to river 2 pieces of heavy equipment were working 410 tonnes/day and 153 trips/day
3. Uttara (Temporary)	Landfill at the block but it was open to river One bulldozer was working	Not operating and the site is inundated

Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 3: Supporting Report*.

The Matuail landfill site has a surrounding embankment. During the dry season (from November to April), almost no discharge and/or leakage of leachate occurred from the landfill site except a small discharge at the west side. But the leachate water level is high even in the dry season. Although the leakage amount of leachate at the west side is small, a small pond and plant are affected by leachate. It t is probable that contaminated rainwater and leachate may overflow in the rainy season (from May to October). Therefore, some measures to prevent water pollution will be required (DCC and JICA 2005).



Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 3: Supporting Report*.

Figure 3.6.2: The Organisation Chart of DCC

The financial problem is one of the major issues facing the management of solid waste. The balance sheet is available only for the years up to 2000, and those for the last three years are still being processed. The receivable account of the holding tax soared to Tk 1.47 billion in 2003. Total assets increased by Tk. 5.2 billion during four years over the period of 1996/2000, mostly caused by an increase of building/structures (Tk. 4.0 billion). The actual financial balance of the past four years is estimated below. The financial balance was red every year and the amount is growing (DCC and JICA 2005).

Table 3.6.6: Financial Balance of SWM (in million Taka)

Items	99–00	00–01	01–02	02–03	Ratio in own DCC Account
1. Overall SWM Revenue	126	141	150	176	6%
2. Overall SWM Expenditure	367	383	402	476	18%
3. Balance	-241	-242	-252	-300	–

Notes:

1. Estimated by the Study Team based on various items of information and data of DCC.
2. Recurrent DCC own expenditures were used for estimates. Depreciation was not considered.
3. There were no capital expenditures during the period.

Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 1: Summary*.

An SWM privatisation project was established to settle issues on waste management in Dhaka City, particularly the financial one. The details of the project will be described in Section 3.6.3.

3.6.2 Relevant Laws and Organisations

The basic law regarding SWM in Dhaka is the Dhaka City Corporation Ordinance, which was promulgated by the Chief Martial Law Administrator on 24th August 1983. Section 78 of the Ordinance stipulates as follows:

(1) The Corporation shall make adequate arrangements for the removal of refuse from all public streets, public latrines, urinals, drains and all buildings and land vested in the Corporation, and for the collection and proper disposal of such refuse.
(2) The occupiers of all other buildings and lands within the Corporation shall be responsible

for the removal of refuse from such buildings and lands subject to the general control and supervision of the Corporation.

(3) The Corporation may cause public dustbins or other suitable receptacles to be provided at suitable places and where such dustbins or receptacles are provided, the Corporation may, by public notice, require that all refuse accumulating in any premises or land shall be deposited by the owner or occupier of such premises or land in such dustbins or receptacles.

(4) All refuse removed and collected by the staff of the Corporation or under their control and supervision and all refuse deposited in the dustbins and other receptacles provided by the Corporation shall be the property of the Corporation (DCC and JICA 2005).

According to the stipulation cited above, DCC is responsible for the removal of waste from all public streets, drains and buildings and land of the Corporation and for the proper disposal of waste. In turn, the occupiers of all other buildings and lands within the jurisdiction of DCC are responsible for the removal of refuse from their buildings and lands. To discharge their responsibility, they have to carry and dispose of their waste in the receptacle (containers or dustbins), which DCC may install, by themselves or to contract an NGO, CBO or private company to carry their refuse to the public dustbins or containers. When the occupiers do not follow the Ordinance, i.e. 'throwing or placing any refuse on any public street or in any place not provided or appointed for the purpose by the Corporation (item 19 of the Third Schedule of the Ordinance)', it shall constitute an offense and punishment shall be meted out after conviction according to Sections 150–153 of the Ordinance. Although the ordinance does not explicitly define it, the responsibility for the disposal of refuse deposited in dustbins or containers is widely regarded as that of DCC, and DCC then transports and disposes the refuse to dumpsites (DCC and JICA 2005).

The Environmental Conservation Act of 1995 and Environmental Conservation Rules of 1997 require the person, who proposes or undertakes every industrial unit or project, to acquire an Environmental Clearance Certificate (ECC, Section 12 of the Act). Land filling by industrial, household and commercial wastes is classified as a 'Red Category', which includes most harmful or dangerous industrial units and projects (Rule 7 and Schedule 1 of the Rules). Most of the staff appears to be unaware of these provisions. Uncontrolled or unidentified dumping or disposal prevails. In some cases, this kind of dumping is done by DCC upon request of the landowners (DCC and JICA 2005).

The Preservation Act of 2000 requires prior consent of the Government for changing the

structure of specific lands such as an open place, playing field or natural reservoir of water by filling land, building construction and any other construction that alters the original Master Plan of Rajdhani Unnayan Kartripakkha (RAJUK). Currently, DCC does not comply with the above Act. Almost its entire staff appears to be unaware of these provisions (DCC and JICA 2005).

Besides DCC, a number of NGOs, CBOs and other organisations are involved in collecting and disposing of solid waste and managing the process. Solid waste management is largely delegated to municipal governors, but, as stated later, the Department of Environment (DoE) is considered to be the administrative entity at the national level.

The major domestic laws and acts related to solid waste management are as follows:

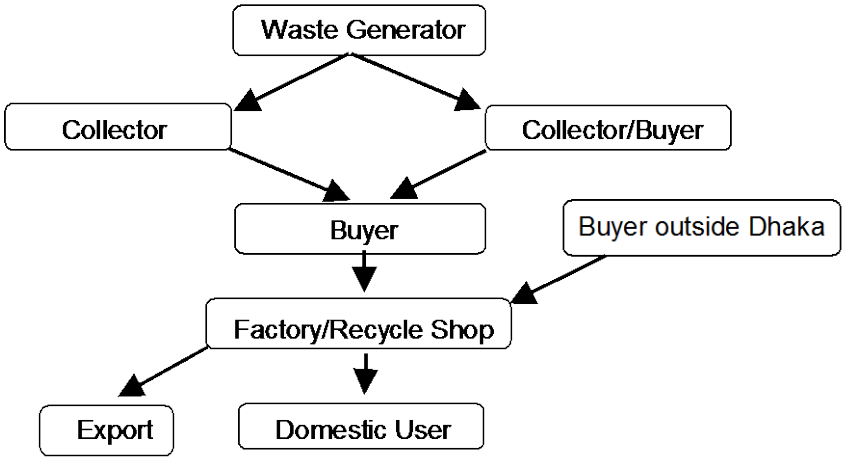
- Environmental Conservation Act (1995): recommends standards for disposal of different types of waste
- Environmental Conservation Rules (1997): recommends waste disposal standards for mainly industrial wastes
- Draft National Solid Waste Management Handling Rules (2005): recommends the 3Rs
- Lead Acid Battery Recycling and Management Rules (2006): recommends recycling of lead acid batteries
- Fertilizer Act (2006): promotes the use of composts
- Biomedical Waste Management Rules (2008): recommends source separation of hospital waste as well as separate collection, transportation and treatment and disposal of all kinds of hospital and clinical waste (DoE 2010)

3.6.3 Approaches and Efforts

The NGO Waste Concern collects domestic waste and composts this as organic waste after separation. There is a manual composting plant at Mirpur that has been in operation since 1995. The landowner (Lions Club) allows Waste Concern to use the land without any charge. Twenty staff members consisting of two administrators, seven collectors and eleven plant workers operate the plant. The collectors collect domestic waste from approximately 1,000 houses in adjacent residential areas using a rickshaw van. Waste is sorted at the plant into organic waste, reusable waste and other waste. Organic waste is used for composting and reusable waste is sold to dealers and other waste is discharged at the nearest dustbin. The plant processes approximately 2 tonnes/day of waste and produces 0.5 ton/day of compost. The fermentation process will take around 60 days. It is noted that the entire fermentation area is covered by a roof to avoid rainfall in the rainy season. The NGO has also installed holed barrels (compost

barrel) at several slum areas. Residents put organic waste in these barrels for fermentation. The NGO buys this organic waste every three months and puts it into the composting process for further fermentation at the plant in Mirpur (DCC and JICA 2005).

To reduce the amount of solid waste, the recycling and scavenging of reusable material is carried out at every stage in the solid waste flow, which includes separating reusable material at the generation source, scavenging by cleaner and primary collector, scavenging at the dustbin and/or container by waste pickers, scavenging at loading work and at the disposal site. Although DCC staff members do some of the scavenging work, DCC has no official control over this recycling activity including waste pickers at the Matuail landfill site. Reusable material picked up through the above activity is sold to dealers for further processing. Recycling stakeholders of municipal solid waste are composed of three principal groups, as shown in the following figure, namely, collectors, buyers and factories/shops for recycled products (DCC and JICA 2005).



Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 3: Supporting Report.*

Figure 3.6.3: Basic Structure of Recycling Stakeholders of Municipal Solid Waste

Although recyclable wastes in Dhaka City vary from paper to bone, the main recyclable wastes and recycled products from the municipal solid wastes in Dhaka City are shown in Table 3.6.7 (DCC and JICA 2005).

Table 3.6.7: Recycled Products from Solid Waste

Types of Wastes	Recyclable Wastes	Recycled Products
Plastic	Mugs, pipes, old sandals, dolls, plastic buckets, etc.	Shoes, sandals, boots, buckets, mugs, bottles, lunch boxes, etc.; more than 150 items.
Paper	Newspaper, cardboard, duplex board, etc.	Media paper, simplex board, cement packing bag, etc.
Glass	Any kind of broken glass	Glass sheet, bottles, lamp shades, etc.
Metal	Iron tin, iron pieces	Steel rods, nuts, bolts, pumps, etc.

Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final Report), Vol. 3: Supporting Report*.

As mentioned above, an SWM privatisation project for the eight wards of Dhaka City has been going on since 15 May 2003, and is known as the 'Ward-Wise Waste Management Project of DCC (Private Initiative)'. Through competitive bid, four organisations were selected and awarded the contract (DCC and JICA 2005).

Table 3.6.8: Summary of Program Management by the Awarded Organisations

Ward No.	1	2	3	4	5	6	7	8
Organisation name	BIEDF					Messer's Rhythm	LN Corporation	MIRUD
Legal status	NGO					Private Company	Proprietorship	NGO
Contract amount	37,000,000 in Total							
No. of field staff members	46	154	55	51	52	55	46	130
Dump site	U BB	U M	U BB	U BB	U BB	T	BB	U A
Financial results	Probably around the break-even point					In loss	Break-even	Not clear

Notes: BIEDF: Bangladesh Integrated Environment Development Forum; MIRUD: Mission of Rural Urban Development; U: Uttara; BB: Berri Band; M: Matuail; T: Tongi; A: Ashulia.

Source: DCC and JICA. 2005. *The Study on the Solid Waste Management in Dhaka City (Final*

Report), Vol. 1: Summary.

With technical assistance from JICA, DCC and the Ministry of Local Government Rural Development and Cooperative implemented the Project for Strengthening of Solid Waste Management in Dhaka City from 2007 to 2011. It was aimed at overall improvement of the solid waste management services of DCC. Major activities of the project included:

- Regular coordination among different departments of DCC for efficient garbage collection and disposal
- Institutionalisation of SWM guidelines for expansion of Participatory Waste Management activities
- Optimisation of secondary waste collection route through regular monitoring and reorganisation
- Institutionalisation of operation and maintenance of final disposal sites
- Development of strategy for increasing revenue for SWM (JICA 2012).

The Department of Environment (DoE), under the Ministry of Environment and Forest (MoEF), has established 'National 3R Strategy for Solid Waste Management'. In the strategy, 3Rs (reduce, reuse and recycle) are encouraged to reduce the amount of solid waste (DoE 2011).

3.7 Other Pollution and Contamination Problems

3.7.1 Noise pollution

One of the forms of serious pollutions other than stated above is noise pollution. To prevent noise pollution, the Government of Bangladesh enacted Noise Pollution (Control) Rules in 2006.

Table 3.7.1: Bangladesh National Ambient Noise Quality Standards vs. World Bank Guidelines

Location	World Bank Guidelines dB(A)		Bangladesh Guidelines dB(A)	
	Day (7 am to 10 pm)	Night (10 pm to 7 am)	Day (6 am to 9 pm)	Night (9 pm to 6 am)
Silent	–	–	50	40
Residential	55	45	55	45
Commercial	70	70	70	60
Industrial	70	70	75	70

Source: GOB. 2006. *Sound Pollution (Control) Rules*; WB. 2007. *New Version of the World Bank Group EHS Guidelines for General Environmental Guidelines*.

However, the actual situation has not been improved, as the data collected by several different researches suggests.

Table 3.7.2: Measured Noise Levels in Some Sensitive Areas of Dhaka

Location (outside the facility)	Measured noise level (dB)	
	Morning	Afternoon
Shaheen School	74	83
Motijheel Govt. High School	79	83
Dhanmondi Govt. Boy's High School	75	80
Azimpur Girl's College	78	80
Tejgaon Women's College	67	75
P.G. Hospital	78	82
Dhaka Medical College Hospital	69	80
Mitford Hospital	73	76
Children's Hospital	69	72

Source: Dey, A. R., N. Kabir and D. Efroymson. 2010. Noise Pollution in Dhaka: Current Situation and Suggestions for Action.

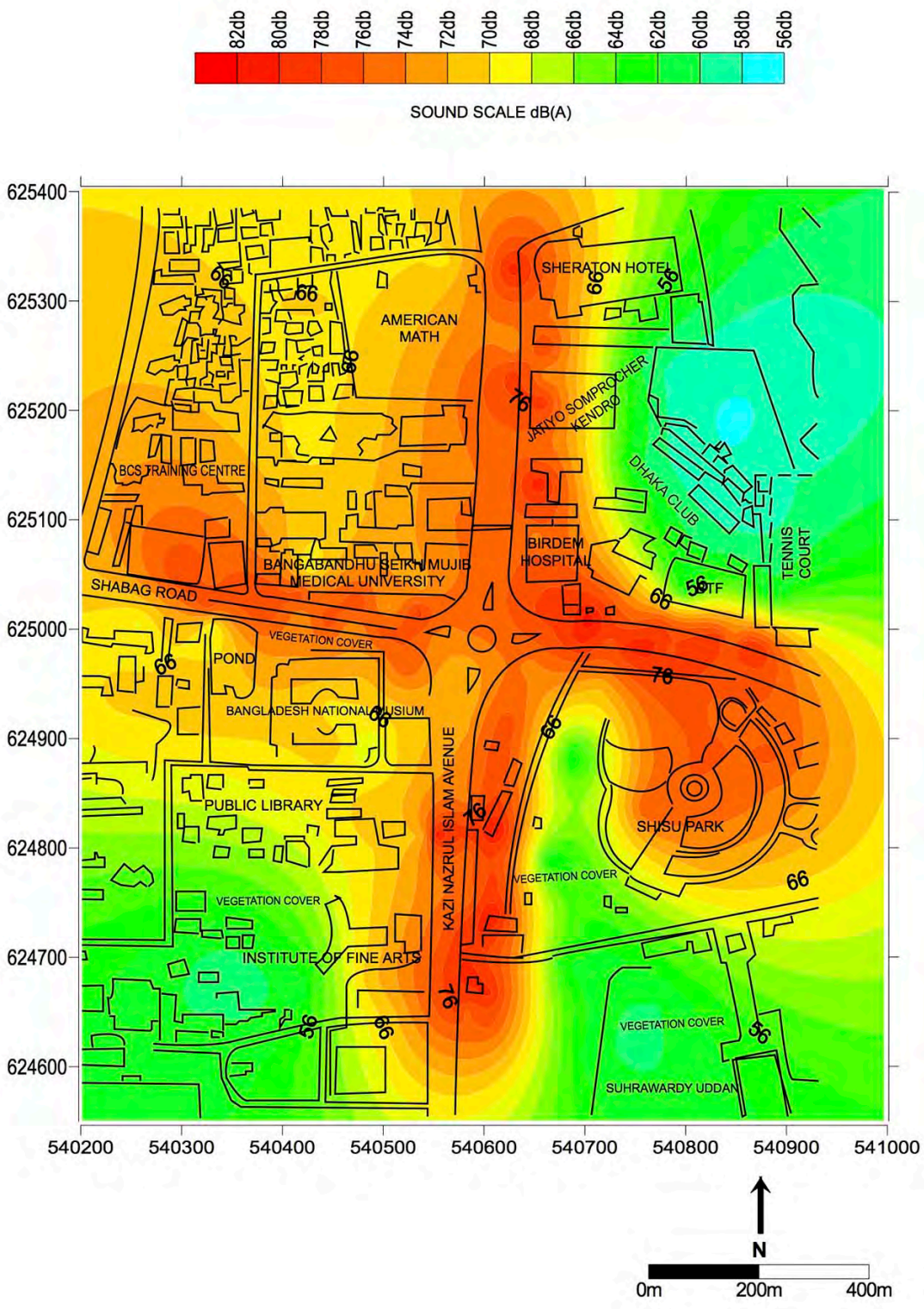
Table 3.7.3: Noise Levels in Selected Areas of Dhaka

Area	Noise level (dB)
Sayedabad Bus Terminal	106
Bangla Motor	106
Sonargaon Hotel	104
Farmgate	104
Mohakhali Crossing	103
Maghbazar	103
Mowchak	103
Gabtuli	102
Jatrabari	100
Tejgaon Industrial Area	97
Mirpur-1	97
Kakrail	92
Gulistan	90
Sapla Chattar Motijheel	89
Sadarghat	87
Mirpur-10	86
BIRDEM Hospital	81
Dhanmondi Residential Area	78
Gulshan Residential Area	70
Banani and Baridhara Residential Area	68

Source: Dey, A. R., N. Kabir and D. Efroymson. 2010. Noise Pollution in Dhaka: Current Situation and Suggestions for Action.

To get the general picture of noise pollution in Dhaka City, a noise map has been created by Rahman et al. The project dealt with the noise mapping of Sahbagh to determine the actual scenario of noise pollution of the area. The sound level data were collected at three specific times of the day (9–12 p.m., 2–4 p.m. & 6–8 p.m.) in 170 location points of the study area for two different day situations (workday and holiday). After the standardisation of the sound level data, two types of GIS software along with graphic software were used to produce six noise maps of three specified times (9–12 p.m., 2–4 p. m. & 6–8 p.m.) for two different day situations (workday and holiday). The interpretation of the noise maps showed that Birdem Hospital, Bangabandhu Sheikh Mujib Medical University, Shisu Park and roadside shops are among the noise-vulnerable zones that are exposed to a noise level greater than 75dB. The highest noise level was recorded when the traffic load was high in a workday. The sound level was low in the

area that had vegetation cover in spite of high traffic noise outdoors (e.g. Charukola institute, Public Library, Sohrawardi Park, South-western part of Shisu Park, inside the Sahbagh Thaana, Dhaka club and northern part of Bangladesh Tennis Federation). One example is shown in the following figure. The noise maps are thought to be useful in illustrating the actual scenario of noise pollution.



Source: Rahman, A., R. Roy and M. J. Uddin. 2011. *Noise Mapping of a Specific Area of Dhaka: A State of the Art Strategy to Assess the Status of Noise Pollution of Dhaka City*.

Figure 3.7.1: Noise Map of Sahbagh, Dhaka (2 p.m. to 4 p.m. on Friday)

Chapter 4

Social Environment

4. Social Environment

Latest Development/Issues Regarding the Social Environment

- Current issues related to child labour and workers' rights are described in Sections 4.2.3 and 4.3, respectively.

4.1 General Condition

In March 2011, the estimated population of Bangladesh was 142,319,000. The average rate of the annual population growth between 2001 and 2011 was 1.34%. Its population density (national average) was 964 people/km^2 (BBS 2011). Ethnic composition was roughly divided as follows: 98% were Bengali and 2% were non-Bengali or from ethnic minorities. With regard to religion, 89.7% were Muslims, 9.2% were Hindus, 0.7% were Buddhists, and 0.3% were Christians. With regard to the religion of ethnic minorities, 37% were Buddhists, 21% were Hindus, 18% were Muslims and 11% were Christians. The official language of Bangladesh is Indian-Aryan Bengali. This language is being used by 97 to 98% of people on a daily basis. In most cases, social observances and common rituals are conducted in Bengali. On the other hand, the ethnic minorities living in the Chittagong Hill Tracts speak the Tibeto-Burman language.

Bangladesh, which was considered before 1947 as the eastern part of the India/Bengal region, was referred to as the 'Golden Bengal' during the time of the colonial rule, where it enjoyed economic and cultural prosperity. When India and Pakistan became independent in 1947, the eastern part of Bengal, where a large number of Muslims lived, became a part of Pakistan, known as East Pakistan. Subsequently, East Pakistan gained independence from West Pakistan and became known as 'Bangladesh'. Its independence was a result of the civil war that rose in 1971 due to a dispute over the marginal positioning of the area in the West Pakistan-centred nation as well as to the economic gap between East and West Pakistan and the enforcement of Urdu as the official language.

The political system of Bangladesh was based on a unicameral parliamentary system (the National Assembly, Jatiya Sansad, has a constant membership of 300). Even after its independence in 1971 and despite sixteen years of military rule from 1975 to 1990, the political system took the form of a pseudo-parliamentary system of authority, which had the concentration of power resting mainly on the president. In 1990, the H.M. Ershad regime was

overthrown by the pro-democracy movement. After its fall, the parliamentary system was established through the constitutional amendment of 1991, with the prime minister appointed as the head of the government and the president as the head of the state. Following this, Bangladesh moved into an era of political democratisation. After democratisation in 1991, the Bangladesh Nationalist Party (BNP) held office in 1991 to 1996 followed by the Bangladesh Awami League in 1996 to 2001. In 2001, the BNP again held office. During the general election in October 2001, the BNP-led four-party coalition headed by the chairperson of BNP Khaleda Zia gained a landslide victory, winning 216 seats out of 300 (the number of seats increased to 345 after additional seats reserved for women were added in 2005).

In October 2006, the Khaleda Zia government ended due to the expiration of its term. In accordance with the provisions of the Constitution, a cabinet election should have commenced within three months from the date of expiration. However, due to the growing domestic conflict between political parties, a state of emergency was announced on 11 January 2007 and the general election was postponed. Subsequently, for approximately two years, a voter and voter ID list was prepared and various countermeasures were taken against corruption. After this, a free, fair, and peaceful election was conducted in 2009. In this election, the Awami League won a significant victory, forming a new administration that was inaugurated under Prime Minister Hasina in January 2009.

The Hasina administration focused on a target called 'Vision 2021', the vision of which was for Bangladesh to become a middle-income country by the year 2021, the fiftieth anniversary of its independence from Pakistan. Its social and economic development projects included 'Digital Bangladesh', which aimed at deploying IT all over Bangladesh and promoting a tolerant attitude towards other religions, with Islam as the main religion.

4.2 Trends and Initiatives Pertaining to Protecting the Rights of Socially Vulnerable Groups

4.2.1 Poverty

(1) Overview

Bangladesh's per capita gross domestic product (GDP) in 2010 was $642, classifying the country as one of the Least Developed Countries (LDC) as per the United Nations framework. However, with its 6.4% economic growth in 2010 and with its maintenance of a relatively high growth rate, Bangladesh's economic situation has become better compared to that of other

LDCs. In addition, its poverty rate has lowered accordingly. As shown in Table 4.2.1, one approach has been to take a value based on the Gini coefficient, which represents the gap between the rich and the poor. The Gini coefficient ranges from zero to one. A value closer to one indicates a greater gap between the rich and the poor in terms of household income in the target society. The Gini coefficient tends to rise every year and it reached 0.31 in 2005 in Bangladesh. However, regional disparities between urban and rural areas have not yet been resolved - the Gini coefficient in 2005 was 0.35 in urban areas and 0.28 in rural areas.

Table 4.2.1: Gini Index of per Capita Expenditure

	1991-92	1995-96	2000	2005
National	0.26	0.31	0.31	0.31
Urban	0.31	0.37	0.37	0.35
Rural	0.25	0.27	0.27	0.27

Source: WB. 2008. *Poverty Assessment for Bangladesh: Creating Opportunities and Bridging the East-West Divide.*

As a standard for measuring poverty in Bangladesh, three methods - Direct Calorie Intake (DCI), Food Energy Intake (FEI) and Cost of Basic Needs (CBN) - are employed to understand the level of poverty.

The DCI method is based on the reference value of calorie intake per day per household member. The poverty line in the financial year (FY) 1995 - 96 for the hardcore poor was 1,805 kcal/day. For the absolute poor, poverty line was 2,122 kcal/day. The FEI method creates a poverty line based on the monthly expenditure necessary to meet the required calorific intake (2,122 kcal in rural areas and 2,112 kcal in urban areas), which is the default food energy requirement. The poverty line in the FY 1995 was 419.7 Taka/month in rural areas and 707.8 Taka/month in urban areas. The CBN method, on the other hand, sets the poverty line by adding the spending needed to provide sufficient calories to meet the minimum nutritional requirements (the food poverty line) to the minimum requirements needed to meet the basic needs for non-food items per capita of household members (the non-food poverty line). Specifically, the region was divided into 14 areas and the following were calculated: i) a food poverty line, ii) a lower non-food poverty line (non-food expenditure in households which total expenditure was equal to the food poverty line) and iii) an upper non-food poverty line (non-food expenditure in households where food consumption was at the food poverty line). The overall poverty line, two types of poverty line were calculated to be the minimum level of i) + ii) (a lower poverty line) and i) + iii) (an upper poverty line that was slightly higher than the minimum). The population below the upper

poverty line was defined to be in absolute poverty. The poverty line in the FY 1995 - 96 shows a gap between the urban areas (Dhaka) with 950 Taka per month and the agricultural areas (Khulna, Jessore, and Kushtia) with 563 Taka per person per month. Organisations such as RDRS Bangladesh, founded in 1972 to assist with the relief and rehabilitation of greater Rangpur-Dinajpur immediately following the war of independence and which operates mainly in deprived northern Bangladesh rather than traditional areas such s Dhaka and Chittagong, have been crucial in the efforts to reduce this gap. RDRS was virtually the only national government organisation (NGO) in the region for many decades, with programmes such as direct service delivery (in fields such as microfinance and community health), indirect implementation (working with grassroots community-based organisation (CBO) partners) and rights-based empowerment and advocacy.

In the biannual expenditure survey of households (Household Income and Expenditure Survey, HIES) conducted by the Bangladesh Bureau of Statistics (BBS) from the FY 1973–74, the poverty line defined using the DCI and FEI methods was employed. In the HIES survey conducted during the FY 1995–96, the CBN poverty line was adopted with the assistance of the World Bank. Since then, the HIES has been conducted in 2000, 2005 and 2010. In addition, the Poverty Monitoring Survey (PMS) was carried out in 2004 by the BBS, with a poverty line defined using the DCI and FEI methods.

(2) Policies and Plans for Poverty Reduction

Poverty Reduction Strategy Papers (PRSP) is prepared by the member countries through a participatory process involving domestic stakeholders and development partners, including the World Bank and International Monetary Fund. Updated every three years with annual progress reports, PRSPs describe the country's macroeconomic, structural and social policies and programs over a three year or longer horizon to promote broad-based growth and reduce poverty, as well as associated financing needs and major sources of financing (WB 2012). The National Strategy for Accelerated Poverty Reduction formulated in October 2005 was set as PRSP in Bangladesh. In addition, the General Economic Division (GED) of the Ministry of Planning was made responsible for checking the progress of each programme in the PRSP and conducting annual monitoring and evaluation activities.

Bangladesh's second poverty reduction strategy paper, entitled ‘Steps towards Change: Second National Strategy for Accelerated Poverty Reduction (NSAPR II)’, provided a framework for implementing the government's agenda during FY09 through FY11. The NSAPR II was a first step in achieving the government's long-term perspective plan. The government also adopted a

vision for the development of the country, which will be reflected in the long-term perspective plan (2010–2020) to layout its development vision. To realize this vision, the government has begun implementing the Sixth Five Year Plan (2010–2015) since July 2010. The NSAPR II was ambitious in terms of the targeted acceleration of growth, underpinned by higher investment, including additional public investment financed from increased tax revenue.

The poverty reduction strategy framework of the NSAPR II outlined five strategic priorities and described the supporting strategies that could help in achieving the set goals. The strategic blocks included (i) macroeconomic environment for pro-poor growth, (ii) critical areas for pro-poor growth, (iii) essential infrastructure for pro-poor growth, (iv) social protection for the vulnerable, and (v) human development. The supporting strategies comprised of (i) ensuring participation, social inclusion, and empowerment; (ii) promoting good governance; (iii) ensuring efficient delivery of public services; (iv) caring for the environment and tackling climate change and (v) enhancing productivity and efficiency through science and technology. The critical concern of the strategy was to achieve higher growth and equity as well as poverty reduction simultaneously. In this context, the focus was on agriculture and rural life, expansion of social safety nets for the ultra poor and targeted approach towards employment generation (GED 2009).

Among the organisations working on these poverty alleviation strategies is Grameen Bank. The bank was founded by Professor Muhammad Yunus, head of the Rural Economics Programme at the University of Chittagong, as part of a research project to examine the possibility of designing a credit delivery system to provide banking services targeted at the rural poor. It is a microfinance organisation and community development bank that is based on the idea that the poor have skills that are under-utilized and has been offering microcredit to the poor in Bangladesh since 1976 with high repayment rates. The main objective of the bank is to promote financial independence among the poor, while encouraging all borrowers to eventually become savers, so that their local capital can be converted into new loans. The total amount of loans disbursed by Grameen Bank, as of October 2011, is Tk 684.13 billion (US $ 11.35 billion). Out of this, Tk 610.81 billion (US $ 10.11 billion) has been repaid. As part of the microfinance services, Grameen Bank aims to reduce poverty through loans for houses, micro-enterprise loans, scholarships, education loans, life insurance, as well as special programs for beggars. The success of microfinance in Bangladesh allowed Grameen Bank to open 2,565 branches, working in 81,379 villages with a total staff of 22,124. While Grameen Bank is the most renowned microfinance organisation in Bangladesh, other microfinance institutions such as ASA have been successful in alleviating poverty through microcredits. As of October 2011, ASA has

served more than 5.01 million clients in Bangladesh.

Proshika is another NGO with a large presence in Bangladesh, with activities in 21,272 villages and 2,380 urban slums in 55 districts, operating a wide range of schemes such as a microcredit programme, a universal education programme to reduce illiteracy, and health and housing programmes, among others. With all these programmes, Proshika has created 12.33 million employment/self-employment opportunities for the poor and brought over 1.23 million households out of poverty, while making more than 1.8 million people literate and planting nearly a billion trees towards the greening of our country.

4.2.2 Gender

(1) Overview

Although the Constitution of Bangladesh notes that 'all citizens are equal under the law and have the right to be protected by law', Bangladesh remains a male-dominated society. In the work environment, for example, the percentage of women engaged in unpaid labour, such as parenting and housework, is 34.3% (male: 6.4%) while engagement in self-employment is 26.9% (male: 51.6%). The percentage of women with an income greater than or equal to 1,000 Taka per month is 39% (male: 92.7%).

In addition, in Bangladesh, there are many customs that require a dowry to be given by the family of the bride to the family of the groom at marriage. The dowry includes cash, land and items, such as home appliances. The contents of the dowry are discussed by the families of both the bride and groom. For families with sons, a large dowry becomes their income while it becomes a large expenditure for families with daughters. Any delay in the payment of the promised dowry may lead to acts of violence towards the bride. The dowry issue has become a significant social problem in Bangladesh.

(2) Relevant Organisations/Policies

Bangladesh founded national institutions for gender policy immediately after its independence. In 1972, one year after independence, the National Women's Rehabilitation Board was established by the first Prime Minister, Sheikh Mujibur Rahman. Several organisational changes took place in response to the movement that arose from the United Nations World Conference on Women regarding gender and policy related to women. Subsequently, the Ministry of Women and Children Affairs (MWCA) was established in 1994. In terms of promoting gender policy, MWCA takes a leadership role among other ministries.

In addition, the government of Bangladesh set a commitment to promote gender policies internationally. For example, in 1984, the Elimination of All Forms of Discrimination against Women was adopted. Furthermore, in 2000, the Optional Protocol in the treaty was ratified, despite the fact that reservations were made on some of the articles, such as Article 2 (obligations of the party to eliminate all forms of discrimination) and Article 16 (equal rights in marriage), due to Islamic law. In 1995, Bangladesh signed the Beijing Declaration at the Fourth World Conference on Women, Platform for Action. Moreover, the national targets of the Millennium Development Goals relating to the empowerment of women and the promotion of gender equality aimed for the elimination of gender inequality in primary and secondary education by 2005 and in all levels of education by 2015.

In the legal system, the Women and Child Repression Prevention Act of 2000 was amended in 2003 to include acts of violence against women.

Grameen Bank has done considerable work at empowering women in Bangladesh. As of October 2011, borrowers of the bank numbered 8.35 million, of which 96% are women. While it targets the poorest of the poor, there is a particular emphasis on women. In Bangladesh, women have represented a suitable clientele because, given that they have less access to alternatives such as traditional credit lines and incomes, they are more likely to be credit constrained and have an inequitable share of power in household decision making. Lending to women also generates considerable secondary effects, including empowerment of a marginalised segment of society. This is especially crucial, as Yunus claims that in 2004, women still had difficulty in getting loans from commercial banks.

(3) Issues

With respect to improving women's status, the efforts of the government and the NGOs over the years have led to impacts and women have played important roles in the success of programmes, including micro-credit, garment industry for export, lowering the rate of population growth, improved nutrition of children and the spread of primary education. Nonetheless, women still face many challenges. They are still bound to work for long periods without pay, such as in the case of doing housework and childcare. Consequently, they do not have much time for capacity-building or for leisure. The mortality rate is much higher for girls than for boys and between the ages of one and four, it is three times higher. Furthermore, in terms of educational attainment, while the adult male literacy rate is 53.5%, the rate for women is significantly lower at 38%.

While a World Bank study has concluded that women's access to microcredit empowers them through greater access to resources and control over decision making, some other economists argue that the relationship between microcredit and women-empowerment is less straightforward.

4.2.3 Child Labour

While the International Labour Organisation (ILO) Convention 182 (the Worst Forms of Child Labour (WFCL)) and the ILO Convention 29 & 105 (the prohibition of forced labour) had been ratified by the government of Bangladesh, child labour remains widely accepted and very common in Bangladesh. Many families rely on the income generated by their children. As such, child labour is often highly valued. When children are forced to work, they are often denied their rights to education, leisure and play. They are also exposed to situations that make them vulnerable to trafficking, abuse, violence and exploitation. Millions of children are reported not to attend school. According to the ILO definition, there are about 3.2 million child labourers in Bangladesh (BBS 2004).

Bangladesh enacted the Labour Act in 2006. The Act includes a chapter on child labour. This new law prohibits the employment of children that are under 14 years of age. Likewise, it prohibits hazardous forms of child labour for persons under age 18. However, children who are aged 12 and above may be engaged in ‘light work’, provided the work does not pose a risk to children’s mental and physical development and does not interfere with their education. The law does not provide a strong enforcement mechanism for the child labour provisions. Additionally, the vast majority of children (93%) work in the informal sector, which makes enforcement of the relevant legislation challenging (UNICEF 2010).

To address these conditions, the ILO International Programme on Elimination of Child Labour, Asian Development Bank (ADB) and the United Nations Children's Fund (UNICEF) supported the government in developing a National Time-Bound Programme geared towards the eliminations of all forms of worst child labour by 2015. The programme strategies include the development and the implementation of regulatory and monitoring mechanisms as well as the provision of non-formal education, skills development training for children trapped in the WFCL, socio-economic empowerment programmes for their families and workplace improvement programmes (ILO 2009). A Child Labour Unit has been established as part of this policy. The Unit will have responsibilities that include collecting and disseminating data relating

to child labour.

4.3 Trends and Initiatives Pertaining to the Protection of Workers' Rights

The civilian workforce of Bangladesh is estimated to be approximately 60.3 million. The unemployment rate is estimated to be 3.7%.

Bangladesh has ratified 33 of the ILO's Conventions. Moreover, it has ratified both ILO Convention No. 87 and No. 98, which cover freedom of association and collective bargaining for workers. However, in most organisations, particularly in the clothing sector, these rights are not enjoyed in practice. Although enterprise unions are foundational in supporting the strength of the trade union movement in Bangladesh, the unionisation rate is as low as 4 to 5% and more than half of these unions are not related to any of the trade union movements affiliated to the national trade union centres. Workers are limited in joining trade unions in all the formal and informal sectors. Similarly, the representativeness of trade unions has been limited in the workplace, even at the national level. The shrinking of the formal sector and the expansion of the informal sector are among the challenges faced by the trade union movement in Bangladesh. These lead to a reduction in organised labour. In addition, many multinational companies that have commenced business during the past ten years in Bangladesh do not approve of the formation of labour unions and collective bargaining is not conducted in these companies at all. With no preparedness nor solid strategies, the labour union movement has experienced a number of issues that come with globalisation, such as labour surpluses, a decrease in union members, changes in employment patterns, threatening the suppression of workers' rights and limitations on organisational activities (JILAF 2011).

In the area of occupational health and safety, the Labour Act (2006) provides guidance with regards to the extent of an employer's responsibility and a worker's right to compensation in the case of injury caused by an accident at work (ILO 2006). However, work-related accidents and diseases continue to be a serious problem in Bangladesh. It is estimated that 11,700 workers suffer fatal accidents and a further 24,500 die from work related diseases across all sectors each year in Bangladesh. In response, the ILO/Japan project on Promoting National Occupational Safety and Health Policy Framework in Bangladesh was started with an aim to contribute to the improvement of safety and health as well as working conditions at the workplace (ILO 2009).

Although the elimination of discrimination in the workplace has been ratified (ILO No. 100, No.

111), a persistent gender gap in the labour force participation and in employment rates continue to exist, reflecting women's unequal access to decent and productive employment opportunities (ILO 2009). The working environment is a major problem related to women's issues and this has significant negative impacts on the entire national economy as well as on women.

4.4 Cultural Heritage

4.4.1 Relevant Regulations and Government Agencies

Article 24 of the national Constitution provides protection for Bangladesh's cultural heritage. It also defines cultural heritage as well as the heritage of the nation, indicating that the nation is to take measures to protect all valuable artistic, cultural and historical heritages in regard to loss and degradation due to movement. In addition, further provision has been made in the Antiquities (Amendment) Act, which was enacted in 1976, and in the Antiquities Preservation Rules, which was drafted in 1986. With regard to relevant legislation, certain laws such as Article 14, was enacted in 1964 during the East Pakistan era. In this ordinance, a portion of the land containing heritage sites was to be rented or purchased by the government. In addition, the Article stipulated that if the preserved site deteriorated and was in danger of collapsing, the nation could purchase it after consultation with an advisory committee.

In Bangladesh, the protection of the nation's cultural heritage is under the jurisdiction of the Ministry of Cultural Affairs. In addition, there is a heritage-related government body under the Ministry of Housing and Public Works, whose oversight includes municipal companies to perform cultural property management, Dhaka National Museum and the Science Museum (BETS 2006).

4.4.2 Major Cultural Heritage in Bangladesh

In Bangladesh, the Antiquities (Amendment) Act stipulates that cultural properties located in 345 places are subject to protection by the nation. In addition, there are three places of Cultural and Natural Heritage that are registered in the United Nations Educational, Scientific and Cultural Organization (UNESCO) list as World Heritage Sites. Figure 4.4.1 shows the distribution of these sites.

(1) Cultural heritage

1) Historic Mosque City of Bagerhat

The mosque is situated in the suburbs of Bagerhat, at the meeting-point of the Ganges and Brahmaputra rivers, where the ancient city formerly known as Khalifatabad was founded in the 15th century. An exceptional number of mosques and early Islamic monuments, many of which are built from bricks, can be seen there.

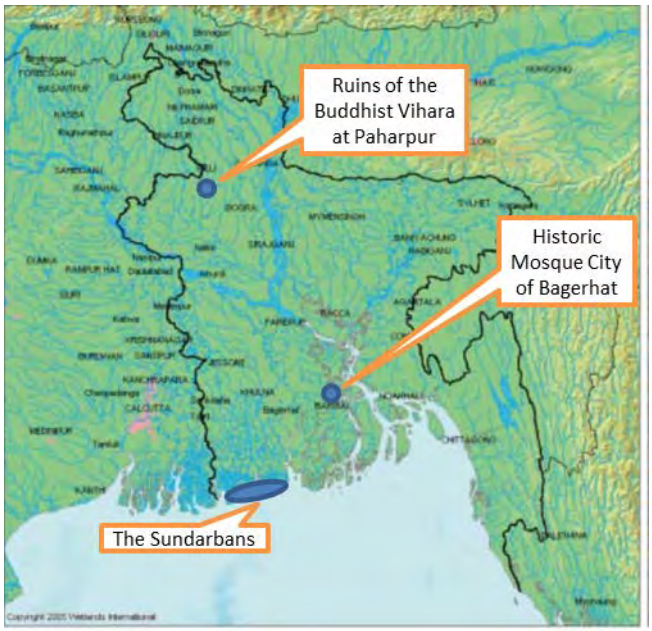
2) Ruins of the Buddhist Vihara at Paharpur (1985)

The ruin is an evidence of the rise of the Buddhism in Bengal from the 7th century onwards. With its simple harmonious lines and profusion of carved decorations, this cultural heritage influenced Buddhist architecture as far away as Cambodia.

(2) Natural Heritage

The Sundarbans (1997)

The Sundarbans mangrove forest is one of the largest mangrove forests in the world. The area is known for its wide range of fauna, which houses 260 bird species, the Bengal tiger and other threatened species, such as the estuarine crocodile and the Indian python. The site is adjacent to the border of India's Sundarbans World Heritage site inscribed in 1987. A great damage occurred to the Sundarbans during the Cyclones Aila and Sidr, which took place in 2007 and 2009, respectively. At present, the Sundarbans mangrove forest has reverted back into its original shape.



Source: Wetlands International. 2006. http://www.wetlands.org/

Figure 4.4.1: World Heritage in Bangladesh

There are other properties that have been submitted to the Tentative List of UNESCO World Heritage. These properties are as follows (UNESCO 2012):

- Mahansthangarh and its Environs (1999)
- The Lalmai-Mainamati Group of Monuments (1999)
- Lalbagh Fort (1999)
- Halud Vihara (1999)
- Jaggadala Vihara (1999)

4.4.3 Issues Related to the Protection of Cultural Heritage

For issues related to the conservation of Bangladesh's cultural heritage, the following three points should be taken into account:

1. It is important to encourage the participation of archaeologists in the preservation of cultural property-related business.
2. There is a need to train technical personnel in cultural heritage conservation.
3. The Antiquities (Amendment) Act (1976), the Archaeological Works Code (1938) and the Immovable Antiques Preservation Rules (1976) need to be reviewed to meet the current situation in terms of cultural heritage (UNESCO 2008).

In addition, legislation pertaining to archaeological impact assessments (AIA) has not yet been developed. AIAs have been considered as necessary in addition to environmental impact assessments (EIAs), especially in development projects that have progressed in Bangladesh in recent years. Moreover, it is important to update the national conservation manual, guidelines and practices to conform to the standards articulated in the World Heritage Convention and in the UNESCO Recommendations for the Implementation of the World Heritage Convention at the National Level.

Chapter 5

Environmental Assessment

5 Environmental Assessment

Latest Development/Issues Regarding the Environmental Assessment

- The Environment Conservation Act was amended in 2010. The English version is yet to be prepared.

5.1 Legal Framework for Environmental Assessment

The legislative bases for environmental assessment in Bangladesh are the 1995 Environment Conservation Act (ECA) and the 1997 Environment Conservation Rules (ECR). The Department of Environment (DoE), under the Ministry of Environment and Forest, is the regulatory body responsible for enforcing the act and the rules. The ECA was amended in 2010; however, the English version has not been prepared.

During the 1970s and 1980s, the Government of Bangladesh, with a view to alleviating poverty and resolving the country's unemployment problem, undertook many industrial and agricultural development projects. Many of these development activities took place without due attention to their environmental consequences. As a result, the country suffered from environmental degradation in many areas. Development cannot be sustained if due consideration is not given to environmental protection.

Consequently, to conserve and improve environmental quality as well as to control pollution, the Government of Bangladesh enacted the ECA, which became effective on June 1, 1995. Section 12 of this Act stipulates the following: 'No industrial unit or project shall be established or undertaken without obtaining environmental clearance from the Director General of DoE, in the manner prescribed by the rules' (DoE 1997). Clause (2) (f) of Section 20 requires that rules be made to 'evaluate, review the Environmental Impact Assessment (EIA) of various projects and activities, and procedures be established for approval' (BCAS 1999). To meet these requirements, the ECR were established. Although the proposer is responsible for conducting an environmental impact assessment of the development proposal, the responsibility for reviewing EIAs for the issuance of an Environmental Clearance Certificate (ECC) rests with the DoE (Momtaz 2002). The DoE published the *EIA Guidelines for Industries*, which provides detailed information on the procedures and evaluation criteria of EIA.

5.2 Strategic Environmental Assessment

To date, there is no act, order or ordinance related to strategic environmental assessment. However, recently the World Bank funded the Dhaka Water Supply and Sewerage Project, which contains a Strategic Environmental Assessment for Sewerage Master Plan.

5.3 Environmental Assessment and Environmental Clearance Certificate

5.3.1 Projects Subject to Environmental Assessment

In Bangladesh, environmental assessment is conducted as part of the process of issuing Environmental Clearance Certificates (ECCs). Industrial projects are divided into four categories, namely, Green, Orange-A, Orange-B and Red, according to their environmental significance and the location of the proposed development.

Category Green projects do not require either initial environmental examination (IEE) or EIA. Red Category projects, by contrast, require both IEE and EIA. This normative screening process enables the DoE and the proposers to determine which steps to follow in acquiring ECCs. Special emphasis is placed on site selection for industries with a significant potential for environmental impacts. Thus, the proposers are required to consider alternative sites, keeping in mind the criteria put forward by the DoE (Momtaz 2002).

The tables below set out the classification of industries and projects for each category.

Table 5.3.1: Green Category

1.	Assembly and manufacturing of TV and radio
2.	Assembly and manufacturing of clocks and watches
3.	Assembly of telephones
4.	Assembly and manufacturing of toys (excluding plastic items)
5.	Bookbinding
6.	Rope and mat (made of cotton, jute and artificial fibre)
7.	Photography (excluding film and X-ray)
8.	Manufacturing of artificial leather goods
9.	Assembly of motorcycles, bicycles and toy cycles

10. Assembly of scientific and mathematical instruments (no manufacturing)
11. Musical instruments
12. Sports goods (excluding plastic ones)
13. Tea packing (no processing)
14. Re-packing of powdered milk (no production)
15. Bamboo and cane goods
16. Artificial flowers (excluding plastic ones)
17. Fountain pens and ball pens
18. Jewellery shops (without manufacturing)
19. Candles
20. Medical and surgical appliances (without manufacturing)
21. Factories manufacturing cork items (excluding metallic ones)
22. Laundry (without washing)

Source: Schedule-I Classification of Industries and Projects Based on Location and Impacts on Environment, Rule 7(2) of Environment Conservation Rules 1997

Table 5.3.2: Orange-A Category

1. Dairy farm (10 cattle heads or below in urban areas and 25 cattle heads or below in rural areas)
2. Poultry (maximum of 250 in urban areas and 1,000 in rural areas)
3. Grinding/husking of wheat, rice, turmeric, pepper and pulses (up to 20 hp)
4. Weaving and handloom
5. Production of shoes and leather goods (capital up to 500,000 taka)
6. Sawmill/wood sawing
7. Furniture of wood, iron, aluminium, etc. (capital up to 500,000 taka)
8. Printing press
9. Plastic and rubber goods (excluding PVC)
10. Restaurants
11. Carton/box manufacturing/printing packaging
12. Cinema hall
13. Dry-cleaning
14. Manufacturing of artificial leather goods (capital up to 500,000 taka)
15. Sports equipment and appliances
16. Salt production (capital up to 500,000 taka)
17. Agricultural machinery and equipment
18. Industrial machinery, tools and equipment

19. Production of gold ornaments
20. Pin and U-pin
21. Frames of spectacles
22. Combs
23. Production of brass and bronze utensils
24. Biscuit and bread factories (capital up to 500,000 taka)
25. Chocolate and lozenge factories (capital up to 500,000 taka)
26. Wooden water vessel manufacturing

Source: Schedule-I Classification of Industries and Projects Based on Location and Impacts on Environment, Rule 7(2) of Environment Conservation Rules 1997

Table 5.3.3: Orange-B Category

1. PVC items
2. Artificial fibre (raw material)
3. Glass factories
4. Life-saving drugs (formulation only)
5. Edible oil
6. Coal tar
7. Jute mill
8. Hotels, multi-story commercial and apartment buildings
9. Casting and moulding
10. Aluminium goods
11. Glue (excluding animal glue)
12. Bricks/tiles
13. Lime
14. Plastic goods
15. Processing and bottling of drinking water and carbonated drinks
16. Galvanising
17. Perfume and cosmetics
18. Flour (large)
19. Carbon rod
20. Stone grinding, cutting and polishing
21. Fish, meat and food processing
22. Printing and writing ink
23. Animal feed
24. Ice cream

25. Clinics and pathological laboratories
26. Utensils made of clay and china clay/sanitary ware (ceramics)
27. Processing of prawn/shrimp
28. Water treatment/purification plants
29. Metal utensils
30. Sodium silicate
31. Matches
32. Starch and glucose
33. Feeds for domestic animals
34. Automatic rice mill
35. Assembly of motor vehicles
36. Wooden water vessel manufacturing
37. Photography (activities related to production of films for movies and X-ray)
38. Tea processing
39. Powdered milk manufacturing/condensed milk/dairy
40. Re-rolling
41. Wood processing
42. Soap
43. Repairing of refrigerators
44. Repairing of metallic water vessels
45. Engineering works (capital up to 10 hundred thousand taka)
46. Yarn manufacturing (spinning mills)
47. Electric cables
48. Cold storage
49. Tire re-treading
50. Repair works of motor vehicles (capital up to 10 hundred thousand taka)
51. Cattle farm (more than 10 in urban areas and 25 in rural areas)
52. Poultry (more than 250 birds in urban areas and 1,000 birds in rural areas)
53. Grinding/husking of wheat, rice, turmeric, chillies and pulses – machine more than 20 hp
54. Shoe and leather goods manufacturing (capital up to 10 hundred thousand taka)
55. Wood, iron and aluminium furniture (capital up to 10 hundred thousand taka)
56. Artificial leather goods manufacturing (capital up to 10 hundred thousand taka)
57. Salt production (capital up to 10 hundred thousand taka)
58. Biscuit and bread factories (capital up to 10 hundred thousand taka)
59. Chocolate and lozenge factory (capital up to 10 hundred thousand taka)
60. Garments and sweater manufacturing

61. Garments/fabric washing
62. Power looms
63. Road construction/reconstruction/extension (feeder road and local road)
64. Bridge construction/reconstruction/extension (length less than 100 m)
65. Public toilets
66. Ship breaking
67. G1 wires
68. Assembly of batteries
69. Dairy and food

Source: Schedule-I Classification of Industries and Projects Based on Location and Impacts on Environment, Rule 7(2) of Environment Conservation Rules 1997

Table 5.3.4: Red Category

1. Leather processing (tannery)
2. Formaldehyde
3. Urea fertiliser
4. T.S.P. fertiliser
5. Chemical dyes, polishes, varnishes and enamels
6. Power plants
7. All mining projects (coal, limestone, hard rock, natural gas, mineral oil, etc.)
8. Cement
9. Fuels (oil refineries)
10. Artificial rubber
11. Paper and pulp
12. Sugar
13. Distillery
14. Fabric dyeing and chemical processing
15. Caustic soda, potash
16. Other alkalis
17. Iron and steel manufacturing
18. Raw materials for medicine and basic drugs
19. Electroplating
20. Photo films, photo paper and photo chemicals
21. Chemicals derived from petroleum or coal
22. Explosives
23. Acids and their salts (organic and inorganic)

24. Nitrogen compounds (cyanide, cyanamide, etc.)
25. Production of plastic raw materials (PVC, PP/iron, polystyrene, etc.)
26. Asbestos
27. Fibreglass
28. Pesticides, fungicides and herbicides
29. Phosphorus and its compounds/derivatives
30. Chlorine, fluorine, bromine, iodine and their compounds/derivatives
31. Industrial gases (excluding nitrogen, oxygen and carbon dioxide)
32. Waste incinerators
33. Other chemicals
34. Ordinance factory
35. Nuclear power
36. Alcoholic beverages
37. Non-metallic chemicals not listed elsewhere
38. Non-metals not listed elsewhere
39. Industrial estate
40. Basic industrial chemicals
41. Non-iron basic metals
42. Detergent
43. Landfilling by household/industrial/commercial waste
44. Sewage treatment plants
45. Lifesaving drugs
46. Animal glue
47. Rodenticide
48. Refractories
49. Industrial gas (nitrogen, oxygen, carbon dioxide)
50. Batteries
51. Hospitals
52. Ship manufacturing
53. Tobacco (processing/cigarette/bin-making)
54. Metallic boat manufacturing
55. Wooden boat manufacturing
56. Refrigerator, air conditioner/air cooler manufacturing
57. Tyres and tubes
58. Board mills
59. Carpets

60. Engineering works (capital above 10 hundred thousand taka)
61. Repairing of motor vehicles (capital above 10 hundred thousand taka)
62. Water treatment plants
63. Laying down/replacement/expansion of sewerage pipelines
64. Laying down/replacement/expansion of water, power and gas distribution lines
65. Exploration/extraction/distribution of mineral resources
66. Construction/reconstruction/expansion of flood control embankment, polder, dike, etc.
67. Construction/reconstruction/expansion of roads (regional, national and international)
68. Construction/reconstruction/expansion of bridge (length 200 m or more)
69. Muriate of potash (manufacturing)

Source: Schedule-I Classification of Industries and Projects Based on Location and Impacts on Environment, Rule 7(2) of Environment Conservation Rules 1997

According to the category into which the assessed project falls, site selection is limited by the Environment Conservation Rules as follows.

Table 5.3.5: Limitation on Site Selection

Green Category	(a) Units of all kinds of cottage industries other than those listed in this Schedule shall remain outside the purview of the ECC (the units of cottage industries indicate all industrial units producing goods or services in which full-time or part-time family members are engaged and the capital investment of which does not exceed 500,000 taka).
	(b) No industrial unit listed in this Schedule shall be located in any residential area.
	(c) Industrial units shall preferably be located in areas declared as industrial zones, in areas where there is a concentration of industries, or in vacant areas.
	(d) Industrial units likely to produce sound, smoke or odour beyond permissible limits shall not be acceptable in commercial areas.
Orange-A and Orange-B Category	(a) No industrial unit included in this list shall be located in any residential area.
	(b) Industrial units shall preferably be located in areas declared as industrial zones, in areas where there is a concentration of industries, or in vacant areas.
	(c) Industrial units likely to produce sound, smoke and odour beyond permissible limits shall not be accepted in commercial areas.
Red Category	(a) No industrial unit included in this list shall be located in any residential area.

	(b) Industrial units shall preferably be located in areas declared as industrial zones, in areas where there is a concentration of industries, or in vacant areas.
	(c) Industrial units likely to produce sound, smoke and odour beyond permissible limits shall not be accepted in commercial areas.
	(d) After obtaining the location clearance based on the IEE report, the EIA report in accordance with the approved terms of reference, along with the effluent treatment plant (ETP) design and its time schedule, shall be submitted within the approved time limit.

Source: Schedule-I Classification of Industries and Projects Based on Location and Impacts on Environment, Rule 7(2) of Environment Conservation Rules, 1997

5.3.2 Procedures and Relevant Organisations

As stated above, environmental assessment is conducted within the procedure of issuing an Environmental Clearance Certificate (ECC) in Bangladesh. The Department of Environment (DoE) is in charge of all these processes. The ECC application process varies according to the category into which the proposed project falls.

For Green Category projects, the following documents must be submitted:

- General information pertaining to the industry or project
- Description of raw materials and finished products
- Process flow diagram
- No-objection certificate from the local authority

For Orange-A and Orange-B Category projects, the following documents must be submitted:

- General information pertaining to the industry or project
- Description of the product along with that of the raw materials
- Process flow diagram
- Layout plan (indicating the site for effluent treatment plant)
- Waste disposal system
- Outlines of relocation, rehabilitation plan (where applicable)
- Other relevant information (where applicable)
- Feasibility study report of the industry or project (applicable only for proposed industries or projects)

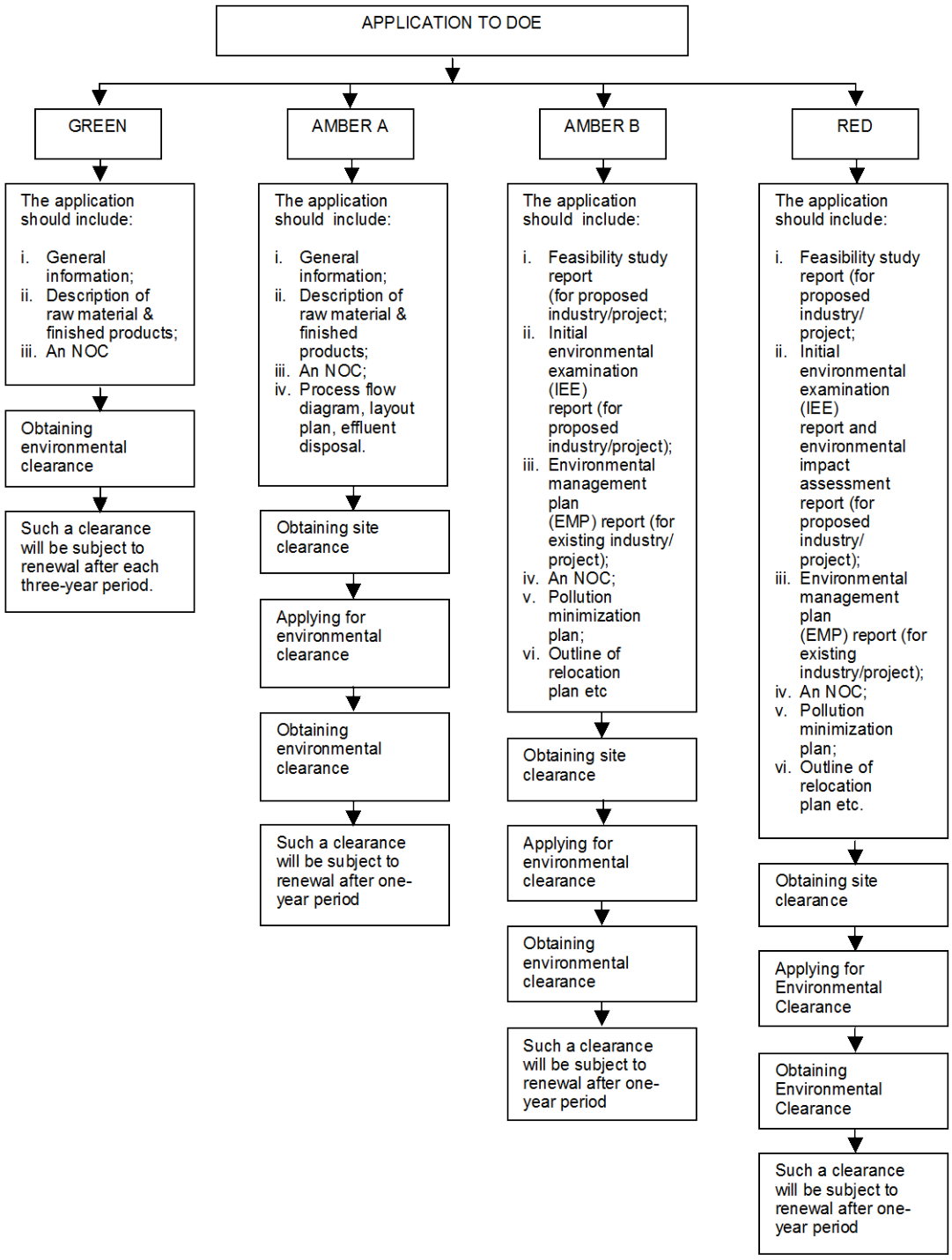
- Initial Environmental Examination (IEE) report, with the process flow diagram, layout plan (indicating the site for effluent treatment plant) and design of the effluent treatment plant (ETP; applicable only for proposed industries or projects)
- Environment management plan (EMP) with process flow diagram, layout plan (indicating the site for ETP), design and efficiency of the ETP (applicable only for existing industries or projects)
- No-objection certificate (NOC) from the local authority
- Contingency plan in respect of adverse environmental impacts together with plan to reduce pollution load
- Outlines of relocation, rehabilitation plan (where applicable)
- Other relevant information.

For Red Category projects, the following documents must be submitted:

- Feasibility study report of the industry or project (applicable only for proposed industries or projects)
- Initial Environmental Examination (IEE) report, together with the terms of reference of Environmental Impact Assessment (EIA) and the process flow diagram of the industry or project, or the Environmental Impact Assessment (EIA) report prepared on the basis of terms of reference approved earlier by the Department of Environment, layout plan (indicating the site for effluent treatment plant), design and time schedule to construct the ETP, process flow diagram (applicable only for proposed industries or projects)
- Environment management plan (EMP), together with process flow diagram, layout plan (indicating location of ETP), design and efficiency of the effluent treatment plant (applicable only for existing industries or projects)
- No-objection certificate (NOC) from the local authority
- Contingency plan in respect of adverse environmental impacts, together with plan to reduce pollution load
- Outlines of relocation, rehabilitation plan (where applicable)
- Other relevant information

The ECC should be issued to all industries and projects when they fall into the categories that require the EIA process to be conducted during screening. The Green Category requires ECC only; there is no need to conduct EIA. Orange-A, Orange-B and Red Categories must, in general, acquire a site clearance certificate before the ECC can be issued, unless the Director General of DoE specifies otherwise. The site clearance certificate is awarded if the Director

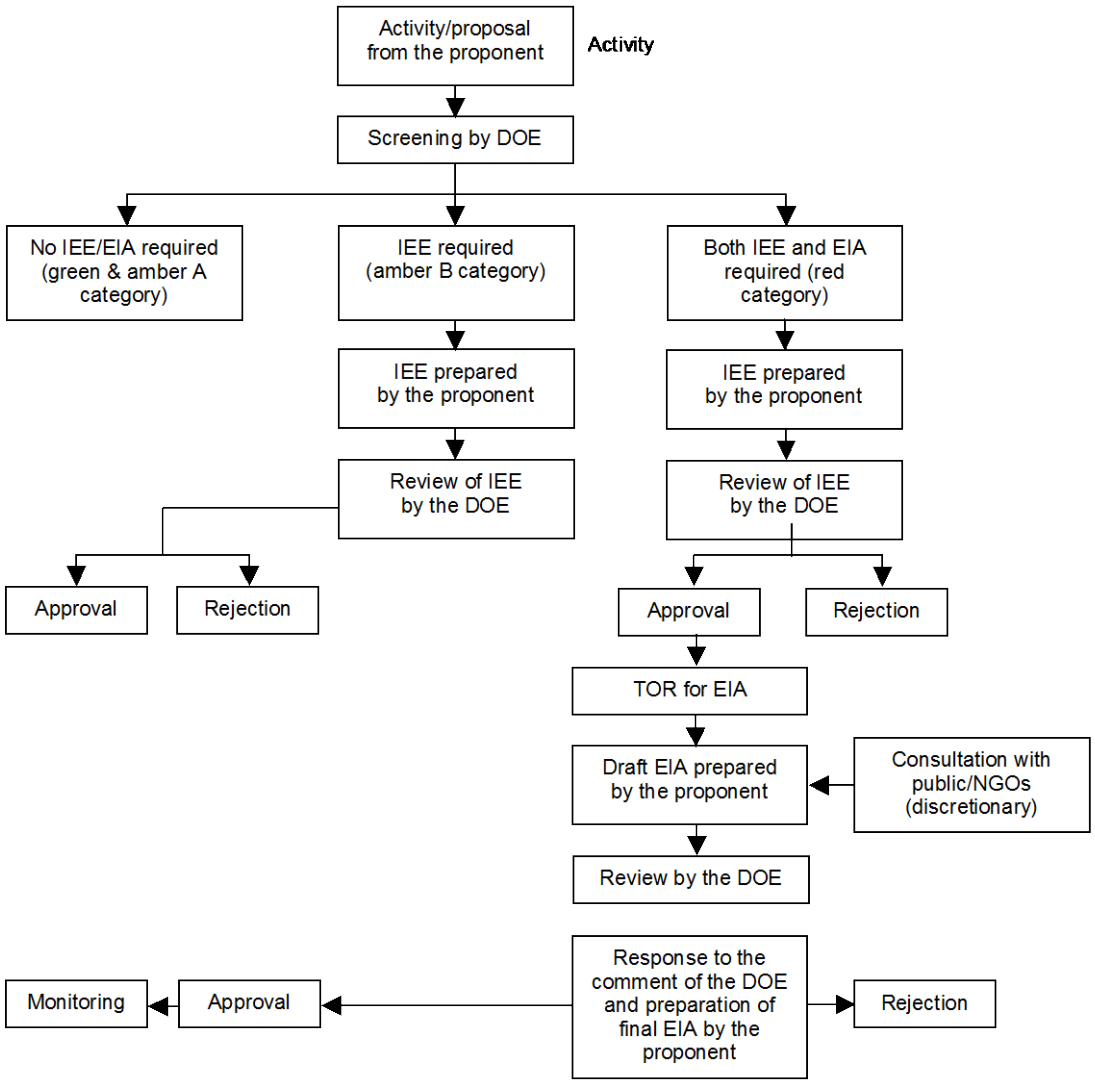
General of DoE considers issuing such a certificate appropriate.



Note: Amber A and Amber B are equivalent to Orange-A and Orange-B respectively.

Source: Ahammed, R. and N. Harvey. 2012. Evaluation of Environmental Impact Assessment Procedures and Practice in Bangladesh. Impact Assessment and Project Appraisal 22(1): 63–78.

Figure 5.3.1: Steps Involved in Obtaining the Environmental Clearance Certificate



Source: Ahammed, R. and N. Harvey. 2012. Evaluation of Environmental Impact Assessment Procedures and Practice in Bangladesh. Impact Assessment and Project Appraisal 22(1): 63–78.

Figure 5.3.2: Flowchart of the EIA Process in Bangladesh

Upon receiving the site clearance certificate (required for all categories except the Green Category), the entrepreneur may:

- Undertake activities related to land development and infrastructure development
- Install machinery and equipment, including the ETP of the unit or project (applicable to Orange-A and Orange-B Category industrial units or projects only)
- Apply for ECC upon completion of the activities specified previously. However, without

the ECC, the entrepreneur shall not have a gas line connection, start trial production in the industrial unit or operate the project (applicable to Orange-A and Orange-B Category industrial units or projects only)

- Submit for approval of the Department the EIA report prepared based on the programme outlined in the IEE report, along with the schedule of timings and the ETP design (applicable to Red Category industrial units or projects)

Scoping is not mandatory under domestic law and is not an identified milestone in the environmental clearance process. EIA guidelines consider IEE as the milestone where scoping is to be carried out. The impacts assessed in the Government of Bangladesh's EIA system include components such as air, noise, land, water, biological and socio-economic aspects.

The application for the ECC should be submitted by the entrepreneur of the industrial unit or project to the relevant Divisional Officer of the Department using Form 3 (shown below), which includes the Environmental Protection Rules and the required documents according to each category.

Table 5.3.6: Form 3

1.	Name of the industrial unit or project - Address of location of the industrial unit or project - Address of present office
2.	(a) Proposed industrial unit or project - Expected date of starting construction - Expected date of completion of construction: expected date of trial production in the case of industrial unit, in other cases, date of starting operations of the project (b) Existing industrial unit or project - Date of starting trial production in the case of industrial unit or, in other cases, date of starting operations of the project
3.	Name of the product and quantity to be produced (daily/monthly/yearly)
4.	(a) Name of raw materials and quantity required (daily/monthly/yearly) (b) Source of raw material
5.	(a) Quantity of water to be used daily (b) Source of water
6.	(a) Name of fuel and quantity (daily/monthly/yearly) (b) Source of fuel
7.	(a) Probable quantity of daily liquid waste

(b) Location of waste discharge (c) Probable quantity of daily emission of gaseous substances (d) Mode of emission of gaseous substances 8. 'Mouza' (village) map indicating 'daag' (plot) number and 'khatiyan' (land tax account) number 9. Approval of Rajdhani Unnayan Katripakkhya/Chittagong Development Authority/Khulna Development Authority/Local Authority (as applicable) 10. (a) Design and time schedule for proposed ETP (b) Fund allocated (c) Area 11. Process flow diagram 12. (a) Location map of industrial unit or project (b) Layout plan (with location of ETP) 13. (a) IEE/EIA report (if applicable) (b) Environmental Management Plan (if applicable) 14. Feasibility report (if applicable)

Applications for ECC are screened by the Divisional Office or the Director/Deputy Director of the DoE. When necessary, the central DOE can also conduct the screening, but the terms of the relevant regulations are not clear.

5.3.3 Evaluation Criteria to be Met in the Environmental Assessment

EIA Guidelines for Industries recommend the following structures for the IEE/EIA report. The project's proposers are recommended to follow the same systematic reporting procedure, regardless of the impact assessment techniques used. This practice will greatly enhance the efficiency of the reviewing process.

Table 5.3.7: Recommended Structure of an IEE Report

• Introduction • Description of the project • Description of the existing background environment around the project site (generally this should cover an area of 1 km radius) • Significant potential impacts (both during construction and operational phases) • Mitigation and abatement measures • Residual impacts, if any (these may have to be studied at the detailed assessment stage)

- Monitoring programme
- Summary and conclusions

Source: EIA Guidelines for Industries, Department of Environment, 1997

Table 5.3.8: Recommended Structure of an EIA Report

1 Introduction
- 1.1 Purpose of the report
- 1.2 Relationship with project feasibility study
- 1.3 EIA team

2 Project Description
- 2.1 Location and access ways
- 2.2 Type
- 2.3 Layout and immediate environment
- 2.4 Materials utilised and produced (mass balance)
- 2.5 Processes and operations involved in manufacture
- 2.6 Requirements of land, water, fuels and other natural resources (other than raw materials) and their sources
- 2.7 Generation of solid, liquid and gaseous waste (water balance, steam balance, material balance and energy balance)
- 2.8 Transport requirements and their modes for incoming and outgoing materials
- 2.9 Utilities and facilities and their capacities
- 2.10 Labour force during construction phase and operational phase
- 2.11 Investment cost and funding arrangement

3 Environmental Background
- 3.1 Environmental base maps (covering a minimum of 10 km radius), showing the features described under 3.2
- 3.2 Describe the following features
  - 3.2.1 Land use
  - 3.2.2 Natural physical resources (air, water, soil)
  - 3.2.3 Natural biological resources (including forests)
  - 3.2.4 Economic development
  - 3.2.5 Socio-economic status
  - 3.2.6 Quality of life values
  - 3.2.7 Environmentally sensitive areas of special or unique scientific, socio-economic or cultural value

4 Environmental Impacts and Mitigation

4.1 Major findings of the Initial Environmental Examination (IEE)

4.1.1 Critical issues (remaining unresolved during IEE study)

4.1.2 Other issues (related to public perceptions, etc.)

4.2 Detailed examination of unresolved issues related to:

4.2.1 Project location

4.2.2 Design criteria

4.2.3 Construction stage

4.2.4 Operations stage

4.3 Evaluation of impacts (in the light of the following)

4.3.1 Environmental laws and regulations or applicable national criteria

4.3.2 Mitigation measures for eliminating or reducing significant impacts

4.3.3 Benefit-cost ratio

4.3.4 Public opinion

4.3.5 Residual impacts

4.4 Follow-up studies

4.5 Critical evaluation

5 Environmental Management Plan

5.1 Technical aspects of the project

5.1.1 Final design

5.1.2 Equipment

5.1.3 Construction methods

5.1.4 Construction contract document

5.1.5 Construction and operations of pollution control measures (air, liquid, solid)

5.1.6 Green belt, landscaping

5.1.7 Re-use/recycling of wastes

5.1.8 Schedule of implementation of 5.1.5, 5.1.6 and 5.1.7

5.1.9 Estimates of capital and operational costs of 5.1.5,5.1.6 and 5.1.7

5.2 Management Organisation

5.2.1 Personnel

5.2.2 Resources (equipment, labs, etc.)

5.3 Environmental monitoring programme (for air, water, soil, terrestrial/aquatic biology, whichever applicable)

5.3.1 Ambient environment quality monitoring

- location
- parameters
- frequency

5.3.2 Effluent and emissions monitoring

- air emissions (stacks, parameters and frequency)
- effluent (locations, parameters and frequency)
- solid wastes (quality and composition of each type of waste and frequency)

5.3.3 Monitoring of environmentally significant parameters of fuels and raw materials (e.g. sulphur and ash content in fuels, metal content in mineral ores)

5.3.4 Data presentation and submission of reports

5.3.5 Estimate of annual costs of 5.2 and 5.3

6 Executive Summary (Summary, Conclusions and Recommendations)

Annexes:

Data collected during field monitoring

Details of air quality and water quality computer modelling, if done

List of scientific and technical references cited in the text

Abstracts of selected references

Data sources

Experts/specialists consulted, their written opinions

Risk analysis study report (if applicable)

Resettlement and rehabilitation (R&R) study report (if applicable) and estimated cost of R&R)

Any other

Source: EIA Guidelines for Industries, Department of Environment, 1997

According to the *EIA Guidelines for Industries*, review and assessment of IEE/EIA reports submitted by the projects proposers are conducted according to the following criteria.

Table 5.3.9: Criteria of IEE/EIA Reports Review

1 Purpose

The purpose of review of an IEE/EIA report is to take decisions in respect of the following:

i) Whether site clearance could be given to the project in the case of the Orange and Red Categories of industries, considering the significant residual project impacts on the various environmental components (physical, biological and socio-economic), and, if so,

ii) What conditions may be prescribed for compliance by the project proposers, during design, construction and operation of the project.

2 Key Aspects to be Addressed

The following questions may lead to an effective review of an IEE/EIA study.

i) Are the beneficial and adverse impacts properly explained?

ii) What are the risks (probability of occurrence and magnitude of consequences) of adverse impacts and are they properly evaluated?

iii) What impacts would the project have on environmentally sensitive areas, endangered species and their habitats and on recreational and aesthetic areas?

iv) Is the 'no project' scenario acceptable?

v) Are any of the alternative sites suggested in the report considered suitable from an environmental angle, even though choosing one of these may increase the cost of the project?

vi) Did similar earlier projects cause significant adverse impacts and, if so, have the present proposals incorporated adequate measures to minimise adverse impacts at the proposed site?

vii) Which are the unavoidable adverse impacts?

viii) Are the concerns expressed by people likely to be affected genuine, and has the project EIA/IEE addressed these concerns adequately?

ix) Are the mitigation measures, as proposed, reasonably feasible and are they likely to be implemented (particularly those that have to be implemented during the operational phase)?

x) What are the parameters that need to be monitored during project construction and operation so that the state of the environment can be studied throughout the project's life?

3 Specific Issues to be Looked into

i) Project activities

Are the project activities adequately described, so as to make the project comprehensible?

ii) Project setting

Is the description of the environmental background of the project site adequate?

iii) Key Issues

Does the report include a summary highlighting the most important conclusions and major issues?

iv) Presentation of Data/Information

Is the data/information presented in comprehensible formats using tables, maps and diagrams?

v) Key Concerns, Key Resources and Uses

Does the report identify and discuss potential impacts of those resources and uses that are considered important by:

(a) the public (e.g. local residents, conservation groups, industry, etc.)?

(b) other agencies (e.g. natural resource and environment agencies)?

Key Activities

Are the activities that have significant impacts on the key resources properly identified? This may be done using the matrix and other methods.

Key Policies

Does the report specifically address policies in respect of national parks, sanctuaries, bio-reserves and ecologically sensitive areas, etc., which may have direct implications for the project, its setting and proposed activities?

vi) Timing and Duration

Does the report indicate when specific project activities will take place and for how long they will continue?

Geographic Boundaries

(a) Are the specific areas of the project properly identified?

(b) Are the boundaries appropriate? Are other areas likely to be impacted?

vii) Social and Administrative Boundaries

Does the report specifically identify:

(a) those individuals and groups of people who will be impacted upon

(b) concerned government agencies (e.g. Department of Agriculture, Forests, Fisheries and Oceans) and relevant policies (e.g. Fisheries Act) that are likely to be affected?

viii) Alternatives

Examining Need

Does the report discuss the need for the project? Need may be related to policy, socio-economic or ecological goals.

Alternative Means

Have alternative means of achieving project goals been considered? If not, does the report state why this was the case?

ix) Collecting Information

Sources of Information

Are the conclusions based on information from specific sources, for example, consultations with experts or research papers/documents, etc.?

Adequacy of Information

Is there any basis for questioning the data cited to support conclusions?

x) Describing Baseline Conditions

Existing Conditions

Does the report adequately describe:

(a) the existing condition of key natural resources and land uses?

(b) relevant social and policy issues of a local nature relating to the project, for example, local people affected by the project?

xi) Predicting Impacts

Prediction Methods

Does the report indicate on what basis predictions are made, e.g. case studies, models, literature, experts, etc.?

Assumptions

Are the assumptions made in these methods clearly stated and justified?

Validity

Is there any basis for questioning the methods used in identifying and measuring impacts?

Nature of Impacts

Is each impact considered in terms of the following factors (where relevant)?

(a) magnitude – the probable severity of each potential impact

(b) extent – the size of area affected

(c) duration – the length of time the impact would last

(d) frequency – the rate of recurrence of the impact

(e) risk and uncertainty – the probability of serious environmental effects and the degree of confidence in the impact projections made

(f) indirect effects – effects resulting indirectly from the identified impacts (e.g. secondary or higher order interactions)

Cumulative Impacts

Does the report consider the cumulative impact of the project with respect to other past, ongoing and potential projects in the region?

Project-caused Impacts

Has an attempt been made to isolate project-generated impacts from other changes resulting from natural variability and/or activities not associated with the proposed project?

Identifying Key Impacts:

Does the report identify significant ecological impacts on such parameters as species populations, water and air quality, erosion, etc., and specify the rationale, criteria or other bases supporting these judgements?

Magnitude versus Importance

Is there a clear distinction made between the predicted size of impacts (magnitude)

and the significance of these impacts (importance)?

xii) Managing and Mitigating Impacts

Mitigation Measures

To mitigate adverse environmental effects of the project:

(a) Could parts of the project be reduced or eliminated?

(b) Could impacted resources be repaired or rehabilitated?

(c) Could affected resources be replaced or compensated for?

(d) Could project design, timing, equipment use or site management be modified to reduce effects?

(e) Could effects be monitored and provision made for future mitigation when the exact nature and extent of effects are better known?

Feasibility

Are mitigating measures defined in specific, practical terms (i.e. fund requirements, person-time, available equipment, timing, etc.) and evaluated for effectiveness and impact on the physical environment?

Residual Impacts

Are there major residual impacts and does the report justify why these impacts are acceptable and cannot be mitigated?

xiii) Follow-up: Surveillance and Monitoring

Are the recommended surveillance and monitoring properly outlined in the form of a specific programme and reporting procedure? For example, who is to carry out surveillance and monitoring, at what places and times, and what arrangements are made for reporting?

Source: EIA Guidelines for Industries, Department of Environment, 1997

5.3.4 Acquisition Procedure for Environmental Clearance Certificate

Renewal of the application for an Environmental Clearance Certificate (ECC) should be done 30 days before the expiration date. In the case of Green Category businesses, renewal should be done every three years; in the case of businesses in the Orange-A, Orange-B and Red Categories, renewal should be applied for every year.

Table 5.3.10: ECC Issuance and Renewal Fees (Unit: Taka)

Industrial unit or project investment amount	ECC issuance fee	Renewal fee
(a) 100,000 to 500,000	1,500	375
(b) 500,000 to 1,000,000	3,000	750
(c) 1,000,000 to 5,000,000	5,000	1,250
(d) 5,000,000 to 10,000,000	10,000	2,500
(d) 10,000,000 to 50,000,000	20,000	5,000
(e) 50,000,000 to 200,000,000	40,000	10,000
(f) 200,000,000 to 500,000,000	80,000	20,000
(g) 500,000,000 to 1,000,000,000	120,000	30,000
(h) 1,000,000,000 to 2,000,000,000	200,000	50,000
(i) 2,000,000,000 to 5,000,000,000	300,000	75,000
(j) 5,000,000,000 to 10,000,000,000	400,000	100,000
(j) 10,000,000,000 and over	500,000	125,000

Source: Schedule-13, SRO 355/Law 2010 Environment Conservation Rules, 1997

5.3.5 Public Participation

Although the importance of providing information to local residents, community consultation and public involvement has been recognised in major documents, specific legislation to implement such a process has yet to be enacted. The EIA Guidelines of the DoE state that a technical summary need not be prepared for the purpose of communication with the public, although Section 4.11 of the Guidelines encourages public participation. No time frames are fixed for prior disclosure of EIA to the public. The regulations mention a 'no grievance' mechanism facility. The DoE makes the minutes of the meetings on environmental clearance available on its website (http://www.doe-bd.org/minutes.php) in Bengali.

5.3.6 Participation of Experts, NGOs and Other Third Parties

Although the importance of the provision of information to local residents, community consultation, or public involvement has been recognised in major documents, specific legislation to implement such process has yet to be enacted.

5.3.7 Information Disclosure of the Result of Environmental Assessment and Environmental Clearance Certification

Although the importance of the provision of information to local residents, community consultation, or public involvement has been recognised in major documents, specific legislation to implement such process has yet to be enacted.

5.3.8 Requirements for Environmental Management Plan

The DoE requires an environmental management plan (EMP) to be drawn up as an outcome of EIA. Under the Guidelines, the DoE requires that special studies be conducted. These studies include aspects such as risk analyses (when there is storage and handling of hazardous and toxic substances), resettlement and rehabilitation (when more than 1,000 people are to be displaced), compensatory afforestation (when deforestation involves an area of more than 5 ha) and severance. Prevention and recycling are to be followed as the first options (pages 29 and 30 of EIA *Guidelines for Industries*). In addition to this, the EMP must be supplied along with a work plan, implementation schedule and monitoring requirements (page 31 of EIA *Guidelines for Industries*).

5.4 Monitoring

5.4.1 Legal Framework and Procedures

Although *EIA Guidelines for industry* suggest having a monitoring plan, they do not provide guidance on the implementation of the monitoring plan or on monitoring employers' accountability.

As there is no institution to monitor the implementation status of the EIA, ECC violations cannot be subject to penalties.

EIA Guidelines for Industries recommend preparation of a post-project monitoring programme. This programme is to be included in the EIA report and, when reviewed, becomes a basis for granting ECC. The process of renewing the ECC requires monitoring and assessment and it is the responsibility of the DoE to follow up and monitor ECC conditions. The Department makes proposer compliance reports available to the public on its website.

There are no formal provisions for obtaining independent assessment of the EIA report if this should be found necessary. There is also no formal mechanism at the DoE for conducting an independent audit of approved projects.

Third party monitoring is recommended through approved laboratories. The Environment Court Act 2000 (Act No. 11 of 2000) allows members of the public to make appeals on non-compliance with the ECA and the ECR.

5.4.2 Disclosure of Monitoring Results

To date, there is no act or ordinance that stipulates disclosure of monitoring results.

5.4.3 Procedure for Addressing Issues on the Monitoring Process

To date, there is no act or ordinance that stipulates the procedure for addressing issues on the monitoring process.

5.5 Major Issues and Challenges of the Current System

The following issues have been identified in the EIA system in Bangladesh.

Table 5.5.1: Issues of EIA System in Bangladesh

Lack of coordination among the agencies involved in EIA	There is no standard EIA procedure that has to be observed by all practitioners. The presence of donor agencies as organisations parallel to the DoE in project approval may create a dual standard in EIA quality.
Disclosure of information and participation of local residents	There is a lack of regulation on the participation of local residents and disclosure of information about the industrial unit or project, resulting in inconsistent procedures.
Monitoring system flaws	The entrepreneur is not responsible for implementing the monitoring plan or for conveying the results of the monitoring. Thus, whether the provisions of the IEE and EIA are being properly implemented remains unclear.
Changes and	There is a lack of information on the actions that need to be taken

amendments to the ECC	when major changes have been made to an ongoing project after the ECC has been issued. The World Bank's *Pakistan: Strategic Country Environmental Assessment: Rising to the Challenges, 2006* compared the number of ECCs issued in Bangladesh (1,300 in 2001) the number of ECCs issued in Pakistan (84 in 2004), highlighting the importance of applying for and obtaining ECCs. As mentioned previously, the lack of clarity regarding the implementation of IEE and EIA monitoring in Bangladesh is a matter of concern.

5.6 Gap Analysis in the Existing Domestic Regulations, the JICA Guidelines for Environmental and Social Considerations and the World Bank Safeguard Policy

There are no significant gaps in terms of the objectives of the EIA. Governmental legislation, however, pays scant attention to transparency, predictability and accountability. One of the reasons for this is that the EIA is conducted within the framework of the Environmental Clearance Certificate (ECC), which makes the EIA more acceptable than otherwise. The procedure of the EIA has recently been clarified, considerably narrowing the gaps between JICA's recommended procedure and that of Bangladesh. It is also important to note that domestic acts and ordinances pay little attention to social impacts and public participation (for further details, see Chapter 9).

Chapter 6

Relevant Regulations and Procedures for Land Acquisition and Involuntary Resettlement

6 Relevant Regulations and Procedures for Land Acquisition and Involuntary Resettlement

Latest Development/Issues Regarding the Land Acquisition and Involuntary Resettlement

- The Acquisition and Requisition of Immovable Property Ordinance (1982) (Ordinance II) was revised in 2004 (Section 6.1).
- Two case studies that focus on involuntary resettlement are presented in Section 6.2.3.2.
- A gap analysis of present domestic regulations, JICA's Guidelines, and the World Bank's Safeguard Policy is presented in Section 6.5.

6.1 Relevant Regulations

The principal legal instrument for land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property Ordinance (1982) (Ordinance II), targeting government land acquisition (including temporary acquisition) for public works. Ordinance II requires that compensation be paid for (i) land and assets acquired (including houses, trees, and standing crops) and (ii) any other impact caused by such acquisition. It has been revised with respect to compensation (the additional amount of compensation for appraised value and amount of compensation for agricultural products) in 1989, 1993, 1994, and 2004.

The Ordinance provides certain safeguards for landowners and has provisions for payment of 'fair value' for the property acquired; however, expenses related to relocation, change in income level after the relocation, and compensation for illegal residents have not been specified in detail.

(1) Relevant Law (year of enactment /amendment)

- The Land Acquisition Act (1894)
- The Acquisition and Requisition of Immovable Property Ordinance (1982)
- Policy relating to involuntary resettlement by the Asian Development Bank and World Bank (enacted in 1995, with amendments being made up until 2011).

(2) Guidelines (year of enactment /amendment)

To date, guidelines for involuntary resettlement and land acquisition have not been enacted in Bangladesh.

6.2 Procedures for Land Acquisition and Involuntary Resettlement

6.2.1 Roles and Responsibilities of Relevant Organisations in the Implementation of Procedures for Land Acquisition and Involuntary Resettlement

An overview of the process for involuntary resettlement and land acquisition is shown in Figure 6.1.1.

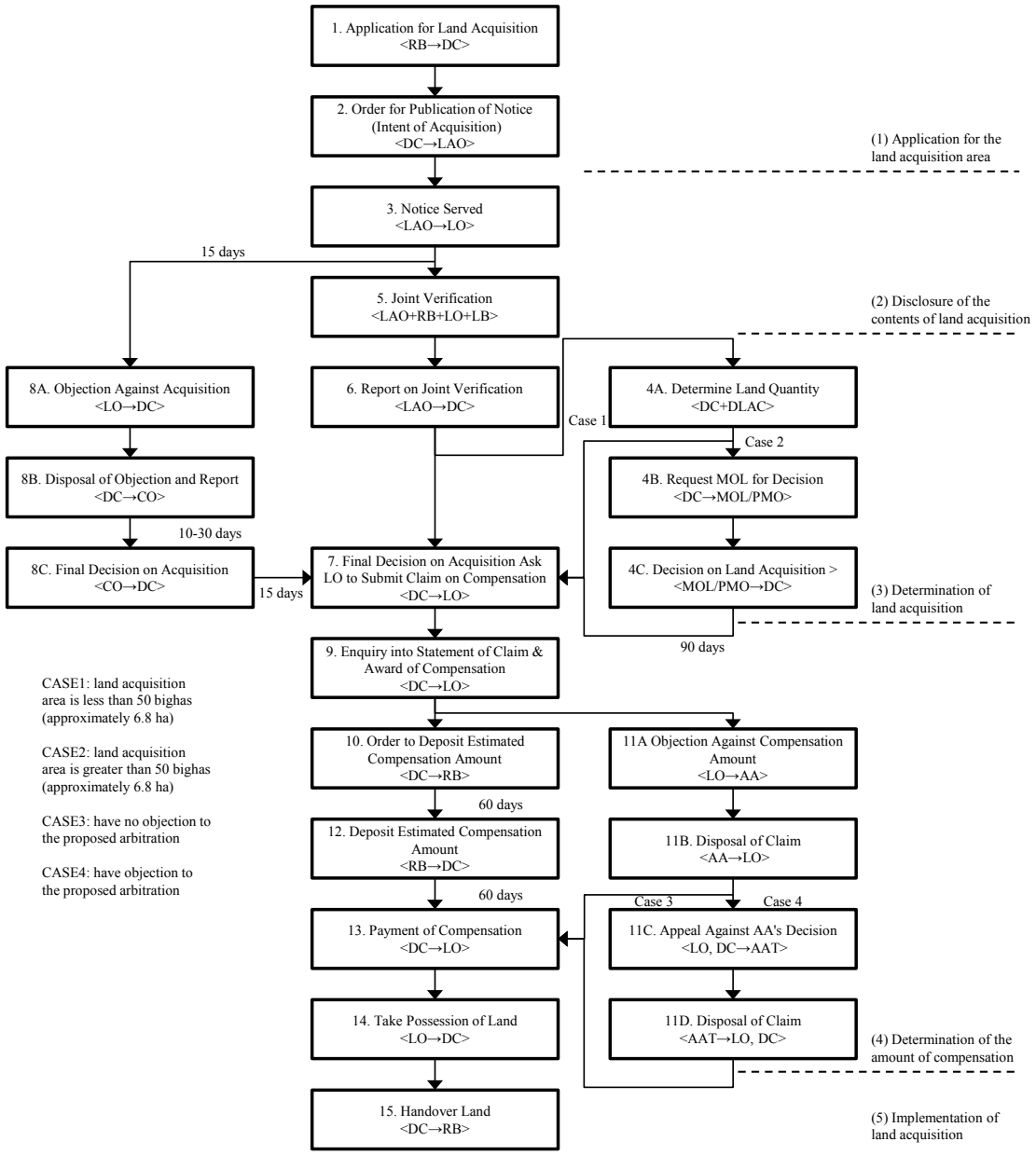


Figure 6.1.1: Land Acquisition Flow

Source: JBIC. 2000. *Survey-related legislation in the country's resettlement annual yen loan principle.*

(1) Application for Land Acquisition

A person/organisation intending to implement a project is required to conduct an initial assessment, such as a topographical study of the site, select suitable sites to set the area for land acquisition, and make an application to the Deputy Commissioner (DC), the person in charge of land acquisition. For the application, the applicant should prepare a map that illustrates the boundaries, using a scale that the government and landowners usually follow (80"=1 mile for Dhaka City and 16"=1 mile for places other than Dhaka City is the most appropriate). At this stage, the DC is supposed to determine whether the land acquisition is appropriate by considering public interests, such as the nature of the business. The DC then starts a land acquisition case (LA Case) for different areas or mouzas (revenue villages), taking into consideration the level of difficulty of managing the cases.

(2) Disclosure of the Contents of Land Acquisition

The DC, through his land acquisition officer (LAO), serves a notice, under Section 3 of the acquisition rule, to the potential landowners as per the records and waits 15 days for claims on the notice, if any. If there is any claim on the land acquisition notice, the DC will accordingly entertain it, as per rule, but, in the meantime, the LAO, on behalf of the DC (acquiring body) and the executing agency (requiring body), will, within 3 days of serving the notice, jointly start conducting a field level verification survey regarding the category of land, features, size, nature of structure, the value of crops and trees, etc. within the proposed right of way of the project and report to the DC. The joint survey report is subsequently signed by the representative of the acquiring body (AB) and requiring body (RB).

After the land acquisition public announcement, if parties related to the land have an objection, a petition must be made to the DC within 15 days from publication (notice=3). After receiving an objection, the DC shall submit a written opinion on it within 30 days (Section 4 (1) and (2) of the Acquisition and Requisition of Immovable Property Ordinance (1982) and the Acquisition and Requisition of Immovable Property (Amendment) Act (1994)).

(3) Determination of Land Acquisition

After the submission of views on the objection, a report recording the above procedures must be submitted to the government (Ministry of Land), and the government must make a final decision within 90 days, if the land acquisition area is greater than 50 bighas (approximately 6.8 ha)

(Case 2 of the flow chart on the previous page). Similarly, a report recording the above procedures should be submitted to a Divisional Commissioner, and the Divisional Commissioner must make a final decision, this time within 15 days (one month maximum), if the area is less than 50 bighas (Case 1 of the flow chart on the previous page). The DC will notify the persons concerned about the final decision within 15 days (maximum one month) (Section 4 (3), (5), and (6), the Acquisition and Requisition of Immovable Property Ordinance (1982) and the Acquisition and Requisition of Immovable Property (Amendment) Act (1994)).

(4) Determination of the Compensation Amount

The amount of compensation is calculated by a pre-determined method for land, structures, trees, and crops based on the results of a joint survey. The DC collects land prices from the Sub-Register's office, as recorded in the deeds transacted during land registration.

The DC also sends a list of affected structures and ponds to the Public Works Department (PWD), with the nature and quantity of affected structures and ponds, as recorded during a joint verification survey; a list of trees is also sent to the Forest Department for calculation of the market price as per rule.

A list of the standing crops is sent to the Agriculture Extension Department and the Agriculture Marketing Department for calculations of the market price. Once the prices/estimates come from these departments, the DC prepares an estimate of compensation, with a 50% premium for land, structures, and trees (following land acquisition laws) and sends the estimate to the RB with a request to deposit the required amount in favour of the DC within 60 days from the date of receipt of the letter. The requiring body then deposits the compensation amount to the DC's office within 60 days. After the required amount is deposited, the DC serves a notice under Section 7 to the affected persons to draft a record of rights to the affected property in order to receive compensation within 15 days from the date of serving the notice-7. Fifty per cent of the total amount of this compensation is added in consideration of other circumstances such as forced land acquisition.

If the required amount is not deposited within 60 days, the DC may postpone the LA Case and start the acquisition process again by dint of law. Any interested person who has not accepted any award made by the DC under this Ordinance may, within 45 days from the date of service of notice of the award (Notice 7), make an application to the Arbitrator for revision of the award. For the purposes of this, the government shall, by notification in the official gazette, appoint a judicial officer, not below the rank of subordinate judge, to be an arbitrator for such areas as

may be specified therein. The Arbitrator can review the petition and enhance the amount not over 10%. Where the amount of compensation determined by an arbitrator is higher than the amount specified in the award of the DC, additional compensation at the rate of 10% per annum on such additional amount shall, subject to the decision of an Appellate Arbitration Tribunal, if any, be payable till that amount is paid or offered for payment. In addition, if compensation is not paid within one year of the land acquisition decision, the DC can abandon all procedures pertaining to the land acquisition and publish the facts of the case in the official gazette.

(5) Implementation of Land Acquisition

After compensation has been paid to the landowners (if a few of the owners have paid, it is deemed as having been paid), the land from the first landowner is entrusted to the DC, and then ownership is transferred to the requiring body. Immediately after, the DC creates a document describing the contents, based on the prescribed format, and publishes it in the gazette, which indicates the completion of the land acquisition through the transfer of ownership to the requiring body (OECF 1997).

6.2.2 Contents and Calculation Policy for Compensation

(1) Calculation Policy for Compensation

The amount of compensation is supposed to be calculated on the basis of the market price as of the date of publication of the land acquisition. The value of land prices in the area of the land acquisition, the building price, and prices of agricultural products are assessed as follows.

- Land prices are calculated as the average deed value of the land registered in the Sub-Register's office based on similar property valuations in the past, one year from the date of serving a notice under Section 3 (using the land price that has been recorded in the registration deed, but, as a general practice, excluding higher prices if found fictitious).
- Building prices are calculated in consultation with the Public Works Department.
- Prices for agricultural products are determined through consultation with the Ministry of Agriculture (at the stage that ownership of the land had been transferred to the DC side).
- Timber prices are calculated in consultation with the Department of Forest.

In addition, items such as relocation and transfer expenses, as well as the disparity between income before and after the acquisition, are supposed to be considered when compensation is determined. In addition, 50% of the appraised value is added in relation to the supplementary aspect of compulsory land acquisition.

Land records and registration certificates in the Office of the Sub-Register under the jurisdiction of the Land Ministry are used in the calculation of the price of land described above; however, land prices are lowered in the registration deed in order to reduce the payment of relevant taxes. As a result, a problem arises, in that the entire amount of compensation calculated is lower than the current market price. The actual price of land should be determined in isolation by the negotiations between buyers and sellers and bear no relationship to other factors. However, in order to assess compensation for the acquired land, these prices are considered and set as a price reference. This procedure becomes a problem in assessing actual market price for land acquired. This problem is covered by the addition of a 50% premium to the averaged deed value of land.

(2) Payment of Compensation

Considering the above procedure of assessing compensation, the DC office prepares an award list of the probable entitled persons based on land records and joint verification survey results for structures, trees, etc. If the land is sold/transferred to others, the award would be corrected accordingly and compensation payment made to the present owner. The DC asks the entitled persons to produce a record of rights (ROR) to the property along with other necessary documents to receive compensation. After being satisfied with the documents so far submitted in favour of the land ownership, the DC, through the LAO, hands over compensation cheques to the landowners in the office or in a public place.

6.2.3 Contents of Livelihood Restoration

6.2.3.1 Livelihood Restoration Plan

Below is a key summary of the status of the livelihood restoration plan in Bangladesh.

(1) Methods and systems of support employed until the resettlement is complete: not specified
(2) Support for the restoration of livelihood and production bases (e.g., sales compensation, unemployment compensation, low-interest loan system, vocational training): not specified
(3) Support for the restoration and improvement of living standards (e.g., counselling, development of social infrastructure, community support): not specified

6.2.3.2 Examples of Livelihood Restoration Plans

Although there is no detailed description relating to livelihood restoration in the regulations, donor projects usually prepare and implement livelihood restoration plans. Below is a summary

of the plans for various projects.

(1) Padma Multipurpose Bridge Project (2011 – present)

The Padma Bridge Project is the largest public sector investment project in Bangladesh.
The bridge will be the longest bridge (6.15 km) on the river all over the world. The project is co-financed by JICA, Asian Development Bank (ADB), World Bank and Islamic Development Bank (IDB). The bridge will provide an uninterrupted transport network, which is expected to directly benefit 30 million people in the Southwest region of the country. Construction of four resettlement sites, construction sites, service areas, etc. has been started in 2011.

This construction project, which involves land acquisition of 1,093 ha, requires the resettlement of nearly 5,000 households. Among those, approximately 3,000 households preferred self-relocation, and over 2,000 households will be relocated in the project-sponsored resettlement sites. The Bangladesh Bridge Authority (BBA), under the Bridge Division of the Ministry of Communications (MOC), is in charge of the project.

- Resettlement Action Plan

Taking into account the severity of the impact, the resettlement action plan (RAP) was made available adequate provisions for alternative income generating/skill development and other enabling strategies, whereby those affected by the project can either continue their previous occupation, initiate a new venture, or embark upon an alternative occupation. The basic objective behind the livelihood restoration activities and schemes are to improve or at least restore the economic status of the project affected people (PAP) enjoyed prior to the project, which also complies with the co-financiers' safeguard policies on the involuntary resettlement. In order to achieve that, the project will adopt a two-fold approach with regard to livelihood restoration, comprising of the following:

1. Short term intervention for income restoration and long term (10 years intervention) for sustainable livelihood restoration; and
2. A dedicated Social Development Fund (SDF) that has been allotted for undertaking the long-term program.

- Current status related to Resettlement Action Plan

According to the materials provided by the Bangladesh Bridge Authority, as of May 2012, the following shows the compensation payments progress (%):

- RAP I: Development of 4 Resettlement Sites (RS) – 92%
- RAP II: Approach Road, Bridge End Facilities and Service areas – 69%
- RAP III: River Training Works (RTW) – 74.59%
- RAP IV: Construction Yard at Janjira – 78.55%
- RAP V: Construction Yard at Mawa – 74.91% and ongoing

The interviewed personnel indicated that implementation of the plan will take longer than anticipated. Total land acquisition and requisition will be about 1099 ha. According to the current survey data, the total PAP are about 80,000 including land owners, squatters, and vendors.

- Legal Framework

RAP is guided by the legal instrument governing land acquisition in Bangladesh, the Acquisition and Requisition of Immovable Property Ordinance (1982) (Ordinance II with amendments in 1989, 1993, and 1994), supplemented with the special ordinance for the Project, the Padma Multipurpose Bridge Project (Land Acquisition) Act (2009) (Act 31) and the State Acquisition and Tenancy Act (1951) (Section 7). RAP III also complies with multiple Safeguard Policy Statements by various donors including JICA and World Bank.

In addition, according to the materials provided by the Bangladesh Bridge Authority, the Acquisition and Requisition of Immovable Property Ordinance (1982) was not sufficient to provide complete compensation support. Hence, a harmonisation of co-financiers' (ADB, WB, JICA) policies was undertaken. Specifically, a gap analysis was conducted with the 1982 Ordinance and the lessons from the Jamuna experience to establish the project resettlement policy and eligibility. The $754 million U.S. Jamuna Bridge was the most expensive and technically one of the most challenging transportation infrastructure projects ever accomplished in Bangladesh. The project was a large undertaking that involved mobilising a massive amount of other resources, resettling about 100,000 people, and compensating families affected by erosion in the project impact area. Of particular relevance was that the project revealed the importance of assessing all possible impact areas. Despite having a resettlement action plan, a local nongovernment organisation (NGO) submitted a complaint to World Bank's inspection panel for alleged violations of the World Bank's operational procedures regarding the resettlement of PAPs living on both downstream and upstream chars (temporary islands that are formed and submerged by changes in river direction and flow). Subsequent investigations showed that char PAPs had not been fully provided for through the RAP.

The adopted policy in Padma project has addressed the safeguard issues and complies with the co-financiers' safeguard requirements. Subsequently, the resettlement framework has documented the harmonisation processes and the project entitlement matrix (BBA 2011).

(2) Southwest Area Integrated Water Resources Planning and Management (SWAIWRPM) Project (Chenchuri Beel Sub-project) (2007–present)

The SWAIWRPM Project is under implementation with financial assistance from the Asian Development Bank (ADB) Loan No. 2200 BAN (SF) and through a Grant (0036 BAN) from the Government of The Royal Netherlands. The main objective for rehabilitation of the sub-project is to increase agriculture production, farm incomes, and employment opportunities by improving water management facilities and the capabilities of the beneficiaries to manage the facilities. The improved facilities will be made effective by controlled flooding and drainage through compartmentalisation.

Re-sectioning work does not require land acquisition or requisition at present. The Bangladesh Water Development Board (BWDB) had acquired land in 1986 for construction of the embankment within which the re-sectioning work will be done. A total of 385 houses, shops, and common properties were identified during a socio-economic survey as requiring relocation. Each of the 385 project affected units (PAUs) (262 households, 106 business enterprises and 17 common resource properties (CPRs), which house squatters or encroachers, without a single titleholder), will experience significant impacts as defined by the Development Partners, as a result of either displacement or loss of 10% or more of income generating assets including small businesses.

The Project Preparatory Technical Assistance (PPTA) Study in phase-II selected the Narail and Chenchuri Beel sub-projects for development, according to the objectives of the project. The Chenchuri Beel Sub-project is one of the two sample Integrated Watershed management programmes prepared under the PPTA and Navoganga and Chitra rivers. The gross area of the Chenchuri Beel Sub-project is 25,560 ha out of which the net area is 17,900 ha. The original idea behind the Chehchuri Beel Sub-project was to provide flood control and drainage to Nrail Sadar, Lohagora and Kalia upazilas, and Naragati thana under Narail district to increase agricultural production by increasing the cropping intensity from about 190% to approximately 220%.

- Resettlement Plan

A Resettlement Plan (RP) has been prepared for the 19,020 km embankment under the Chenchuri Beel Sub-project. Mitigation of all impacts, including the significant resettlement impacts, will be undertaken through implementation of the RP. It identified and proposed a number of remedial measures for addressing the gaps between national legislation and the requirements of the Donor's Policy on Involuntary Resettlement. PAUs will be compensated by the BWDB for all lost assets. Compensation through the RP for Chanderchar, Pateswari, Burikhali, Bagdanga, and Baze Babra area under the Chenchuri Beel Sub-project is based on entitlements including:

- Replacement value for structures; and
- Other resettlement assistance as required, such as shifting allowance, construction costs, and compensation for loss of workdays/income due to displacement.

In particular, the RP approach incorporates (i) resettlement issues; (ii) impact mitigation with special attention to the women and vulnerable groups; (iii) income generation support to the eligible members of the DP families; and (iv) poverty reduction assistance to the poorest affected people.

They will receive compensation for lost housing, business and any other productive means or livelihood opportunities lost through relocation. Female-headed and other vulnerable households will be eligible for further cash assistance for relocation and resettlement to improve their living conditions. Compensation and entitlements have been identified based on impacts and losses, and are similar to those approved under other projects.

- Implementation Framework

The Resettlement Plan (RP) addresses resettlement issues within the framework of the Government of Bangladesh (GOB) and ADB's policy on involuntary resettlement and covers the displaced people (DP) under resettlement/rehabilitation program providing income restoration and poverty reduction assistance to eligible DPs, who are all informal settlers on the right-of-way. In particular, the ADB's Safeguard Policy requires that if the screening or social assessment determines that people will experience resettlement impacts, internal monitoring of the RP implementation is expected to be the overall responsibility of the project management office (PMO) and the RP Implementing Agency (IA). An external monitoring agency will be engaged by BWDB during the RP implementation for ongoing verification, and an independent reviewer will be engaged by BWDB after completion of implementation of the RP (BWDB. 2011).

6.2.4 Grievance Redress Mechanism (GRM)

In case of objections within arbitration law, the following procedures are applied.

- A petition for the determination of land acquisition: based on the notice for land acquisition, an objection by the property owner must be filed with the DC within 15 days from the publication of the notice, and in response to it, the DC office will summarise the views on the objection within 30 days. (Section 4 (1) and (2), The Acquisition and Requisition of Immovable Property Ordinance (1982) and The Acquisition and Requisition of Immovable Property (Amendment) Act (1994)).

- A petition regarding the determination of the amount of compensation: if there is an objection to the amount of compensation, the landowner must petition an arbitrator and entrusts him or her with a resolution. If the resolution is not acceptable, either the landowner or the DC side will initiate a lawsuit and wait for a court ruling. Moreover, if the requiring body does not pay the compensation within one year after the decision to acquire the land, the DC is able to abandon all procedures pertaining to the land acquisition and is to publish the details in the official gazette.

6.2.5 Provision of Information to the Public, Public Consultation, Procedure of Public Participation and Information Disclosure

Community participation (holding public hearings, participation in each stage of the transfer, etc.): the DC informs the potential affected persons through a public notice (under Section 3) on the requirement of land acquisition for the public interest according to the prescribed method. When the notice is circulated among the land owners, the land acquisition procedure is officially started through the LAO for the DC. Then, if there is no objection, the LAO, along with the executing agency, conducts a field level verification in the presence of the landowner and jointly reviews the size and category of land and buildings, purposes and value of crops and trees, etc., and a report is submitted to the DC.

6.3 Monitoring

Currently, there are no particular regulations to stipulate the implementation of monitoring involuntary resettlement in Bangladesh. Only aid projects sponsored by donors conduct periodical external monitoring activities and disclose the results according to their safeguard policies.

6.4 Issues and Problems

(1) Legal and actual considerations and practices for illegal residents (squatters)
The practices of the executing agency relating to illegal residents have not been documented (OECF 1997).

1) Local type: to lose the production base (e.g., acquisition of farmland by the dam project)
For bargadars (landless farmers cultivating land under tenant contract farming), compensation for farming products is paid out in cash based on a decision by the DC (Section 10A, The Acquisition and Requisition of Immovable Property (Amendment) Act (1994)).

2) Urban type: to lose their livelihood (e.g., acquisition of residences by the road project)
Not specified in the regulations

3) NGOs to support the residents in case of acquiring land

(2) Issues related to land acquisition
1) Subject for compensation

- In land acquisition, due to the implementation of the project, the landowner can be the recipient of compensation for direct loss of the land. However, peasants, shopkeepers, and squatters would not be eligible for compensation, as they are only indirectly affected. Huge numbers of them will lose a source of income and housing, but they are not legally subject to compensation.

- There is a consequence in that land prices in the surrounding area rise with the implementation of the project, although, on the other hand, in the case of construction projects such as airports, leather tanning factories, or waste disposal facilities, the price sometimes drops.

2) Contents of compensation

- The greatest concern for the people affected by the project is the amount of compensation for land acquisition, which is calculated using the average price of land of the surrounding area in relation to the previous year, in accordance with the laws. However, with some exceptions, the amount of compensation will generally not be paid at the original land price.

- In order to increase the amount of compensation paid out in land acquisition, some interested parties (such as government officials) force a bribe from the landowner. Few cases of bribery are punished, since it is difficult to prove in court, and it is difficult to identify actual situations. Other problems pertaining to the amount of compensation paid include the following.

    - The amount of compensation is estimated to be lower than the general market price.
    - Since the land registration tax for both buying and selling is set based on the sale price of the land, the amount of compensation is kept low.
    - Prices of the surrounding land rise along with the project implementation, and it becomes difficult to acquire new land.
    - In some cases, payment of compensation could take several years.
    - The cost of relocation needs to be prepared by the landowners themselves.

3) Involuntary resettlement

- With the exception of some recent cases carried out by donors, development of social infrastructure (such as housing construction) has rarely been carried out in the resettlement destination by the land acquirer, because there is no provision in the law to do so and because of the judgment of the person in charge that 'relocated residents could obtain an adequate compensation: therefore relocation should be considered on their own'.
- In the process of the project implementation, opinions of local residents do not need to be obtained, even with reference to any land acquisition.

4) Laws and regulations

- The land acquisition announcement process is a simple way to place a sign on the target area without directly notifying local residents.
- As a deadline is not set for the court's decision of arbitration with respect to land acquisition, the procedure tends to be delayed.
- It is stipulated that the amount of compensation added is less than 10% of the calculated amount, even if there is a claim for arbitration of compensation.
- A delay in payment of compensation frequently occurs.

5) Administration

- The latest information is not listed in the records and the map of the registration office.
- There is a problem with the number and quality of the registration office staff.
- Cooperation with relevant organisations and the registration office is poor.

- In the planning stage of the project, the evaluation of land and the number of residents to be relocated has not been made.
- Documents relating to land acquisition that must be submitted are complex and often delay the procedure.

6.5 Gap Analysis between the Present Domestic Regulations, the JICA Guidelines for Environmental and Social Considerations and World Bank Safeguard Policy

Currently, the only legal framework that governs land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property Ordinance, 1982. However, its provisions are not adequate to address adverse impacts associated with land acquisition and involuntary displacement and do not fulfil the requirements of the JICA and the World Bank's Operational Policy on Involuntary Resettlement or that of international practices.

In essence, the law is largely indifferent to the landowners' presentation of socio-economic conditions or the long-term adverse impacts on incomes and livelihood that the acquisition and displacement may cause on the affected people. In addition, there are no other policies that complement the acquisition ordinance terms of assessing, mitigating, and monitoring adverse impacts that the affected people may suffer. Some of the salient gaps between the existing legal framework, JICA's Guidelines for Environmental and Social Considerations, and the World Bank's Safeguard Policy are summarized below.

- Avoiding/Minimizing Land Acquisition: the law only implicitly discourages unnecessary acquisition, as lands acquired for one purpose cannot be used for a different purpose and lands that remain unused are to be returned to the original owners. However, there are no mechanisms to monitor if these conditions are actually adhered to.
- Eligibility for Compensation: the law does not recognize the rights of those, such as squatters, who do not possess legal titles to the lands they live on or make a living from. There is thus no provision to mitigate the adverse impacts they suffer.
- People who are impacted through loss of income are not recognized: the Land Acquisition Act provides for compensation for lands and other fixed assets built and grown on them (structures, trees and orchards, crops, and any other developments like ponds, built amenities, etc.). However, there is no provision to assess the impacts on peoples' incomes, livelihood, loss of employment and businesses or mitigation measures to restore loss of

incomes and livelihood.

- Compensation Standards: although the law stipulates payment of compensation at 'market prices' for acquired lands as the just compensation, the legal assessment procedures used almost always result in prices that are far below the actual market prices.
- Relocation of Displaced Persons: there is no provision in the existing laws for relocation of displaced families who are affected by the loss of their assets: land and/or structures.
- Ensuring Payment/Receipt of Compensation: the legal process to determine entitlements are too cumbersome and time-consuming and do not ensure payment of compensation prior to their displacement. Lands are legally acquired and handed over to the project execution agency as soon as the authority identifies the owners (or 'awardees'), by examining the records, and sends a legal notice advising them to claim the compensation (or 'awards'). The onus is left on the affected land owners to prove, by producing an array of documents, that the acquired lands legally belonged to them. As gathering these documents is a long, expensive, and cumbersome process, many landowners may be unable to claim their awards. The project has meanwhile started to use the lands.
- Socio-economic Rehabilitation: the existing legal framework does not have any provisions to mitigate long-term impacts on peoples' livelihood caused by their displacement. Socioeconomic rehabilitation of involuntarily displaced persons is absent in the legal regime of the country (WB 2010).

Chapter 8 provides a more detailed analysis on the gap between governmental laws of Bangladesh and other donors' guidelines, including case studies.

Chapter 7

Legal Framework and Procedures pertaining to Considerations for Indigenous Peoples and Ethnic Minority Groups

7 Legal Framework and Procedures pertaining to Considerations for Indigenous Peoples and Ethnic Minority Groups

Latest Development/Issues Regarding the Indigenous Peoples and Ethnic Minority Groups

- Issues and problems pertaining to indigenous peoples are described in Section 7.7.
- A gap analysis of the present domestic regulations, JICA's Guidelines, and World Bank's Safeguard Policy is presented in Section 7.8.

7.1 Distribution and Historical Background of Indigenous Peoples and Ethnic Minority Groups

7.1.1 Indigenous Peoples

Around 45 different indigenous groups reside in the country of Bangladesh. Most of these people inhabit upland regions or forest areas. Estimates of their population size range from 1.5 million (as reported in the 2009 UNDP report) to 2.5 million (reported in the 2009 MOHFW report). According to the 1991 Census, at that time about 82% of the indigenous population of Bangladesh lived in rural areas and 18% in urban areas. They mainly resided in the Chittagong Hill Tracts (CHT) and other largely residential areas such as Maimeishin, Rajshahi, Sylhet, Patuakhali and Barguna. The groups living in these districts were the Chakuma, Garo, Manipuri, Marma, Munda, Oraon, Santal, Khasia, Tripura, Muro, Hajon, and Rakuhain. These people belong to different ethno-lingual communities, profess diverse faiths, have unique cultures and are bound by their own unique customary laws. The highest proportion of indigenous peoples practice Buddhism (37%), followed by Hinduism (21%), Islam (18%), and Christianity (11%), while people who practice other religions constitute the remaining 13% (MHFW 2011).

In the Chittagong Hill District, a specific culture system focused on slash-and-burn agriculture has been practiced by the indigenous peoples for many years. In the late eighteenth century, this region became a colony of the British East India Company, and the area was treated largely as an autonomous state. However, since becoming the independent nation of Bangladesh, the

relationship between the government and various indigenous peoples deteriorated, as they sought improved rights and more respect, sparking a conflict that lasted for over 20 years and only ended when the cease-fire declaration was signed in 1992. The Peace Accord was formally signed in 1997 and the current status of the Accord is based on the Indigenous Peoples Development Plan prepared under the ADB's previous IP Policy in 2000. The situation, however, has not significantly improved over the last decade.

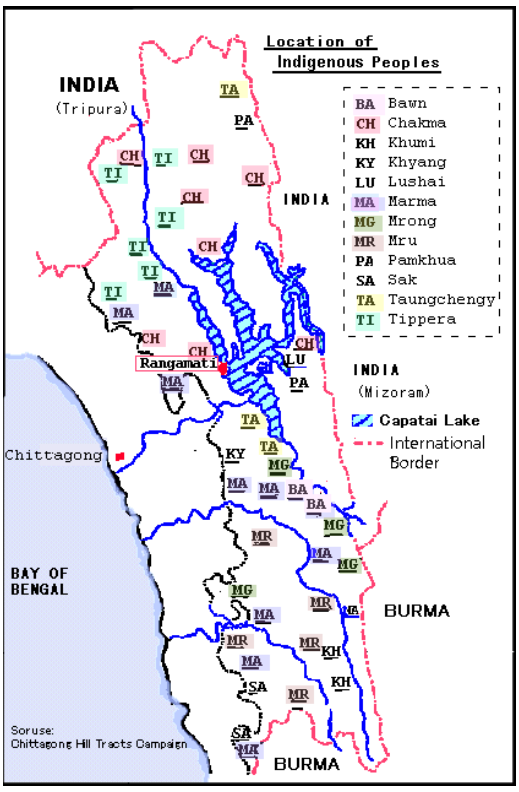


Fig. 7.1.1: Distribution of Indigenous Peoples in Chittagong Hill District.

Source: Japan CNT Committee (2004). Based on a figure in AIPP: Indigenous Peoples of Asia, Many Peoples, One Struggle. http://thirdculture.com/jpa/jcc/image/dismap2.htm (Accessed on 26 May 2012).

7.1.2 Ethnic Minority Groups

Bengal was a part of former British India and many of the socially dominant Hindus also took the political lead. Islamic leaders considered this situation a political and social threat and eventually recognized their inferior social position. This led to a push for opportunities for social advancement for Muslims and eventually sparked a movement for independence from India. At the time of the separation of India and Pakistan in 1947, many Hindus migrated to the Indian side. In their absence, the Muslim population became the core of society in the Bengal

region. Because of the expansion of employment opportunities in Bangladesh after independence in 1971, and in light of the proliferation of public education within the Muslim community, the ratio of Hindus to Muslims in public office and employment has now completely reversed.

As mentioned in section 7.1.1, today Muslims account for nearly 90% of the population of Bangladesh, while Hindus account for just 9.2%. In 1947, however, when Pakistan became separate from British India, the Hindus in East Bengal made up over 22% of the entire population. In other words, more than 10% of the nation have left the country and became a population of 'lost Hindus' over the past 50 years. This problem of population outflow still continues, though it is not considered to be a refugee issue caused by one particular disturbance. This permanent outflow is instead understood to be caused by various legal, social and psychological pressures experienced on a daily basis by the minority Hindus.

7.2 Social and Economic Condition of Indigenous Peoples and Ethnic Minority Groups

Indigenous peoples and ethnic minority groups in Bangladesh have been consistently excluded from the nation's social, political and economic framework - a situation that has hindered the establishment of their social identities. Indigenous peoples and ethnic minority groups have limited political clout and have no means of defending their basic rights, since they have limited opportunities to influence policy planning to strengthen their own social position. As a result, access to important components of the social infrastructure such as education and healthcare is limited, and many of the peoples and groups suffer from poor nutrition, disease and inferior hygiene in their home environments (IMF 2005).

Until very recently, no socioeconomic surveys targeting the populations of indigenous peoples and ethnic minority groups residing in a number of districts had been conducted by the Bangladesh government.

7.2.1 Indigenous Peoples

According to a 2009 UNDP report, indigenous peoples have a higher incidence of poverty than Bengalese in the Chittagong Hill Tracts (CHT). The report stated that the annual household net income of the Bengalese was approximately Tk. 71,000 and income for indigenous peoples was

on average approximately Tk. 62,000. For an average rural household in the CHT, the annual net income was approximately Tk. 66,000 (the annual net income of a rural Bangladeshi household was Tk. 84,000).

Children's enrolment rates in primary and secondary schools are higher among Bengalese than other groups, but dropout rates are high, with 65% of children discontinuing their education before the completion of primary schooling due to financial problems and the distance of the school from their residence. The overall literacy rate in Bengal is below 20%, while the national literacy rate in Bangladesh is 50% (MHFW 2011).

In addition, this district suffers from chronic water shortages, the residents do not have sufficient knowledge of whether their water is sanitary or not, and they are always at risk of waterborne diseases (ADB 2000).

7.2.2 Hindu Minorities

It has been indicated that the following problems are faced by the Hindu minority in Bangladesh.

- Employment structure

In the 1991 census, Hindus accounted for approximately 12% of the nation, but in terms of employment, they accounted for no more than 3% to 5% of general staff employees. Furthermore, in organisations such as the military and police forces, the proportion of individuals from minority groups employed in higher positions was particularly low, revealing an imbalance in the employment structure caused by factors such as internal promotion.

- Issues related to the Land Act

The Pakistani government declared a state of emergency during the second India-Pakistan war in 1965 and promulgated the ordinance defence. The government then forcefully confiscated land from Hindus, recognizing them as the 'enemy'. Although the war came to an end in 1969, the government enacted the Enemy Property Act to continue the timed ordinance under the state of emergency even in peacetime. After independence in 1971, the Bangladesh government transferred these assets and changed the name of the act to the Vested Property Act through a 1974 ordinance. However, it was extremely difficult for Hindus to recover their land once it had been labelled as belonging to the enemy. President Ershad decreed that the government would not expropriate land in 1984, illustrating the fact that expropriation of land had continued up

until that point. Until the Awami administration abolished the Vested Property Act in 2001, observance of Ershad's cabinet order had been politically approved by the unified parliament. This meant that the Act had been a factor threatening the livelihoods of Hindus for many decades. According to recent estimates, approximately one third of Hindu households directly suffered as a result of the Act and 20% of their assets were lost (Togawa 2004).

In the Bangladesh constitution, enacted in 1972, the principles of secularism and nationalism are laid out as the government's general ruling principles. However, due to increasing domestic unrest associated with prolonged military administration and military coups, as well as improving relations with Islamic countries, the Islamic philosophy became more highly valued than secularism. In 1977, the secular provisions were removed from the constitution and, in 1988, an amendment to the constitution established Islam as the state religion of Bangladesh. In 1979, in reaction to this movement, Hindus organized a protest against the constitutional amendment, claiming that the establishment of Islam as the state religion contradicted the equality provisions set out in Article 11 of the Constitution.

Various organisations have established initiatives to address the current status of religious minorities. The Bangladesh Hindu Buddhist Christian Unity Council is an organisation that lobbies the government in the interests of non-Muslim people in Bangladesh, including Hindus Buddhists and Christians. Specifically, the Council collects information on various incidents perpetrated against domestic religious minorities, raising awareness of the status of minority groups among the general public, and lobbying and negotiating with the government on policy decisions. There are also governmental agencies such as the Hindu Kalyan Trust that works towards the repair and reconstruction of the country's Hindu temples and the development of surrounding facilities, as well as subsidizing the promotion of Hindu rituals.

7.3 Relevant Regulations Pertaining to Considerations for Indigenous Peoples and Ethnic Minority Groups

The constitution or legal system does not make explicit provision guaranteeing the rights of indigenous peoples or ethnic minority groups. In general, the government's development of such regulations is lagging behind.

7.4 Procedures Pertaining to Considerations for Indigenous Peoples in Development Projects

The constitution or legal system does not make explicit provisions guaranteeing the rights of indigenous peoples or ethnic minority groups in development projects. During the planning and implementation stages of development projects that may affect indigenous peoples and ethnic minority groups, their leaders have limited opportunity to participate as stakeholders. As a result of the implementation of these projects, there are instances when residents who are not from ethnic minority groups move to residential areas where the land was previously held by ethnic minority group, which then forces these ethnic minority residents to leave their land.

7.5 Affirmative Actions for Indigenous Peoples and Ethnic Minority Groups

Constitutional safeguards for indigenous peoples and ethnic minority groups have been only partially provided through either reservations or affirmative action. Still, their ability to negotiate and benefit equitably from development activities remains weak compared to the majority of Bengalese. In many parts of the country ethnic minority groups are in a continuing struggle for formal recognition of their communal and private land ownership, as well as their traditional rights to forest resources (ADB 2011).

7.6 Policies and Systems for Indigenous Peoples

The Ministry of Chittagong Hill Tracts Affairs (MOCHTA) was established in 1998 and is mandated to supervise and coordinate the overall development and administrative activities of the Chittagong Hill Tracts (CHT) region. However, as MOCHTA is based in Dhaka, the local government which has jurisdiction over residential areas for ethnic minority groups is placed under this ministry. Since the 1997 Peace Accord, the CHT Regional Council (CHTRC) has been managing administrative functions to ensure the cooperation of regional development projects run by the local administrative organisation, the Hill District Council (HDC). However, because of budget troubles the CHTRC has not sufficiently fulfilled this function (ADB 2000).

In terms of policies, the fifth Five-Year Plan (1997 to 2002) cited the development of the north-western part of the country as one of its specific objectives, specifically in the CHT and the coastal area where there has so far been little development (ARC 2005). In addition, the

Prime Minister's Office has a regional development budget for indigenous peoples and ethnic minority groups living in the plains (IMF 2005).

7.7 Issues and Problems

There are still gaps between the claims of indigenous peoples and the government's response. In 2005 in a press conference at the National Press Club Dhaka held by representatives from organisations whose remit relates to issues affecting indigenous peoples, including the Bangladesh Indigenous Peoples Forum, the following requests were made to the government:

1. To recognize the right of self-determination of indigenous peoples in the Constitution of Bangladesh;
2. To guarantee the right to their ancestral land, forest and environment;
3. To cease the development of an eco-park on their ancestral land;
4. To carry out the Peace Accord properly and immediately;
5. To stop the torture, oppression, false lawsuits and confiscation of land of indigenous peoples;
6. To create a central ministry and agency such as MOCHTA and a land commission for indigenous peoples living in the plains;
7. To ensure that indigenous children receive primary education in their own language;
8. To receive free, prior informed consent based on sufficient information and voluntary consent from indigenous peoples in advance when conducting development projects undertaken by government or the private sector on indigenous land, and to ensure meaningful participation of indigenous peoples in development projects;
9. To comply with United Nations conventions, protocols and declarations which Bangladesh has ratified, including ILO 107;
10. To ensure the participation of indigenous representatives in the national policymaking process (JN 2005).

In a recent turn of events, in July 2011, an inter-ministerial meeting decided to erase the term “indigenous people” and replace it with “ethnic minorities” in all Bangladesh laws and regulations, official documents, textbooks and other publications, in accordance with Amendment 15 of the Constitution. The meeting also decreed that projects undertaken with foreign aid would not be authorized under the name of “development of indigenous peoples”; they will only be authorized if the names are changed to “development of ethnic minorities”. Representatives from the Ministry of Foreign Affairs explained these changes as follows: “all

the residents of Bangladesh are indigenous peoples, and the minority ethnic and tribal people living in the CHT are immigrants who arrived in the seventeenth century. There is no reason to designate particular populations as indigenous peoples. The Peace Accord does not use the word indigenous people either. They should be referred to as "ethnic minorities" in accordance with the Constitution." (JN 2011)

7.8 Gap Analysis between the Present Domestic Regulations, the JICA Guidelines for Environmental and Social Considerations and the World Bank Safeguard Policy

Ethnic minority groups in Bangladesh have been excluded from the social, political and economic framework of the nation for several decades, hampering the establishment of their social identity. Consequently, there is no specification under Bangladesh national law that considers the impact of development projects on Indigenous Peoples at the planning and implementation stage and opportunities for participation in the field of discussion for minority leaders is limited. Indigenous peoples and ethnic minority groups also have weak political clout and have no art to defend their own basic rights, since opportunities to influence policy planning that could strengthen their social position are tightly constrained. As a result, access to social infrastructure such as education and health is restricted, leading to poor nutrition and disease in many of the peoples and groups, and forcing many to live in environments with inferior hygiene (IMF 2005).

In order to bridge the gap between the needs of ethnic minorities and national policies, World Bank requires project proponents to include an Indigenous Peoples Plan whenever appropriate, which should follow World Bank's operational policies described in Chapter 8 (Section 8.1.3) provide further detailed analysis of the gap between the governmental laws of Bangladesh and other donors' guidelines, referencing several case studies.

Chapter 8

Environmental and Social Considerations in Other Donors' Projects

8 Environmental and Social Considerations in Other Donors' Projects

8.1 Current Situation and Issues of Environmental and Social Considerations in the Projects by World Bank

8.1.1 Current Condition and Problems Related to Implementation of EIA

World Bank (also referred to as WB) undertakes environmental screening of each proposed project in order to determine the appropriate extent and type of environmental assessment (EA). World Bank classifies the proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts as follows:

- Category A: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the 'without project' situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. For a Category A project, the borrower is responsible for preparing a report, normally an Environmental Impact Assessment (EIA) (or a suitably comprehensive regional or sectoral EA) that includes, as necessary, elements of the other instruments referred to in paragraph 7 of Operational Policy 4.01.
- Category B: A Category B project has potential adverse environmental impacts on human populations or environmentally important areas - including wetlands, forests, grasslands, and other natural habitats - which are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects. The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A assessment. Like Category A, a Category B environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for

adverse impacts and improve environmental performance. The findings and results of EA for Category B projects are described in the project documentation (Project Appraisal Document and Project Information Document).Category C: likely to have minimal or no adverse environmental impacts and therefore do not require further EA action beyond screening.

- Category FI: projects where World Bank provides funds to participating national banks, credit institutions, and other financial intermediaries (FIs) for lending at the FIs' risk to final borrowers. In the case of such projects, the FI screens each subproject proposed for financing and classifies it into one of the three categories A, B, or C (WB 2012).

For all Category A and B projects, the borrower provides relevant material in a timely manner prior to consultation and in a form and language that are understandable and accessible to the groups being consulted. (OP 4.01, 14) (WB 2012)

World Bank classification differs from that of Bangladesh, in which projects are classified in Green, Orange-A, Orange-B and Red Categories. In the case of Orange-A, Orange-B and Red categories, the issuance of an Environmental Clearance Certificate (ECC) is needed as a requirement for applying to EIA. Therefore, although the overt classification used to screen the development projects exists, the EA procedure is relatively vague because it is conducted within the frame of ECC issuance. In case of discrepancies, World Bank uses its own Safeguard Policies to prepare the Environmental Assessment.

Table 8.1.1: Recent Projects with Environmental Assessment in Bangladesh

Project Name (ID)	Date of Approval	Description
Gas Infrastructure Development Project (P009533) http://www.worldbank.org/projects/P009533/gas-infrastructure-development-project?lang=en	May 09, 1995	Category A, EIA. The project represents the development of a new mainline 59 km pipeline right-of-way through flat agricultural land, development drilling in an existing producing field, and implementation of control and management systems.
Bangladesh Padma Multipurpose Bridge Project (P111017) http://www.worldbank.org/projects/P111017/bangl	Feb 24, 2011	Category A. The project consists of the construction of a bridge that provides direct links between two major seaports of the country. Draft Final EA, EMP and RAP for overall

adesh-padma-multipurpose-bridge-project?lang=en		project in December 2009. In view of the different requirements of the Government of Bangladesh (also referred to as GOB) and the co-financiers of the project, a harmonized environmental safeguard framework was developed to conduct the EIA.
Aquatic Biodiversity Conservation (P049587) http://www.worldbank.org/projects/P049587/aquatic-biodiversity-conservation?lang=en	Jul 20, 1999	Category B. This project faced a two-year delay due to additional studies to examine social and environmental impacts which required approval for a project extension. Despite the 18 months' extension, the project could not compensate for the initial delay, causing the community management processes put in place to be weaker than anticipated when they should take over operation, management and maintenance of structures. The anticipated extension activities to complement infrastructure development could not be implemented, which may have an impact on reaching the target for sustainable increase in production.

Source:http://www.worldbank.org/projects/search?lang=en&searchTerm=&countryshortname_exact=Bangladesh&src= (WB website, May 2012)

8.1.2 Current Condition and Problems Related to Implementation of Land Acquisition and Involuntary Resettlement

In cases where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits.

The Resettlement plan must include all the necessary measures to ensure that the displaced persons are:

- Informed about their options and rights pertaining to resettlement;

- Consulted and provided with technically and economically feasible resettlement alternatives; and
- Provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project (WB 2011a).

WB also emphasizes importance of conducting regular monitoring by an External Monitoring Agent to confirm:

- results of internal monitoring;
- that the compensation process has been accomplished adhering to procedures communicated to project-affected families and indigenous peoples during consultation;
- whether the resettlement entitlements were suitable to the objectives, whether the objectives were suited to the project-affected families, and if livelihood and standard of living were restored or enhanced;
- the affected enterprises received enough assistance to re-establish themselves;
- if vulnerable groups were provided with effective and sustainable income earning opportunities to help restore pre-project income levels (WB 2011a).

Resettlement planning includes early screening, scoping of key issues, the choice of resettlement instrument, and the information required to prepare the resettlement component or subcomponent. The scope and level of detail of the resettlement instruments vary with the magnitude and complexity of resettlement. In preparing the resettlement component, the borrower draws on appropriate social, technical, and legal expertise and on relevant community-based organisations and NGOs.

While World Bank prioritizes the avoidance of resettlement and promotes the research of alternative options, Bangladesh national policy focuses on mitigation of the effects of resettlement rather than trying to avoid it. World Bank only stipulates that compensation for loss of assets should be at replacement cost, while government policy in Bangladesh considers cash-based compensation for acquired assets with the impacts of loss of land, houses and the need for resettlement not being considered. Regarding supervision, currently there is no law or directive on the supervision of the land acquisition process by the Deputy Commissioner.

Currently the only legal framework that governs land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property Ordinance of 1982.Its provisions, however, are not adequate to address adverse impacts associated with land acquisition and involuntary

displacement and do not fully satisfy the requirements of the Bank's Operational Policy (OP 4.12) on involuntary resettlement or those of the international practices. In essence, the law is largely indifferent to the landowners' present socio-economic conditions, or the long-term adverse impacts on incomes and livelihood that the acquisition and displacement may cause on the affected people. Also, there are no other policies that complement the acquisition ordinance in assessment approaches, mitigation and monitoring of potential adverse impacts on the affected people. Some of the salient gaps in the existing legal framework are summarized below:

- Lack of Monitoring Activities - Avoiding/Minimizing Land Acquisition: The law only implicitly discourages unnecessary acquisition, as lands acquired for one purpose cannot be used for a different purpose, and lands that remain unused are returned to the original owners. However, there are no mechanisms to monitor if these conditions are actually adhered to:
- Eligibility for Compensation: It does not recognize the rights of those, such as squatters, who do not possess legal title to the lands they live in or make a living from. There is thus no provision to mitigate the adverse impacts they suffer.
- Lack of Recognition of People who are impacted through loss of income: The Land Acquisition Act provides for compensation for lands and other fixed assets built and grown on them (structures, trees and orchards, crops and any other developments like ponds, built amenities, etc.). However, there is no provision to assess the impacts on peoples' incomes, livelihood, loss of employment and businesses for mitigation measures to restore loss of incomes and livelihood.
- Compensation Standards: Although the law stipulates payment of compensation at 'market prices' for acquired lands as just compensation, the legal assessment procedures used almost always result in prices that are far below the actual market prices.
- Relocation of Displaced Persons: There is no provision in the existing laws for relocation of displaced families who are affected by the loss of their assets, i.e., land and/or structures.
- Ensuring Payment/Receipt of Compensation: The legal process to determine entitlements is too cumbersome and time-consuming, and it does not ensure payment of compensation prior to their displacement. Lands are legally acquired and handed over to the project execution agency as soon as the authority identifies the owners (or 'awardees'), by examining the records, and sends a legal notice advising them to claim the compensation (or 'awards'). The onus is left on the affected land owners to prove, by producing an array of documents, that the acquired lands legally belong to them. As gathering these documents is a long, expensive and cumbersome process, many landowners may be unable to claim

their awards. The project meanwhile has started to use the lands.

- Socio-economic Rehabilitation: The existing legal framework does not have any provisions to mitigate long-term impacts on peoples' livelihood caused by their displacement. Socioeconomic rehabilitation of the involuntarily displaced persons is absent in the legal regime of the country (WB 2010).

Table 8.1.2: World Bank Projects with Resettlement Plan in Bangladesh

Project name (ID)	Approval Date	Description
Chittagong Water Supply Improvement and Sanitation Project (P103999) http://www.worldbank.org/projects/P103999/chittagong-water-supply-improvement-sanitation-project?lang=en	Jun 23, 2010	The project aims to increase sustainable access to safe water and improved sanitation, as well as support the establishment of a long-term water supply, sanitation and drainage infrastructure development and operational management program in Chittagong. The Land Acquisition Ordinance of 1982 does not apply to the region. As with other projects in Bangladesh, a project specific Resettlement Policy Framework (RPF) was produced in order to address the inadequacy of the existing legal provisions and meet the requirements of the project funded by World Bank.
Integrated Agricultural Development Project (P123457) http://www.worldbank.org/projects/P123457/bangladesh-integrated-agricultural-development-project?lang=en	Aug 12, 2011	The main objective is to increase productivity of agricultural crops, livestock and aquaculture subsectors in the ecologically constrained and economically disadvantaged areas. Since the project area is inhabited mainly by poor, small and marginal farmers and farm women, and since they are its main target group, the project is expected to benefit them by enhancing employment opportunities and income, thus contributing to poverty reduction as well as improved food security and standard of living. The provisions of the acquisition law are significantly restrictive to meeting the requirements of World Bank OP 4.12. As such, the Resettlement Action Plan intended to bridge the Bank's OP 4.12 and the Acquisition and Requisition of Immovable

		Property Ordinance of 1982 of Bangladesh, amended in 1983 and 1994.
Clean Air and Sustainable Environment (P098151) http://www.worldbank.org/projects/P098151/clean-air-sustainable-environment-project?lang=en	May 12, 2009	The objective of the Clean Air and Sustainable Environment (CASE) Project for Bangladesh aims to catalyse adoption of sustainable environmental initiatives in urban transport and small-scale industries through demonstration initiatives. Negative impacts of the project include: acquired lands and other assets, homestead loss, loss of business, employment and rental income, and loss of employment income from displaced and temporarily closed businesses.

Source: WB. http://www.worldbank.org/projects/search?lang=en&searchTerm=&countryshortname_exact=Bangladesh&src= (Accessed on 24 May 2012).

Case Study: Third Road Rehabilitation & Maintenance (P037294)
Closing date: Dec 31, 2002

The project was cofounded by the British Department for International Development and implemented by the Roads and Highways Department of the Government of Bangladesh. Total project financing was $273 million U.S., and the project sought to reduce the total cost of road transportation on Bangladesh's most travelled roads by:

- Reducing "bottlenecks" by expanding and improving critical road links in the overall transport system, i.e., the Nalka-Hatikamrul-Bonpara (N-H-B) Road; rehabilitation of the Dhaka-Sylhet Road;
- Improvement of the Feeder Roads 'A' network (FRA), and the widening of critical narrow bridges on the national and regional road network in the Northwest and Southwest regions of the country;
- Improving the institutional capacity of the RHD in road maintenance and improved financial management;
- Improving road safety by developing the institutional capacity of the RHD to identify hazardous locations and to design and implement physical measures to reduce road accidents at these locations;
- Promoting private sector development (i.e. medium-size contractors) through contracting

out FRA road works now undertaken by smaller and less sophisticated contractors; and

- Wherever conditions permit, use of labour-intensive methods for road construction and maintenance to create employment and reduce poverty (WB 2006).

After carrying out the initial surveys, the necessity for land acquisition was identified, and resettlement was found to affect 32,310 households (including 18,200 land owners, 12,191 squatters, and 1,919 employees).

Major Factors Affecting Implementation and Resettlement Outcome (WB 2006)

The project faced some factors affecting the outcome both subject to government control and outside of government control, such as:

- There was a total of 124 days of general strikes (known as “hartels” in Bangladesh) during the period from September 1998 to February 2005, which had a significant effect on the civil works of the project, and some disruption to other project activities, such as meetings, delivery, transport, etc.
- The project faced difficulties in managing co-financed operations.

Implementation of the project experienced several delays caused by the inherent problems in the country's land administration system, and the procedures and practices in using the present Land Acquisition Ordinance, such as inconsistency and lack of uniformity in data management, improper procedures for determining market rates for structures and other assets, valuation of assets, and procedures for compensation payment. Additionally, in the Third Road Rehabilitation & Maintenance project, the two participating NGOs were inefficient in program and data management, and involved in questionable practices with the APs (WB 2006).

From this project, World Bank concludes that future Bank assistance should focus not only on infrastructure development, but also on improving the institutional framework and governance structure within which the road transport sector is managed and financed. This includes the recommendation to parallel reforms in the Government of Bangladesh’s public administration (WB 2006).

8.1.3 Current Condition and Problems Related to Considerations for Indigenous Peoples

In the WB's Safeguard Policies related to the considerations for indigenous peoples, the following procedures are stipulated:

- Screening by the Bank to identify whether indigenous peoples are present, or have a collective attachment to the project area;
- Social assessment by the borrower. The assessment should include baseline information on the demographic, social, cultural and political characteristics of the affected indigenous peoples' communities;
- Free, prior, and informed consultation with the affected indigenous peoples' communities at each stage of the project, and particularly during project preparation, to fully identify their views and ascertain their broad community support for the project;
- Preparation of an Indigenous Peoples Plan or an Indigenous Peoples Planning Framework; and

World Bank assumes the responsibility of disclosing the information to the public in accordance with World Bank Policy on Disclosure of Information, while the borrower should make it available to the affected indigenous peoples' communities in a culturally appropriate form, manner, and language.

Current Condition and Problems related to Considerations for Indigenous Peoples

Ethnic minority groups in Bangladesh have been excluded from social, political and economic framework of Bangladesh over the years, and the situation hampers the establishment of their social identity. There is no specification under Bangladesh national laws that consider the impact of projects on indigenous peoples; as a result, at the planning and implementation stages of development projects, the opportunity for minority leaders to participate in the discussion is limited.

Also, indigenous peoples and ethnic minority groups have weak political clout and have no means to defend basic rights of their own, since they have limited opportunity for policy planning and formulation to strengthen their own social position.

As a result, access to social infrastructure, such as education and health, is limited. Many of the peoples and groups suffer from poor nutrition and disease, and are forced to live in hygienically inferior environments (IMF 2005).

Table 8.1.3: World Bank Projects with Indigenous Peoples Plan in Bangladesh

Project Name (ID)	Approval Date	Description
Primary Education Development Project II (P074966) http://www.worldbank.org/projects/P074966/primary-education-development-project-ii?lang=en	24 Feb 2004	The expansion of primary education of indigenous children by developing appropriate strategies, actions and institutional arrangements for improving access of indigenous children to attaining quality primary education.The Government of Bangladesh does not have any specific policy for indigenous populations except Chittagong Hill Tracts (CHT), which is recognized as "Tribal Area" in the 1997 Peace Accord. For this project it was necessary to understand the social, cultural, economic and physical barriers affecting full access to education in order to develop a suitable framework to provide appropriate services to indigenous peoples in Bangladesh. At the end of the project in 2011, the goal was only partially achieved due to the lack of institutional experience and capacity, opportunities for special needs, indigenous and vulnerable children have not been created to the expected level. In order to address this, a third phase of the program (PEDPIII) which was approved in August 2011 will be launched.
Bangladesh Rural Water Supply and Sanitation Project (P122269) http://www.worldbank.org/projects/P122269/bangladesh-rural-water-supply-sanitation-project?lang=en	22 Mar 2012	This Social Management Framework (SMF) is proposed to deal with social safeguard issues that are likely to arise under the proposed Bangladesh Rural Water Supply and Sanitation Project (BRWSSP). The project is being prepared, and will be implemented, by the Department of Public Health Engineering DPHE under the Ministry of Local Government Rural Development & Cooperatives (LGRD&C) of Government Bangladesh (GOB). Starting in 2012, the activities under this multi-component project will be implemented over a five-year period across

		Bangladesh. This project will be implemented under the support of World Bank. The multi-component BRWSSP project aims to establish increased and sustainable provision of safe water supplies, in the rural areas of Bangladesh where the shallow aquifers are contaminated (for example, by arsenic, iron, salinity, and pathogens). To ensure hygiene sanitary practices of the targeted community is also an objective of the project.

Source: WB. http://www.worldbank.org/projects/search?lang=en&searchTerm=&countryshortname_exact=Bangladesh&src= (Accessed on 24 May 2012).

Case Study: Health Nutrition and Population Sector Program (P074841)

This project seeks to improve health and nutrition services to tribal groups in Bangladesh. The implementing agency is the Ministry of Health and Family Welfare (MOHFW) of Bangladesh, and financing came from the World Bank. The project will cover all indigenous groups in Bangladesh. Centrally administered projects/programmes were designed on a nationwide basis and provide HNP services across the country. Additional components, such as satellite clinics, EPI, family welfare outreach activities, and nutritional centres, were provided within the project's framework to improved service delivery. Whilst such an approach was useful in bringing services close to patients/consumers, the utilisation of these services remained low for reasons arising out of the behavioural characteristics of providers and users. The organic growth of services, in response to the perceived importance of certain issues, resulted in less attention to the quality of services, HRD, service equity, and sustainability. All these initiatives were part of broader plan, and at times, the plan varied from the ground-level reality, affecting HNP status. Difficult terrain, health facility location disadvantages, non-availability of service providers, lack of appropriate HRD policy to encourage/motivate service providers to work in remote areas, and weak monitoring and supervision systems were some of the barriers to access.

Indigenous peoples in Bangladesh have their own set of languages, social structures, cultures and economic activities. They are at varying levels of economic and educational development. They also live in sparsely populated and difficult to access terrains, such as forests and hilly regions. Any development activity or provision of services needs to take into account these

socio-cultural and economic, as well as spatial aspects. For HNP services to be effective in areas inhabited by indigenous groups or to provide HNP services to indigenous people, a concerted effort has to be made. A key issue is how to make HNP services socially and linguistically sensitive, so that ethnic groups, such as indigenous people, can access and utilize the services provided by the government.

Discussions with indigenous people, representatives of indigenous groups and experts reveal that they depend on native medicine men or tribal healers for health care services. Access to the nearest health facility, providers' attitudes, language difficulties, and health seeking behaviour of indigenous people largely limit the effective utilisation of HNP services. There is a general consensus to recognize the need to provide culturally and linguistically sensitive services in tribal areas.

For this project, the implementing agency decided that while the health and population programme will be implemented by government staff, nutrition programme implementation will receive support from NGOs contracted for this purpose. MOHFW hires these NGOs and monitors their activities. Additional support will be provided in the form of advocacy, behaviour change communications, and solving micronutrient deficiency problems.

Based on the review of available literature, one-on-one consultations and input from a stakeholders, the Indigenous Peoples' Plan was created with the following observations:

- There is low priority for obtaining ethnographic information, as it may be perceived as an academic exercise with little relevance; this information is relevant for designing culturally appropriate strategies for development programmes and other health services;
- Resources are required for undertaking the intensive exercise of identifying locations with no service or inadequate services;
- The indifferent and rude behaviour of staff affects utilisation of services and lack of adequacy of training institutes in tribal areas; and
- The importance of involvement of indigenous leaders (WB 2011b).

8.1.4 Confirmation System for Monitoring

WB has developed a monitoring and evaluation system for use during the project implementation as well as after completion of the project. At first, the WB task team will

conduct a mid-term monitoring review. During the course the review, the team's environmental and social considerations specialist periodically (at least twice in a year) visits the field to monitor.

The team verifies compliance with the conditions agreed upon between WB and the borrower, and the monitoring results done by the borrowers. World Bank also stipulates that the borrower reports on:

- Compliance with measures agreed with the Bank on the basis of the findings and results of the EA, including implementation of any EMP;
- The status of mitigatory measures;
- The findings of monitoring programs; and
- Measures set out in the legal agreements, any EMP, and other project documents.

There are significant gaps in the monitoring activity between WB policies and those of Bangladesh. This is mainly due to the fact that no stipulation of monitoring, either by the project proponent or the regulatory agencies, exists in Bangladesh.

8.1.5 Implementation of Information Disclosure during Project Formulation, Project Screening and Project Implementation

World Bank's Safeguard Policies state that, for meaningful consultations between the borrower, project-affected groups and local NGOs in all Category A and B projects, the borrower should provide relevant material in a timely manner prior to consultation and in a form and language understandable and accessible to the groups being consulted.

For a Category A project, the borrower provides a summary of the proposed project's objectives, description, and potential impacts for the initial consultation. In addition, for a Category A project, the borrower makes the draft EA report available at a public place accessible to project-affected groups and local NGOs. Any separate Category B report for a project proposed for IDA financing is made available to project-affected groups and local NGOs (WB 2012).

There are significant gaps between World Bank policies and those of Bangladesh regarding information disclosure, as no stipulation of monitoring the disclosure, either by the project proponent or the regulatory agencies, exists in Bangladesh.

The 1982 Ordinance requires a "notice" to be published at convenient places on or near the property in a prescribed form and manner, stating that the property is proposed to be acquired. GOB passed The Environment Court Act of 2000 (Act No. 11 of 2000) to allow for the making of appeals by the public on non-compliance with the ECA (1995) and ECR (1977).

8.2 Current Situation and Issues of Environmental and Social Considerations in the Projects by the ADB

8.2.1 Current Condition and Problems Related to Implementation of EIA

Asian Development Bank (ADB) Environmental Guidelines were updated in 2003 in order to address the following points:

- Incorporate the increasing expectations of environmental assessment that reflect the growing environmental concerns around the globe;
- Have a more transparent procedure for determining the environmental category;
- Formalize approaches for ADB's lending activities to financial intermediaries;
- Refine approaches to sector lending where the subprojects and specific locations may not be known in advance; and
- Strengthen requirements for environmental management plans.

In accordance with the assessed environmental impact by the project's potential environmental impacts, a project is categorized into:

- Category A-likely to have significant adverse environmental impacts and requires EIA.
- Category B- potentially adverse environmental impacts are less than those of category A. An initial environmental examination (IEE) is required to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the Initial Environmental Examination (IEE) is regarded as the final environmental assessment report (ADB 2003)IEE;
- Category C-does not require EIA or IEE, although environmental implications are still reviewed;
- Category FI - projects are classified as category FI if they involve a credit line through a financial intermediary or an equity investment in a financial intermediary.

Table 8.2.1: ADB Projects with Environmental Assessment in Bangladesh.

Project Name (ID)	Approved Date	Description
Padma Multipurpose Bridge Project (35049)	22 Sep 2005	ADB Category A, EIA. The aquatic environment in the Padma River is relatively undisturbed by human interference. The construction of a bridge takes into consideration disturbances of natural environmental conditions, notably the river's morphology and the floodplain's drainage conditions. (http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=35049&submit=Submit)
Chittagong Port Trade Facilitation Project (36105)	02 Jul 2003	ADB Category B, IEE. For this project, environmental considerations were built based on the project (3357 BAN) Oil Spill Impact and Response Management Program as well as the environmental issues identified by CPA, such as controlling pollution from shore-based sources and handling of hazardous material. (http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=36105&submit=Submit)
Road Maintenance and Improvement (33243)	29 Nov 2000	ADB Category A, EIA required. The principal objective of the project is to improve transport efficiency and thereby enable the country to more fully exploit its trade potential. (http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=33243&submit=Submit)
Gas Sector Development Program (38164)	16 Jul 2007	ADB Category B. Major environmental benefits expected; a switch to clean and affordable fuel will reduce the level of environmental pollution. (http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=38164&submit=Submit)

Source: ADB. http://www2.adb.org/Projects/summaries.asp (Accessed on 25 May 2012).

Case Study: Padma Multipurpose Bridge Project (35049- 01)
Approval date: 22 Sep 2005

The Padma Multipurpose Bridge Project, which will be implemented by The Government of Bangladesh through the Bangladesh Bridge Authority, will be build at the first fixed crossing of the Padma River. The bridge will be used for road traffic and will be comprised of a two-level steel truss composite bridge that is 6.15 km long. The top deck will accommodate a four-lane highway, and the lower deck will accommodate a single-track railway that will be added in the future. The bridge will have 12.0 km of approaching roads, 1.5 km on the Mawa side and 10.5 km on the Janjira side, and bridge-end facilities include toll plazas and service areas. The bridge will require river rerouting with dredging and bank protection work, 1.5 km of which will be on the Mawa side and 12 km of which will be on the Janjira side, to regulate river flow and prevent damage to the bridge structure.

The EIA study was based on secondary data from various published sources, the JICA report, the BCL report, and limited primary data collected through field monitoring. The alternative analysis was only conducted under the "with" and "without project" scenarios. The "without" project scenario showed that the only alternative to the bridge would be a ferry, which causes air, soil and noise pollution.

In order to conduct the Environmental Assessment of this project, ADB assigned individual consultants. A report was prepared in accordance with the relevant laws and regulations of the Government of Bangladesh and with the Environmental Policy of the ADB (2002) and Environmental Assessment Guidelines of ADB (2003).

A coordinated policy that included all financial institutions and Government of Bangladesh policies was prepared for this project. The framework required an Environmental Management Program to be presented for the pre-construction, construction and operational phases. It was to include construction safety and emergency preparedness plans to address gas leaks/explosions as well as spills due to accidents on the bridge. It also required compliance with the Canadian Environmental Assessment Agency's General Guidance for Practitioners Incorporating Climate Change Considerations in Environmental Assessment, which is not included in any of the individual safeguard policies.

As a result of the analysis, the EIA indicated that the project will have both negative and positive impacts. The main negative impacts included land acquisition of about 1,144 ha and resettlement of about 4,975 households, cutting around 201,273 trees and loss of 1,267 ha of aquatic habitats. It was determined that the key institutions for the successful implementation of the Environmental Management and Monitoring Plan (EMMP) of the project are the contractor, CSC, PIU and EU of BBA. Institutional strengthening and capacity building was proposed to enhance the implementation of the EMMP.

8.2.2 Implementation of Land Acquisition and Involuntary Resettlement

According to ADB, Category A and B projects may involve land acquisition, potentially resulting in adverse social impacts, including displacement of individuals and communities, under the following stipulations: the project proponent must avoid involuntary resettlement wherever possible and minimize involuntary resettlement by exploring and design alternatives. The borrower/client will conduct social impact assessments and set the cut-off date to identify the affected persons as well as any structures which will be affected. Based on the results, the Resettlement Plan is formulated and should include:

- Scope of land acquisition and resettlement;
- Objectives, policy framework, and entitlements: describe key national and local land, compensation and resettlement policies, laws, and guidelines that apply to project.
- Consultation and grievance redress participation;
- Compensation, relocation, and income restoration: describe arrangements for valuing and disbursing compensation, arrangements for housing relocation, including transfer and establishment, as well as income restoration measures to be implemented;
- Institutional framework;
- Resettlement budget and financing;
- Implementation schedule; and
- Monitoring and evaluation (ADB 1998).
- The monitoring and evaluation of projects according to ADB's policies should include:
- Budget and timeframe: whether the resources are being allocated on time and if land has been acquired and occupied in time for project implementation;
- Delivery of entitlements: whether all affected people (AP) received entitlements according to the numbers and categories of loss set out in the entitlement matrix; if all AP received payment on time, including compensation to business and wage earners affected by the project; and if relocation sites have been developed as per agreed standards;

- Consultation, grievances and special issues; and
- Livelihood development.

It can therefore be said that the confirmation methods of compensation by ADB are basically similar to that of World Bank. The independent or external monitoring agents employed by project proponents are tasked with the same assignments and submission of compliance monitoring reports. An independent land appraiser or a specialist in property appraisal is employed particularly to confirm the means of compensation and property valuation or land pricing.

Current Condition and Problems related to Implementation of Land Acquisition and Involuntary Resettlement

As previously mentioned, avoidance of resettlement is not given priority in Bangladesh, where policies focus on mitigating the effects of resettlement. Section 3 of the 1982 Ordinance requires notification only; no consultation with affected people is required. Minimizing the displacement of people as much as possible by exploring all viable design alternatives should also be promoted at a national policy level. Since the 1982 Ordinance falls short of the requirements of co-financiers' safeguard policies, including those of ADB, the project land acquisition and resettlement policy has been coordinated with co-financiers' safeguard requirements. This process was carried out using a gap analysis involving the 1982 Ordinance II and the co-financiers' safeguard policies and gap-filling measures.

In 2007, a draft National Policy on Resettlement and Rehabilitation (NPRR) was prepared under the Ministry of Land with the help of ADB technical assistance (TA). The NPRR is designed to address and mitigate adverse impacts by both Project and non-Project methods, i.e. river erosion and slum eviction, induced impacts and displacement, with provision for appropriate assistance and rehabilitation.

The NPRR is based on the premise that, in order to achieve overall socioeconomic development, it is imperative to safeguard the interest of those affected who cannot bear the risks and costs of national development. This policy is still in the process of evaluation and approval by the Government. As a result the 1982 Ordinance still applies to all cases of land acquisition and requisition throughout Bangladesh. One exception is that the Chittagong (Land Acquisition) Regulation of 1958 was applied to the Chittagong related project.

In the absence of an approved Government policy consistent with the ADB's recent 2009 safeguard policies, project-specific Land Acquisition and Resettlement Frameworks (LARF) are

prepared for projects overseen by ADB when needed. The LARFs will apply to all subprojects to be prepared and approved under the Project. This will ensure that APs impacted by land acquisition – whether it is owned land or occupied through formal or informal agreement or without any title or agreement – will be eligible for appropriate compensation that covers replacement value of their assets.

The LARF reflects the Government land acquisition laws/regulations as well as the ADB's recent Safeguard Policy Statement (SPS), which covers environmental, involuntary resettlement and IP polices.
The LARF stipulates eligibility and provisions for all types of losses, including land (and in this Project, IP Common Land), crops, trees, fisheries and fish ponds, structures, business, employment (workdays and wages) and social infrastructure.

Table 8.2.2: ADB Projects with Resettlement Plan in Bangladesh

Project Name (ID)	Approval Date	Description
Second Chittagong Hill Tracts Rural Development Project (42248) http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=42248&submit=Submit	14 Jul 2011	The project consists of the upgrade and improvement of 166 km of rural roads comprising 105 km of union (subdivision of an upazila [sub-district]) roads; 61 km of upazila roads; 3,884 meters of bridges and culverts; and extension of 3 functional buildings of Bandarban, Khagrachari, and Rangamati. Many of the laws that apply to the rest of the country, including the Code of Civil Procedure of 1908, the East Bengal State Acquisition and Tenancy Act of 1950, and the Land Acquisition Ordinance of 1982 do not apply to the region. Therefore, ADB prepared a project-specific land acquisition and resettlement framework to ensure that the project would meet with ADB's policies. The evaluation process determined that 12 people in 19 households, 6 businesses, and 3 community buildings were going to be affected. ADB conducted socioeconomic surveys and consultations, and all affected people expressed their willingness to relocate themselves.

Sustainable Rural Infrastructure Improvement (40515) http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=40515&submit=Submit	05 Nov 2009	This project is designed to reduce poverty and raise incomes in 21 districts of northwest and southwest Bangladesh, fostering economic growth, governance and gender equity by enhancing accessibility of the rural people to health and education and economic opportunities. Widening the access to markets and livelihood activity will result in improved earnings for the rural poor.
Khulna Water Supply Project (42171) http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=42171&submit=Submit	24 Nov 2009	The outcome of the project will be expanded access to water supply with improved service standards in Khulna. It is classified as category A for involuntary resettlement and category C for indigenous people in accordance with the ADB Safeguard Policy Statement. Properties to be acquired are primarily agricultural lands or lowland fishing ponds without residential structures.

Source: ADB. http://www2.adb.org/Projects/summaries.asp (Accessed on 25 May 2012).

The Acquisition and Requisition of Immovable Property Ordinance (Ordinance II of 1982) and its subsequent amendments in 1993 and 1994 provide the current legal framework in Bangladesh, but not all regions are covered by this Ordinance. It covers all cases of acquisition and requisition of immovable property (i.e. land, crops, built structures) for any public purpose or in the public interest. This Ordinance does not cover affected people without title or ownership records, such as uthulies (informal settlers/squatters/encroachers), or khas land cultivators. Further, in most of the cases the compensation paid does not constitute market or replacement value of the property acquired.

In the absence of an approved Government policy consistent with the ADB‘s recent 2009SPS, ADB has been producing project-specific land acquisition and resettlement frameworks (LARF) as a mechanism to bridge the gap with policies in Bangladesh. The LARF aims at ensuring that APs impacted by land acquisition – whether it is owned land or occupied through formal or informal agreement or without any title or agreement – will be eligible for appropriate compensation covering replacement value of their assets.

The LARF reflects the Government land acquisition laws/regulations as well as the ADB’s

Safeguard Policies. The LARF stipulates eligibility and provisions for all types of losses, including land, crops, trees, fisheries and fish ponds, structures, business, employment (workdays and wages) and social infrastructure.

Case Study: Road Network Improvement and Maintenance Project II (34415-012)
Approval Date: 20 Nov 2003

The Road Network Improvement and Maintenance Project-II (RNIMP-II), which was funded by ADB, was developed by the Government of Bangladesh in response to infrastructure improvement needs, to support the maintenance of the RHD road network, to upgrade the strategic regional roads and feeder roads in poor areas in the Northwest and Central North regions of Bangladesh, to provide better access to the border area of Banglabandh, and to eliminate some missing links in the main road network. The project will help the Government encourage poverty reduction through economic growth by improving transportation efficiency and strengthening integrated road networks. The agencies responsible for the project were: the Ministry of Women and Children Affairs, the Roads and Highways Department, and the Bangladesh Road Transport Authority.

Data generated through field survey revealed that 3,964 households/persons will be affected by the implementation of this road improvement project, which would involve about 20,138 people scattered over 6 segments of the project corridor.
The affected properties of 3964 households could be grouped into three broad categories: Homestead- 221, Shops (of various types) - 2,645 and others- 1,098. In short, the majority of the affected properties are small commercial units. In addition to these privately owned properties, about 229 common/community properties will be also affected. These are: Mosque (75), Temple (13), Madrasha (18), school (22), college (4) and some others. The number of affected structure is estimated to be 2,392 (taking Kacha, semi-pacca and pacca together) (ADB 2008).

ADB recognizes that attention to the social and environmental aspects of road projects has become increasingly important for their successful implementation.
In all projects, consultations with stakeholders are essential to identify possible adverse impacts and to develop land acquisition and resettlement plans, mitigate environmental impacts, and address gender dimensions of projects. A flexible resettlement plan prepared in full consultation with the stakeholders will avoid unnecessary delays encountered by recent road projects. Participatory assessments involving the poor are important tools to ensure that their needs are reflected in project formulation. In addition, adequate supervision, monitoring and reporting by

a competent independent agency are required.

8.2.3 Current Condition and Problems Related to Considerations for Indigenous Peoples

In its Safeguard Policy Statement (2009), ADB defines IPs as a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees: self-identification as members of a distinct indigenous cultural group and recognition of this identity by others; collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories; customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and a distinct language, often different from the official language of the country or region.

ADB's policy on indigenous peoples' states that, as socioeconomic development takes place, many development initiatives are extending into geographically remote areas, often considered the traditional homelands of indigenous peoples, which offer resources such as forests, minerals, and hydropower potential. Physical intrusions of developmental interventions into the traditional domains of indigenous peoples, and social intrusions into indigenous cultures, can be viewed by indigenous peoples and others as a violation of human rights, rights to land, and rights associated with the maintenance of culture.
ADB's policy on indigenous peoples ensures that ADB interventions are:

- Consistent with the needs and aspirations of affected indigenous peoples;
- Compatible in substance and structure with affected indigenous peoples' culture and social and economic institutions;
- Conceived, planned, and implemented with the informed participation of affected communities;
- Equitable in terms of development efforts and impacts; and
- Not imposing the negative effects of development on indigenous peoples without appropriate and acceptable compensation.

In line with the ADB policy on indigenous peoples, the Initial Social Assessment (ISA) conducted as part of the project design should include specific considerations for indigenous peoples as a potentially affected population. If the ISA identifies indigenous peoples specifically as a significantly and adversely affected population, or vulnerable to being so affected, an Indigenous People's Development Plan (IPDP) acceptable to ADB must be prepared by the

government or other project sponsors. The IPDP should include key elements such as specific measures to mitigate negative effects and provide necessary and appropriate assistance and compensation so that the circumstances of the affected peoples would be as favourable as would have existed before the intervention (ADB 2004).

If necessary, pertinent sections of the IPDP should be included in the environmental assessment report to complete the description of the physical environment, the potential impacts of the project, and the measures to mitigate, offset, or compensate for, adverse impacts. The IPDP will also confirm the social acceptability of the proposed project, as the Plan could not have been prepared without prior consultations with, and involvement of, the affected indigenous peoples. As previously mentioned, here is no specification under Bangladesh national laws, which differs with ADB policies that define specific policies when the project involves indigenous peoples' communities.

Table 8.2.3: ADB Projects with Indigenous Peoples Plan in Bangladesh.

Project Name (ID)	Approval Date	Description
Second Chittagong Hill Tracts Rural Development Project (42248) http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=42248&submit=Submit	14 Jul 2011	The Project impact will be increased rural household incomes in CHT subproject areas. The outcome of the Project will be increased employment and income generating opportunities in subproject areas. The CHT is inhabited by a variety of ethnic groups (the IPs) popularly known in Bangladesh as 'tribes.' Three major tribes are the Chakma, Marma and Tripura. They constitute more than 88 percent of the total number of IPs in the CHT.
Second Crop Diversification Project (40534) http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&t	30 Jun 2010	The project will foster commercialisation of agriculture through interventions to promote diversification into high-value crops (HVCs) and value addition, gender mainstreaming, and climate change adaptation. The project is market oriented and demand driven, and will increase farmers' incomes and enhance food security in Bangladesh. The Project considered since the initial stages that although

ype=&ctry=&query=40534&submit=Submit		no resettlement was required by the project, indigenous peoples doing sharecropping or cultivating their own land may be affected by the intervention, and therefore included them in the beneficiary groups to benefit them.
Primary Education Sector Development Program (42122) http://www2.adb.org/Projects/summaries.asp?mode=1&browse=1&type=&ctry=&query=42122&submit=Submit	05 Jul 2011	The Third Primary Education Development Project (PEDP III) is a follow-up to the on-going Second Primary Education Development Program (PEDP II), the first sub-sector wide approach (SWAp) in the education sector in Bangladesh. Together with eight other development partners (DPs) including World Bank, the Project will support the government's priorities of improving student learning outcomes and completion rates, and reducing disparities across all regions. The Government's program will focus on achieving key outputs level results and other implementation of policy and institutional changes that are essential to meet the Government's objective of providing quality education for all children The Third Primary Education Development Project will increase efforts to make education accessible to indigenous communities, as the second phase of the project partially achieved the original goals.

Source: ADB. http://www2.adb.org/Projects/summaries.asp (Accessed on 25 May 2012).

Case Study: Second Chittagong Hill Tracts Rural (ID:42248)
Approval date: 14 Jul 2011

The project, funded by ADB at a cost of $55 million U.S., consists of upgrading and improving 166 km of rural roads, comprising 105 km of union (a subdivision of an upazila [subdistrict]) roads, 61 km of upazila roads, 3,884 metres of bridges and culverts, and the extension of three functional buildings: Bandarban, Khagrachari, and Rangamati. Of the total proposed road length, 71 km of the roads are in Bandarban, 53 km in Rangamati, and 42 km in Khagrachariwas. These roads are designed to improve the lack of village access to local markets, which impedes the development and transformation of production. The outcomes of the project include increased employment and increased income-generating opportunities in subproject areas. The Ministry of Chittagong Hill Tracts Affairs Bangladesh is the executing agency.

This project followed ADB's Safeguard Policy Statement (2009), which defines IPs as 'a distinct, vulnerable, social, and cultural group possessing the following characteristics in varying degrees:

• Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;

• Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;

• Customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and

• A distinct language, different from the official language of the country or region."

The Indigenous Peoples Plan (IPP) outlines the principles and methodology to design and implement the Chittagong Hill Tracts Rural Development Project II (CHTRDP-II) in a way that fosters full respect for indigenous peoples' (IPs') identity, dignity, human rights, livelihood systems, and cultural uniqueness as defined by the IPs themselves so that they:

- Receive culturally appropriate social and economic benefits,
- Do not suffer adverse impacts as a result of projects, and
- Can participate actively in projects that affect them.

To bridge the gaps between Bangladesh national policies, an Indigenous Peoples Plan (IPP) was prepared by the project proponent. The IPP followed ADB safeguard components, resulting in four main components in the CHTRDP-II's IPP:

- Payment for IP Common Lands to usufruct and legal owners of land (through registration with Headmen) taken for the Project, in particular Upazila and Union, as well as Village Access (Category A and B) Roads, although small village infrastructure is also included, wherever land is required.
- Participatory Village Mapping (PVM) to delineate boundaries and major land use within villages along CHTRDP-II roads, backed up by a proactive Grievance Redress System to counteract land invasion occasioned by new and upgraded Upazila and Union roads. Such mapping will also be used for watershed management and for heightening village awareness of the need to keep village common forests intact.
- Ensuring prioritisation of IPs in view of their higher poverty status, and monitoring the need to provide targeted assistance to the Small IP Groups in the CHT who are by and large more vulnerable than the larger IP groups, in the event of disproportionate benefit allocation.
- Raising awareness among GOB officials working in the CHT (and in the central

administration in Dhaka) of IP issues, history, and customs.

8.2.4 Monitoring Procedure

Upon its reorganisation in 2002, ADB established arrangements for compliance by monitoring projects with its safeguard policies. With the support of the Environment and Social Safeguard Division, ADB's Chief Compliance Officer is responsible for advising management and operations departments on safeguard compliance and related operational procedures and guidelines. Compliance with safeguard policies is monitored throughout the project cycle. If a project poses risks of noncompliance, actions to ensure compliance are recommended at the Management Review Meeting, and project compliance is reviewed again at a Staff Review Committee meeting. Operations departments take steps to ensure that outstanding safeguard requirements are met before Board approval. As stated in the ADB Safeguard Policy Statement (SPS), ADB assumes the responsibility for conducting due diligence and for reviewing, monitoring, and supervising projects throughout the ADB's project cycle in conformity with the principles and requirements embodied in the SPS (ADB 2009). Likewise, ADB requires borrowers/clients to follow SPS Section57:

- Establish and maintain procedures to monitor the progress of implementation of safeguard plans;
- Verify compliance with safeguard measures and progress toward intended outcomes;
- Document and disclose monitoring results and identify necessary corrective and preventive actions in the periodic monitoring reports;
- Follow up on these actions to ensure progress toward the desired outcomes;
- Retain qualified and experienced external experts or qualified NGOs to verify monitoring information for projects with significant impacts and risks;
- Use independent advisory panels to monitor project implementation for highly complex and sensitive projects; and
- Submit periodic monitoring reports on safeguard measures as agreed with ADB.

In Bangladesh, the EIA issuance requires an Environmental Clearance Certificate which needs to be renewed every year or three years depending on the classification of the project. To renew it, monitoring and assessment are required. The DOE therefore has responsibility for follow-up and monitoring of ECC conditions. DOE makes the proponent compliance reports available to the public on its website. However, there is no formal mechanism or a programme at DOE that conducts an independent audit of approved projects.

8.2.5 Implementation of Information Disclosure during Project Formulation, Project Screening and Project Implementation

According to ADB's 2009 SPS, the borrower/client will submit to ADB the following documents for disclosure on ADB's website (ADB 2009):

- A full EIA draft (including the draft EMP) at least 120 days prior to ADB Board consideration, and/or environmental assessment and review frameworks before project appraisal, where applicable;
- The final EIA/IEE;
- A new or updated EIA/IEE and corrective action plan prepared during project implementation, if any; and
- Environmental monitoring reports.

ADB specifies that the borrower/client will provide relevant environmental information, including information from the documents, in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders.

For illiterate people, other suitable communication methods will be used. There are significant gaps between the ADB's policies and the Bangladesh policies that do not require information disclosure, let alone public hearing or public comment. The Environment Court Act of 2000 recognizes the public's right to appeal on non-compliance with the ECA (1995) and ECR (1977).

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Appendix

List of Tables

TABLE A-1

Major Acts and Ordicances Related to Envrionemental and Social Considerations in Bangladesh

No.	Law Name	Year
1. General		
(1)	The Environment Conservation Act	1995
(2)	The Environment Court Act	2000
(3)	The Environment Conservation Rules	1997
(4)	The Bangladesh Environmental Preservation Ordinance	1987
2. Pollution and Conservation		
(1)	The Smoke Nuisances Act	1905
3. Health		
(1)	The Fatal Accidents Act	1855
(2)	The Vaccination Act	1880
(3)	Prisons Act	1894
(4)	The Epidemic Diseases Act	1897
(5)	Lepers Act	1898
(6)	Lunacy Act	1912
(7)	Juvenile Smoking Act	1919
(8)	The Bengal Dentists Act	1939
(9)	The Drugs Act	1940
(10)	The Public Health (Emergency Provisions) Ordinance	1944
(11)	The Undesirable Advertisement Control Act	1952
(12)	The Prohibition of Smoking in Show-Houses Act	1952
(13)	The Eye Surgery (Restriction) Ordinance	1960
(14)	The Medical Qualifications (Information) Ordinance	1960
(15)	The Allopathic System (Prevention of Misuse) Ordinance	1962
(16)	The Indecent Advertisement Prohibition Act	1963
(17)	The Bangladesh College of Physicians and Surgeons Order	1972
(18)	The Bangladesh Malaria Eradication Board Order	1972
(19)	The Bidi Manufacture (Prohibition) Ordinance	1975
(20)	The Pharmacy Ordinance	1976
(21)	International Centre for Disrrhoea Diseases Research, Bangladesh Ordinance	1978
(22)	The Prevention of Malaria (Special Provision) Ordinance	1978
(23)	The Medical and Dental Council Act	1980
(24)	The Medical Practice and Private Clinics Laboratories (Regulation) Ordinance	1982
(25)	The Drugs (Control) Ordinance	1982
(26)	The Bangladesh Unani and Ayurvedic Practitioners Ordinance	1983
(27)	The Bangladesh Homeopathic Practitioners Ordinance	1983
4. Food and Consumer Protection		
(1)	Merchandise Marks Act	1889
(2)	The Medical Degrees Act	1916
(3)	The Agricultural Produce (Grading and Marking) Act	1937
(4)	The Imports and Exports Control Act	1950

(5)	The Pure Food Ordinance	1959
(6)	The Agricultural Produce Markets Regulation Act	1964
(7)	Customers Act	1969
(8)	The Essential Commodities (Storage, Keeping and Disposal) Order	1973
(9)	The Bangladesh Hotels and Restaurants Ordinance	1982
(10)	The Breast-milk Substitutes (Regulation of Marketing) Ordinance	1984
(11)	The Bangladesh Standards and Testing Institution Ordinance	1985
5. Occupational Rights and Safety		
(1)	The Bengal Mining Settlements Act	1912
(2)	The Workmen's Compensation Act	1923
(3)	The Dock Labourers Act	1934
(4)	The Employers Liability Act	1938
(5)	The Mines Maternity Benefit Act	1941
(6)	The Coal Mines Labour Welfare Fund Act	1947
(7)	The Maternity Benefit (Tea Estates) Act	1950
(8)	The Shops and Establishment Act	1965
(9)	The Control of Employment Ordinance	1965
(10)	The Factories Act	1965
(11)	Dock Workers' (Regulation of Employment) Act	1980
6. Public Safety and Dangerous Substances		
(1)	The Explosives Act	1884
(2)	The Explosives Substances Act	1908
(3)	The White Phosphorus Matches Prohibition Act	1913
(4)	The Poisons Act	1919
(5)	The Public Safety Ordinance	1953
(6)	The Dangerous Cargoes Act	1953
(7)	The Essential Commodities Act	1957
7. Displacement, Relief and Rehabilitation		
(1)	The Bengal Rural Poor and Unemployed Relief Act	1939
(2)	The Displaced Persons (Compensation and Rehabilitation) Act	1958
(3)	The Displaced Persons (Land Settlement) Act	1958
(4)	The Cattle (Prevention of Trespass) Ordinance	1959
8. Land Use, Administration and Management		
(1)	Transfer of Property Act	1882
(2)	The Mussalman Wakf Validating Act	1913
(3)	The Development Act	1935
(4)	The Non-agricultural Tenancy Act	1949
(5)	State Acquisition and Tenancy Act	1950
(6)	The Acquisition of Waste Land Act	1950
(7)	The Culturable Waste Land (Utilization) Ordinance	1959
(8)	The Bangladesh Land Holding Limitation Order	1972
(9)	The Acquisition and Requisition of Immovable Property Ordinance	1982
(10)	The Land Reforms Ordinance	1984

9. Agriculture and Agro-Chemicals		
(1)	The Canals Act	1864
(2)	The Irrigation Act	1876
(3)	The Destructive Insects and Pests Act	1914
(4)	The Agricultural and Sanitary Improvement Act	1920
(5)	The Tanks Improvement Act	1939
(6)	The Agricultural Development Corporation Ordinance	1961
(7)	The Agricultural Pests Ordinance	1962
(8)	The Agricultural Pesticides Ordinance	1971 (1983)
(9)	The Bangladesh Rice Research Institute Act	1973
(10)	The Jute Research Institute Act	1974
(11)	The Bangladesh Agricultural Research Institute Ordinance	1976
(12)	The Seeds Ordinance	1977
(13)	The Bangladesh Irrigation Water Rate Ordinance	1983
(14)	The Bangladesh Institute of Nuclear Agriculture Ordinance	1984
10. Water Resources		
(1)	The Embankment and Drainage Act	1952
(2)	Territorial Water and Maritime Zones Act	1974
(3)	The Territorial Water and Maritime Zones Rules	1977
(4)	The Ground Water Management Ordinace	1985
11. Fishery		
(1)	The Private Fisheries Protection Act	1889
(2)	The Protection and Conservation of Fish Act	1950
(3)	The Government Fisheries (Protection) Ordinance	1959
(4)	Bangladesh Fisheries Development Corporation Act	1973
(5)	The Fish and Fish Products (Inspection and Quality Control) Ordinance	1983
(6)	The Marine Fisheries Ordinance	1983
(7)	The Fisheries Research Institute Ordinance	1984
12. Forestry		
(1)	The Forest Act	1927
(2)	The Private Forests Ordinance	1959
(3)	The Forest Industries Development Corporation Ordinance	1959
(4)	The Attia Forest (Protection) Ordinance	1982
13. Wildlife and Domestic Animal		
(1)	The Cattle-Trespass Act	1871
(2)	The Live-stock Importation Act	1898
(3)	The Glanders and Fancy Act	1899
(4)	The Cruelty to Animals Act	1920
(5)	The Bengal Diseases of Animals Act	1944
(6)	The Animals Slaughter (Restriction) and Meat Control Act	1957
(7)	The Bangladesh Society of the Prevention of Cruelty to Animals Ordinance	1962
(8)	The Bangladesh Wild Life (Preservation) Order	1973

(9)	The Bangladesh Veterinary Practitioners Ordinance	1982
(10)	The Livestock Research Institute Ordinance	1984
14. Energy and Mineral Resources		
(1)	The Mines Act	1923
(2)	The Boilers Act	1923
(3)	The Petroleum Act	1934
(4)	The Bangladesh Water and Power Development Boards Order	1972
(5)	The Bangladesh Petroleum Act	1974
(6)	The Bangladesh Petroleum Corporation Ordinance	1976
(7)	The Bangladesh Oil, Gas and Mineral Corporation Ordinance	1985
15. Local Government Laws		
(1)	The Paurashave Ordinance	1977
(2)	The Chittagong City Corporation Ordinance	1982
(3)	The Dhaka City Corporation Ordinace	1983
(4)	The Local Government (Union Parishads) Ordinance	1983
(5)	The Khulna City Corporation Ordinance	1984
16. Rural and Urban Planning and Protection		
(1)	The Police Act	1861
(2)	The Places of Public Amusement Act	1933
(3)	The Building Construction Act	1952
(4)	The Town Improvement Act	1953
(5)	The Chittagong Development Authority Ordinance	1959
(6)	The Khulna Development Authority Ordinance	1961
(7)	The Rajshahi Town Development Authority Ordinance	1976
(8)	The Dhaka Metropolitan Police Ordinance	1976
(9)	The Chittagong Hill Tracts Development Board Ordinance	1976
(10)	The Rajshahi Division Development Board Ordinance	1976
(11)	The Chittagong Division Development Board Ordinance	1976
(12)	The Rural Electrification Board Ordinance	1977
(13)	The Chittagong Metropolitan Police Ordinance	1978
(14)	The Chittagong District Development Board Ordinance	1982
(15)	The Bangladesh Rural Development Board Ordinance	1982
(16)	The Comilla, Naakhale and Sylhet Districts Development Boards Ordinance	1982
(17)	The Khulna Metropolitan Police Ordinance	1985
17. Transportation and Safety		
(1)	The Obstructions in Fairways Act	1881
(2)	The Ferry Act	1885
(3)	The Railway Act	1890
(4)	The Ports Act	1908
(5)	The Highways Act	1925
(6)	The Vehicles Act	1927
(7)	The Inland Water Transport Authority Ordinance	1958
(8)	The Prevention of Interference with Aids to Navigable Water Ways Ordinance	1962

(9)	The Bangladesh Shipping Corporation Order	1972
(10)	The Bangladesh Inland Water Transport Corporation Order	1972
(11)	The Removal of Wrecks and Obstructions in Inland Navigable Water-ways Rules	1973
(12)	The Inland Shipping Ordinance	1976
(13)	The Chittagong Port Authority Ordinance	1976
(14)	The Mongla Port Authority Ordinance	1976
(15)	The Motor Vehicle Ordinance	1983
(16)	The Bangladesh Merchant Shipping Ordinance	1983
(17)	The Jamuna Multipurpose Bridge Authority Ordinance	1985
18. Cultural and Natural Heritage		
(1)	The National Archives Ordinance	1983
(2)	The Bangladesh Jatiya Jadughar Ordinance	1983
19. Vulnerable Group		
(1)	The Child Marriage Restraint Act	1929
(2)	The Suppression of Immoral Traffic Act	1933
(3)	The Children (Pledging of Labour) Act	1933
(4)	The Employment of Children Act	1938
(5)	The Bengal Vagracy Act	1943
(6)	The Children Act	1974
20. Miscellaneous		
(1)	The Penal Code	1860
(2)	The Code of Criminal Procedure	1898

TABLE A-2

Status of Bangladesh with Regard to Major International Conventions, Protocols and Treaties Related to the Envrionment

No.	International Conventions, Protocols and Treaties	Signature	Ratification (R) Acceptance (AT) Adherence (AD) Accession (AC) Approval (AP)	Entry into force
Environment Conservation				
1	International Plant Protection Convention (Rome, 1951)		1 Sep 1978 (AD)	
2	Plant Protection Agreement for the South East Asia and Pacific Region (as amended) (Rome, 1956)		4 Dec 1974 (AD)	
3	Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971)			21 Sep 1992
4	Protocol to Amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1982		21 May 1992 (AT)	21 Sep 1992
5	Amendments to Articles 6 and 7 of the Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1987		21 Sep 1992 (AC)	01 May 1994
6	Convention Concerning the Protection of the World Cultural and natural Heritage (Paris, 1972)		03 Nov 1983 03 Aug 1983 (AT)	
7	Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)	20 Nov 1981	20 Nov 1981 18 Feb 1982 (AC)	
8	United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (Paris, 1994)	14 Oct 1994	26 Jan 1996	26 Dec 1996
9	Convention on Biological Diversity (Rio De Janeiro, 1992)	05 Jun 1992	03 May 1994	
10	International Convention to Combat Desertification (Paris 1994)	21 Jun 1994		
11	Cartagena protocol on Biosafety to the Convention on Biological Diversity (Cartagena, 2000)	24 May 2000	05 Feb 2004	
12	Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)			01 Dec 2005

13	Convention on persistent Organic Pollutants (Stockholm, 2001)	23 May 2001	12 Mar 2007	
Nuclear				
1	Statute of the International Atomic Energy Agency, 1956	—	27 Sep 1972 (R)	27 Sep 1972
2	Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water (Moscow, 1963)		03 Nov 1985 (AC)	
3	Treaty on the Non-Proliferation of Nuclear Weapons, 1968	—	31 Aug 1979 (AC)	
4	Convention on Early Notification of a Nuclear Accident (Vienna, 1986.)	—	07 Jan 1988 (AC)	07 Feb 1988
5	Convention on Assistance in the Case of a Nuclear Accident of Radiological Emergency (Vienna, 1986.)	—	07 Jan 1988 (AC)	07 Feb 1988
6	Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea Bed and the Ocean Floor and in the Subsoil Thereof, 1971			18 May 1972
7	Convention on Nuclear Safety (Vienna, 1994.)	21 Sep 1995	21 Sep 1995 (AT)	24 Oct 1996
8	Comprehensive Nuclear Test-Ban Treaty, 1996	24 Oct 1996	8 Mar 2000 (R)	
Sea Pollution				
1	International Convention for the Prevention of Pollution of the Sea by Oil (London, 1954)			28 Dec 1981
2	United Nations Convention on the Law of the Sea (Montego Bay, 1982)	10 Dec 1982	27 Jul 2001	
Air Quality				
1	Vienna Convention for the Protection of the Ozone Layer (Vienna, 1985)		02 Aug 1990 (AC)	31 Oct 1990
2	Montreal Protocol on Substances that Deplete the ozone Layer (Montreal, 1987)		02 Aug 1990 (AC)	
3	Amendment to the Montreal Protocol on substances that Deplete the Ozone Layer (London, 1990)		18 Mar 1994 (R)	
4	Amendment to the Montreal protocol on Substances that Deplete the Ozone Layer (Copenhagen, 1992)		27 Nov 2000 (AT)	
5	Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer adopted by the Ninth Meeting of the Parties (Montreal, 1997)		27 Jul 2001 (AT)	
6	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (Beijing, 1999)		24 Aug 2010 (AC)	

7	United Nations Framework Convention on Climate Change (New York, 1992)	09 June 1992	15 April 1994	14 July 1994
8	Kyoto protocol to the United Nations Framework Convention on Climate Change (Kyoto, 2001)	—	22 October 2001 (AC)	16 February 2005
Solid Waste				
1	Basel Convention on the Control of Trans boundary Movements Wastes and Their Disposal (Basel, 1989)		01 Apr 1993 (AC)	
Genetically Modification				
1	International Treaty on Plant Genetic Resources for Food and Agriculture, 2001	17 Oct 2002	14 Nov 2003	
Weapons (except nuclear)				
1	Convention on the Prohibition of Military or Any Other Hostile Use of Modification Techniques (Geneva, 1976)		03 Oct 1979 (AC)	
2	Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Paris, 1993)	14 Jan 1993	25 Apr 1997 (R)	
Miscellaneous				
1	Treaty on Principles governing the Activities of States in the Exploration and use of outer Space Including the Moon and Other Celestial Bodies (London, Moscow, Washington, 1967)		17 Jan 1986 (AC)	

TABLE A-3

Bangladesh National Ambient Air Quality Standards vs. WHO Guideline Values

Pollutant (Unit)	Averaging Period	Bangladesh Standards	WHO Guidance Values
CO ($\mu g/m^3$)	8 hrs	10,000	10,000
	1 hr	40,000	30,000
Pb ($\mu g/m^3$)	1 yr	0.5	0.5
NO_x ($\mu g/m^3$)	1 yr	100	-
TSP ($\mu g/m^3$)	8 hrs	200	-
PM_{10} ($\mu g/m^3$)	1 yr	50	20
	24 hrs	150	50
PM_{25} ($\mu g/m^3$)	1 yr	15	10
	24 hour	65	25
O_3 ($\mu g/m^3$)	1 hr	235	-
	8 hrs	157	100
SO_2 ($\mu g/m^3$)	1 yr	80	-
	24 hour	365	20

Source: ADB and the Clean Air Initiative for Asian Cities (CAI-Asia) Center. 2006. *Bangladesh: Country Synthesis Report on Urban Air Quality Management (Discussion Draft).*

TABLE A-4

Bangladesh National Drinking Water Standards vs. WHO Guideline Values

No.	Parameter	Unit	Standard	WHO
01	Aluminium	mg/l	0.2	0.2 (A)
02	Ammonia	mg/l	0.5	0.06
03	Arsenic	mg/l	0.05	0.01 (P)
04	Barium	mg/l	0.01	0.07
05	Benzene	mg/l	0.01	0.01
06	$BOD_5$20°C	mg/l	0.2	
07	Boron	mg/l	1.0	0.5 (T)
08	Cadmium	mg/l	0.005	0.003
09	Calcium	mg/l	75	
10	Chloride	mg/l	150-600*	
11	Chlorinated alkanes	mg/l	0.01	
	carbontetrachloride	mg/l	0.001	
	1.1 dichloroethylene 1.2 dichloroethylene	mg/l	0.03	
	tetrachloroethylene	mg/l	0.03	
	trichloroethylene	mg/l	0.09	
12	Chlorinated phenols -pentachlorophenol	mg/l	0.03	0.02

	-2.4.6 trichloropehnol		0.03	0.02
13	Chlorine (residual)	mg/l	0.2	5
14	Chloroform	mg/l	0.09	0.3
15	Chromium (hexavalent)	mg/l	0.05	0.05 (P)
16	Chromium (total)	mg/l	0.05	0.05 (P)
17	COD	mg/l	4	
18	Coliform (fecal)	n/100 ml	0	
19	Coliform (total)	n/ 100 ml	0	
20	Color	Hazen	15	
21	Copper	mg/l	1	2.0
22	Cyanide	mg/l	0.1	0.07
23	Detergents	mg/l	0.2	
24	DO	mg/l	6	
25	Fluoride	mg/l	1	1.5
26	Hardness as ($CaCO_3$)	mg/l	200-500	300 (A)
27	Iron	mg/l	0.3-1.0	0.3 (A)
28	Kjeldhl Nitrogen	mg/l	1	
29	Lead	mg/l	0.05	0.01
30	Magnesium	mg/l	30-35	
31	Manganese	mg/l	0.1	0.4 (C)
32	Mercury	mg/l	0.001	0.006
33	Nickel	mg/l	0.1	0.07
34	Nitrate	mg/l	10	50 short term exposure
35	Nitrite	mg/l	<1	3 short term exposure
36	Odour	mg/l	Odorless	
37	Oil and grease	mg/l	0.01	
38	pH		6.5-8.5	6.5-8.5 (A)
39	Phenolic compounds	mg/l	0.002	
40	Phosphate	mg/l	6	
41	Phosphorus	mg/l	0	
42	Potassium	mg/l	12	
43	Radioactive materials (gross alpha activity)	Bq/l	0.01	0.5
44	Radioactive materials (gross beta activity)	Bq/l	0.1	1
45	Selenium	mg/l	0.01	
46	Silver	mg/l	0.02	
47	Sodium	mg/l	200	
48	Suspended particulate matters	mg/l	10	
49	Sulfide	mg/l	0	

50	Sulfate	mg/l	400	500 (A)
51	Total dissolved solids	mg/l	1000	600
52	Temperature	°C	20-30	
53	Tin	mg/l	2	
54	Turbidity	JTU	10	10
55	Zinc	mg/l	5	4.0 (A)

Notes: (A) Normal threshold value, no health based guideline in WHO Guidelines for Water Quality, 3rd Edition); (C) Concentration of the substrates at this level or below may affect taste or odour resulting in consumer complaints; (P) Provisional guideline, evidence of hazard exists but limited information on health effects are available.

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.; WHO. 2008. *Guidelines for Drinking-water Quality*, 3rd ed.

TABLE A-5

Standards for Gaseous Emission from Industries or Projects

No.	Parameters	Standard
1	Particulate	(mg/m^3)
	(a) Power plant with capacity of 200 Megawatt or above.	150
	(b) Power plant with capacity less than 200 Megawatt.	350
2	Chlorine	150
3	Hydrochloric acid vapour and mist	350
4	Total Fluoride F	25
5	Sulfuric acid mist	50
6	Lead particulate	10
7	Mercury particulate	0.2
8	Sulfur dioxide	Kg/ton acid
	(a) Sulfuric acid production (DCDA* process)	4
	(b) Sulfuric acid production (SCSA * process)	10
	* DCDA: Double Conversion Double Adsorption, SCSA: Single Conversion, Single Adsorption	
	Lowest height of stack for dispersion of sulphuric acid (in meter)	
	(a) Coal based power plant	
	(1) 500 Megawatt or above	
	(2) 200 to 500 Megawatt	275
	(3) Less than 200 Megawatt	220
	(b) Boiler	$14 (Q)^{0.3}$
	(1) Steam per hour up to 15 tons	
	(2) Steam per hour more than 15 tons	11
	Q= Emission of sulphur dioxide (kg/hour)	$14 (Q)^{0.3}$
9	Oxides of Nitrogen	
	(a) Nitric acid production	3 kg/ton acid
	(b) Gas Fuel based Power Plant	50 ppm

	(1) 500 Megawatt or above. (2) 200 to 500 Megawatt. (3) Below 200 Megawatt. (c) Metallurgical oven	50 ppm 40 ppm 30 ppm 200 ppm
10	Kiln soot and dust (a) Blast Furnace (b) Brick Kiln (c) Coke oven (d) Lime Kiln	Mg/Nm^3 500 1000 500 250

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.

TABLE A-6

Standards for Waste from Industrial Units or Projects

No.	Parameter	Unit	Places for Determination of Standards		
			Inland Surface water	Public Sewage system connected to treatment at 2nd stage	Irrigated Land
01	Ammonical Nitrogen (as elementary N)	mg/l	50	75	75
02	Ammonia (as free ammonia)	mg/l	5	5	15
03	Arsenic	mg/l	0.2	0.05	0.2
04	BOD_5 20°C	mg/l	50	250	100
05	Boron	mg/l	2	2	2
05	Cadmium	mg/l	0.50	0.05	0.05
06	Chloride	mg/l	600	600	600
07	Chromium	mg/l	0.5	1.0	1.0
09	COD	mg/l	200	400	400
10	Chromium (hexavalent Cr)	mg/l	0.1	1.0	1.0
11	Copper	mg/l	0.5	1.0	1.0
12	Dissolved Oxygen	mg/l	4.5-8	4.5-8	4.5-8
13	Electro-conductivity	micromho/ cm	1200	1200	1200
14	Total dissolved solids	mg/l	2,100	2,100	2,100
15	Fluoride	mg/l	2	15	10
16	Sulfide	mg/l	1	2	2
17	Iron	mg/l	2	2	2
18	Total Kjeldhal Nitrogen	mg/l	100	100	100
19	Lead	mg/l	0.1	1.0	0.1
20	Manganese	mg/l	5	5	5

21	Mercury	mg/l	0.01	0.01	0.01
22	Nickel	mg/l	1.0	2.0	1.0
23	Nitrate	mg/l	10.0	Not yet fixed	10
24	Oil and grease	mg/l	10	20	10
25	Phenolic Compounds (as C6H5OH)	mg/l	1.0	5	1
26	Dissolved Phosphorus	mg/l	8	8	15
27	Radioactive substance	mg/l	To be specified by Bangladesh Atomic Energy Commission		
28	pH	mg/l	6-9	6-9	6-9
29	Selenium	mg/l	0.05	0.05	0.05
30	Zinc	mg/l	5	10	10
31	Total Dissolved Solids	mg/l	2,100	2,100	2,100
32	Temperature	Centigrade	40	40	40
33	Suspended Solids (SS)	mg/l	150	500	200
34	Cyanide	mg/l	0.1	2.0	0.2

Notes:

1. The standards shall be applicable to all industries or projects other than those specified under the heading "Standards for sector wise industrial effluent or emission".
2. Compliance with these standards shall be ensured from the moment an industrial unit starts trial production, and in other cases, from the moment a project starts operation.
3. These standards shall be inviolable even in case of any sample collected instantly at any point of time. These standards may be enforced in a more stringent manner if considered necessary in view of the environmental conditions of a particular situation.

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.

TABLE A-7

Standard for Exhaust Gas from Vehicles

Parameter	Unit	Standard Limit
Black Smoke	Hartridge Smoke Unit (HSU)	65
Carbon Monoxide	gm/k.m.	24
	percent area	4
Hydrocarbon	gm/k.m.	2
	ppm	180
Oxides of Nitrogen	gm/k.m.	2
	ppm	600

Note: Measured at two third of maximum rotation speed

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.

TABLE A-8

Standards for Sewage

Parameter	Unit	Standard limit
BOD	milligram/l	40
Nitrate	milligram/l	250
Phosphate	milligram/l	35
Suspended Solids (SS)	milligram/l	100
Temperature	Centigrade degree	30
Coliform	Number per 100 ml	1000

Notes:

(1) This limit shall be applicable to discharge into surface and inland waters bodies.

(2) Sewage shall be chlorinated before final discharge.

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.

TABLE A-9

Standards for Sound

SI. No.	Category	Standards determined at dBa unit	
		Day	Night
a.	Silent zone	45	35
b.	Residential zone	50	40
c.	Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes)	60	50
	Commercial area	70	60
	Industrial area	75	70

Notes:

1. The time from 6 a.m. to 9 p.m. is counted as daytime.
2. The time from 9 p.m. to 6 a.m. is counted as nighttime.
3. Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/establishments identified/ to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.

TABLE A-10

Standards for Sound Originating from Motor and Mechanized Vessels

Category of Vehicles	Unit	Standard	Remarks
*Motor Vehicles (all types)	dBa	85	As measured at a distance of 7.5 meters from exhaust pipe.
		100	As measured at a distance of 0.5 meters from exhaust pipe.
Mechanized Motors	dBa	85	As measured at a distance of 7.5 meters from exhaust pipe.
		100	As measured at a distance of 0.5 meters from exhaust pipe.

Notes: At the time of taking measurement, the motor vehicle shall not be in motion and its engine conditions shall be as follows:

(a) Diesel engine- maximum rotating speed.

(b) Gasoline engine -at two thirds of its maximum rotating speed and without any loud.

(c) Motorcycle- if maximum rotating speed is above 5000 rpm; two thirds of the speed and if maximum rotating speed is less than 5000 rpm, three fourth of the speed.

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.

TABLE A-11

Standards for Odour

Parameter	Unit	Standard Limit
Acetaldehyde	ppm	0.5–5
Ammonia	ppm	1–5
Hydrogen Sulfide	ppm	0.02–0.2
Methyl Disulfide	ppm	0.009–0.1
Methyl Sulfide	ppm	0.01–0.2
Styrene	ppm	0.4–2.0
Trim ethylamine	ppm	0.005–0.07

Notes:

1. Following regulatory limit shall be generally applicable to emission/exhaust outlet pipe of above 5 meter height:
   Q= 0.108 x He2Cm (Where Q= Gas Emission rate Nm3/hour)
   He= height of exhaust outlet pipe
   Cm=above mentioned limit (ppm)
2. In cases where a special parameter has been mentioned, the lower limit shall be applicable for warning purposes, and the higher limit shall be applicable for prosecution purpose or punitive measure.

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.

TABLE A-12

Bio-Ecological Zones of Bangladesh

No.	Name	Description
1	Himalayan Piedmont Plain	The Himalayan Piedmont Plain occupies most of Dinajpur and parts of Jamalpur, Netrokona, Sherpur, Sunamganj and Sylhet district. The area is composed of numerous smooth but irregular-shaped ridges with broad and braided rivers. Being the ecotone between hill forests and low land swamps, ecologically this zone is very rich and diverse. Reeds and grasslands are the characteristic vegetation of this zone. Wildlife species of this zone is also diverse. Although the bird population, like that of mammals, has been affected by the disappearance of its natural habitats, there still exist a large number of birds in this zone.
2	Barind Tract	Barind Tract is located in the centre and western part of Rajshahi division. The greater part of the tract is almost plain and is crisscrossed by only a few minor rivers. This tract is considered an ecologically fragile ecosystem with extremely low vegetation cover. Though this zone was rich with faunal diversity in the past, it has now noticeably reduced mostly due to various pressures like expansion of human habitat, agricultural extension, unwise use of agrochemicals and illegal hunting.
3	Madhupur Sal Tract	The Madhupur Sal tract extends across the district of Gazipur, Tangail and Mymensingh. The boundary between this ecosystem and its surroundings are generally sharp and well defined. Undulating Sal forest is the main ecological feature of this zone. This region is enriched with high floral diversity, but unfortunately, over 70% of the Sal forest area is either already degraded or encroached. The Madhupur Sal tract is prominent by the presence of Sal (Shorea robusta) tree. Records show that the Bengal tiger and One-horned rhinoceros, both of which have become extinct from this zone now, had healthy population in the past. However, due to continuous habitat destruction most of the wildlife of this region are either extinct or in vulnerable condition.
4	Teesta floodplain	Teesta floodplain spreads over several different landscapes in greater Rangpur and the adjoining regions. The diversity results from the fact that the Teesta river had occupied and later abandoned several different channel during the last few thousand years including the valleys now are occupied by the Mahananda, Punarnava, Atrai, Choto Jamuna, Kortoya and Ghagat rivers. There were large patches of forests in this zone, but they have in most cases been ruthlessly cut down. However, this zone is still fairly wooded with many valuable indigenous timber species. Although most of the large mammals have been disappeared- form this area but most of common bird species are still found in this location.
5	Ganges Flood plain	The Ganges floodplain is basically consisted of the active floodplain of the Ganges River and the adjoining meandering floodplains, and is mostly situated in the Greater Jessore, Kustia, Faridpur and Barisal districts. This floodplains are comprises of ridges, basins and old channels. The Gangetic alluvium is readily distinguished from the old Brahmaputra, Jamuna and Meghna sediments by its high lime contents. Ganges channel is constantly shifting within its active floodplain, eroding and depositing large areas of new char lands in each flooding season, but it is less braided than that of the Brahmaputra-Jamuna. Both plants and animals are adapted with the pattern of flooding. The flood plains are characterized by mixed vegetation. Huge number of stagnant water bodies and channels, rivers and tributaries support a habitat of rich biodiversity. Free-floating aquatic vegetation is commonly shown in most of the wetlands. Both cultivated and wild plants species are found in homesteads forest. Major groups of the oriental birds are represented in this zone by many species. A large number of migratory birds are observed in winter. Different species of tortoises and turtles are found in perennial water bodies.

6	The Brahmaputra-Jamuna floodplain	The Brahmaputra floodplain situated in greater Mymensingh and Dhaka districts comprises the active channel of the Brahmaputra River and the adjoining areas of the young floodplain lands formed since about 1780, when the river shifted to its present course (i.e. the Jamuna River) to the south of Dewanganj in Jamalpur district. The main river course is strongly braided and consists of several interconnecting channels. This floodplain posses a unique variety of plants, medicinal herbs, fruit yielding trees, many jungle shrubs, creepers and climbers, flowering trees etc., many of which yield valuable products. Bushes of reeds and canes are also found here. The faunal diversity in this zone is also rich. Leopard was frequently sited in this zone. The most common poisonous snake is the Banded krait (Bungarus fascinatus) in this area, which could easily be identified by its broad black and yellow bands.
7	Surma-Kushiara floodplain	The Surma-Kushiara floodplain comprises of river draining from the Northeastern borders towards the Sylhet basin. The relief is generally smooth, comprising broad ridges and basins, but it is locally irregular alongside river channels. The zone is abounded with diverse wetlands, small and medium beels and channels, secondary rivers and huge seasonally inundated lands where locals do fishing in wet season and cultivate rice in dry season. There are patches of degraded swamp forest still exist remnant of its historic extent. Floral composition is interesting with numerous hydrophytes. The extensive network of the wetlands in this zone, especially in the winter, is inhabited by migratory waterfowl as numerous water birds, ducks, egrets and herons come to visit for wintering and breeding.
8	Meghna floodplain	A major part of the Meghna floodplain was created by the deposition of sediments brought in by the old Brahmaputra River, before it changed its course. The rest of the sediments were laid down principally by the Meghna River itself and by some minor rivers draining from Tiperrah hills. The floodplain is characterized by many broad meandering channels, char and low lying landscape and is mostly affected by seasonal flooding while river bank erosion is occurred commonly. The luxuriant growth of palm trees is the dominant characteristic feature of the vegetation type of this zone. The Betel nut “Supari” (Areca catechu) is most visible as the dominant species in the western portion of this region. This zone also abundance in several varieties of cane, a good deal of bamboo and thatching grass. Faunal diversity is richer in here than any other parts of the country. In mammalian species, different species of cats, bats, otters, pangolins, and raptorial birds are found.
9	The Haor basin	The haor basin is an internationally important wetland ecosystem, which is situated in Sumanganj, Habiganj, Sylhet, Kishorganj, Moulavibazar and Netrokona districts. It is a mosaic of wetlands habitats, including numerous rivers, streams and irregular canals. The Haor basin contains about 400 haors and beels in different sizes. These haors and beels provide habitats for various types of aquatic species of plants and animals. These haors and beels support major subsistence and commercial fisheries while the seasonally flooded lake margins support major rice-growing activities and abundant aquatic vegetation provides ideal grazing for domestic livestock and a source of fuel and fertilizers for the local inhabitants. The wetlands are also home to a wide variety of resident and migratory waterfowls including perhaps as many as 100,000 to 150,000 duck and provide a refuge to many other species of wildlife. Keeping in mind all these ecological benefits, The Tangua Haor which is located in this zone has been declared as a Ramsar site as well as Ecologically Critical Area (ECA). The Haor basin is the only region in Bangladesh where remnant patches of freshwater swamp and reed lands still exist. About 150 species of waterfowl have been recorded in this zone, but over 70 of these are now rare.
10	Chalan Beel	Chalan beel is an extensive low land area at the lower Atrai basin in the northwestern region of Bangladesh, spreads across the district of Nator, Pabna and Sirajganj. It consists of a series of beels connected to one another by various channels to form more or less a continuous water body

		during the rainy season. Although, the beel area expands into a vast water body, so long the Jamuna remains flooded during the monsoon months with dense aquatic vegetation, it however, dries out in the winter leaving only patches of 'water-holes" in the central part of this zone. Chalan beel is an ecologically diversified area due to its diversified physiological foundation. The fertile soils, less migration of nutrients from soils, abundance of moisture and climatic factors helped the area to provide good vegetation and dependant faunal composition. Biologically, the beel offers a vast variety of terrestrial, aquatic and marshy habitats, predominantly used by waterfowl. Chalan Beel was formerly an important wintering area for ducks, geese and shorebirds, but now that the wetland dries out in early winter, fewer migrant waterfowl visit the area.
11	Kaptai Lake	This is an artificial lake created by a dam, which was completed in 1962 and has since flooded over 68,800 ha of forest valleys and arable land in Chittagong and the Chittagong Hill Tracts (CHTs) districts. This wetland is surrounded by evergreen forests. However, the aquatic diversity of this lake is not well known. Aside from the immediate ecological damages such as inundating croplands, villages and forest, the lake that is created had far-reaching ecological consequences.
12	Gopalgonj-Khulna Peat Land	Gopalgonj-Khulna peat land is occupies a number of low-lying areas between the Ganges river flood plains and the Ganges tidal floodplains in the south of Faridpur region and the adjoining part of Khulna and Jessore districts. Thick deposits of peat occupy perennially wet basins but they are covered clay around the edges. The soil in this zone is potentially strong acidic and low in essential plant nutrients. Basins are deeply flooded by rainwater monsoon however in close to Khulna, water is brackish in some degrees. The floral diversity in this zone is quite limited. Due to lack of diversity in vegetation, the variety in faunal species and there population size in this zone are also less than enviable (Brammer, 2000), of which, the diversity of bird species is relatively better in this zone (Rashid, 1980).
13	The Sundarbanss	The Sundarbans mangrove forest is situated in the southwest of Bangladesh and extends from the international boundary with India. Sundarbans is the world's largest Mangrove forest consist of about 330 species of plants, 42 species of mammals, 35 species of reptiles, 400 species of fishes and 270 species of birds. Salinity and provide a different type of ecosystem (Mangrove ecosystem) in this region. Plants and wildlife species tidal effect distribution is depend on the salinity. The Sundarbans are divided in 3 ecological zones on different degrees of salinity. These are (1.) Oligohaline, (2.) Mesohaline and 3. Polyhaline zone.
14	Chakaria Sundarbanss	The Chakaria Sundarbanss was used to be a mosaic of newly formed grassy islands, river channels, tidal creeks, aquaculture ponds, mangrove forests and intertidal mudflats, located in the estuarine system of Matamuhuri and several other minor rivers. Unfortunately, most of this ecosystem has been destroyed and cleared for shrimp culture.
15	The coastal plains	The coastal plains are underlain by heavy marine or tidal clays but these have been buried under by more sand or silty deposits near the foot of the hills and along the courses of rivers and streams, which run across the plains. The eastern coastline, extending from the mouth of the Feni river to the southern tip of mainland along Chittagong, is regular and unbroken and protected along the sea by mud-flats and submerged sands. This zone is important for a wide variety of waterfowls.
16	Offshore islands	This zone covers numerous offshore islands, including Hatiya, Bhola, Nhijhum dweep etc. Shapes of most of these islands are continuously changing as a result of erosion and accretion. Moreover, there are extensive inter- tidal mudflats composing parts of the islands. The vast amount of sediments brought down by Meghna made the estuary shallow for a considerable distance. Most of these islands have man made

		mangrove plantations. The islands of this zone are very important staging and wintering areas for a wide variety of waterfowls, particularly the migratory shorebirds.
17	Narikel Jinjira coral island	The southern-most tip of Bangladesh, the Narikel Jinjira coral associated island is separated from the mainland by "Naaf estuary". There are two well-defined lagoons in this island and some 200 fresh water ditches. There is some stunted Mangrove forest in the south-west of the island while the sand dunes support an extensive growth of some herbs and shrubs. All five species of marine turtles known to occur in Bangladesh have been observed in this area, among them the first three species are known to nest in the area.
18	Meghna estuarine floodplains	A huge newly accreted mudflat is the main physiographic feature of the Meghna estuarine floodplains, which is situated at the southern part of the Southeast region. Deposition and erosion are constantly taking place on the land margins. In many places during the dry season, part of the zone and surface becomes saline in varying degrees. Urighash (Portaresia coarctata) is the pioneer plant species in the new land formation whereas the luxuriant growths of Palms are the dominant. All the accreted inter-tidal lands are important wintering grounds for migratory waterfowls.
19	Sandy beach/Sand dunes	The main feature of this zone is the continuous line of sandy beaches and sand dunes, backed in places by narrow coastal plains, and bounded almost throughout by hills. Vegetation cover is relatively less diverse and consists primarily of dopati lata (Ipomoea pescaprae) and nil nishinda (Vitex trifolia). This zone is very important for marine turtle and snakes, in particular a large number of marine turtle use this beach area as their breeding habitat.
20	Chittagong Hills and the CHTs	The south-eastern hill range of the country is composed of tropical evergreen and semi- evergreen forest, which are important watershed areas of the country. The majority of the species in the lower canopy are evergreen, and the upper canopy of the forest is deciduous type. Tropical evergreen forest is found in the valleys of this zone. Knowledge on the diversity of reptiles and amphibians of this zone is rather rudimentary, as few surveys of these animals have been made. This zone posses richest avifauna population of the country mostly marine and shore birds.
21	Sylhet hills	The Sylhet hilly tracts could be remnants of Pleistocene terraces with small hillocks are locally known as "Tilla". Tropical evergreen forest is found in this zone particularly in the valleys. This zone is still relatively rich with faunal diversity. The region is popular among bird watchers due to its rich bird diversity.
22	The Lalmai-Tipperah hills	The Lalmai-Tipperah hills laying the eastern border of South-East region constitutes a distinct physiographic unit enjoys tropical semi-evergreen forests. The principal floral characteristic of this zone is present a large proportion of deciduous species. The diversity of bird and mammal species is still considerably high but these species are increasingly under threat of extinction due to unhindered loss of habitats. The zone faces flash flood in rainy season.
23	The saline tidal floodplain	The saline tidal floodplain has a transitional physiography, which is located at the south portion of Southwest and South central region. It has a low ridge and basin relief, crossed by innumerable tidal rivers and creeks. Soils are the non-saline throughout the over substantial amount of areas in the north and east but they become saline to various degrees in the dry season in the south-west and are saline for much of they ear in the Sundarbanss. The river carries fresh water throughout the year to the east and north-east, but saline water penetrates increasingly further inland towards the west of the floral diversity, this zone has innumerable indigenous weeds grow in beel areas. Several types of palms and bamboo clumps grow in almost all the villages. This zone affords a very lucrative place for game birds include goose, duck, cranes, spine,

		jungle fowls etc. in both Sundarbanss and the beels and char areas. Moreover, the river network and expanses of beels are abound with different species of fishes.
24	Major Rivers	Bangladesh consists mainly of riverine and deltaic deposits of three large and extremely dynamic rivers entering the country: the Brahmaputra, Ganges and Meghna rivers. Newly accreted land, if it does not erode quickly, is initially colonized by grass, particularly catkin grass (Saccharum spontaneum, for example). Dense growth of catkin grass can accelerate silt deposition on chars. Jamuna river provide highest amount of char lands. Many of the species' natural distribution, migration and storage are primarily functioned via these rivers into other wetland ecosystems (GoB-IUCN, 1992). A diverse range of water fowls are directly or ecologically dependent on these rivers and its associated ecosystems. However, it is quit alarming that, with the exception of few species of turtles, all other river biodiversity is threatened with extinction.
25	Coastal Marine Water	There is over 25 million acres of marine area, which comprise the territorial waters and the Exclusive Economic Zone (EEZ) of Bangladesh. A large area in the south, therefore, is the coastal zone, which has its own dynamics and deserves special attention as a very distinct terrain (GoB, 1994). The coastal area, comprising the complex delta of the Ganges-Brahmaputra-Meghna river system has immense biological resources. Information on the status of the biological wealth, both in terms of flora and fauna, is very rudimentary this zone.

Source: DoE and MoEF. 2010. *Fourth National Report (Biodiversity National Assessment Programme of Action 2020)*.

TABLE A-13
IUCN Categories

EXTINCT (EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
EXTINCT IN THE WILD (EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
CRITICALLY ENDANGERED (CR)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see another table below), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
ENDANGERED (EN)	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see another table below), and it is therefore considered to be facing a very high risk of extinction in the wild.
VULNERABLE (VU)	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see another table below), and it is therefore considered to be facing a high risk of extinction in the wild.

Source: IUCN. 2001. *IUCN Red List Categories and Criteria: Version 3.1*.

TABLE A-14
Criteria for Critically Endangered, Endangered and Vulnerable

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild: A. Reduction in population size based on any of the following: 1. An observed, estimated, inferred or suspected population size reduction of ≥90% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following: (a) direct observation (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites. 2. An observed, estimated, inferred or suspected population size reduction of ≥80% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥80% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km2, and estimates indicating at least two of (a)–(c):

(a) Severely fragmented or known to exist at only a single location.

(b) Continuing decline, observed, inferred or projected, in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) area, extent and/or quality of habitat

(iv) number of locations or subpopulations

(v) number of mature individuals.

(c) Extreme fluctuations in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) number of locations or subpopulations

(iv) number of mature individuals.

2. Area of occupancy estimated to be less than 10 km2, and estimates indicating at least two of (a)–(c):

(a) Severely fragmented or known to exist at only a single location.

(b) Continuing decline, observed, inferred or projected, in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) area, extent and/or quality of habitat

(iv) number of locations or subpopulations

(v) number of mature individuals.

(c) Extreme fluctuations in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) number of locations or subpopulations

(iv) number of mature individuals.

C. Population size estimated to number fewer than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a)–(b):

(a) Population structure in the form of one of the following:

(i) no subpopulation estimated to contain more than 50 mature individuals, OR

(ii) at least 90% of mature individuals in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a very high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥70% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

(a) direct observation

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥50%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥50% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5000 km2, and estimates indicating at least two of (a)–(c):

   (a) Severely fragmented or known to exist at no more than five locations.

   (b) Continuing decline, observed, inferred or projected, in any of the following:

      (i) extent of occurrence

      (ii) area of occupancy

      (iii) area, extent and/or quality of habitat

      (iv) number of locations or subpopulations

      (v) number of mature individuals.

   (c) Extreme fluctuations in any of the following:

      (i) extent of occurrence

      (ii) area of occupancy

      (iii) number of locations or subpopulations

      (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 500 km^2, and estimates indicating at least two of (a)–(c):

   (a) Severely fragmented or known to exist at no more than five locations.

   (b) Continuing decline, observed, inferred or projected, in any of the following:

      (i) extent of occurrence

      (ii) area of occupancy

      (iii) area, extent and/or quality of habitat

      (iv) number of locations or subpopulations

      (v) number of mature individuals.

   (c) Extreme fluctuations in any of the following:

      (i) extent of occurrence

      (ii) area of occupancy

      (iii) number of locations or subpopulations

      (iv) number of mature individuals.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a)–(b):

   (a) Population structure in the form of one of the following:

      (i) no subpopulation estimated to contain more than 250 mature individuals, OR

(ii) at least 95% of mature individuals in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

(a) direct observation

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥30%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 20,000 km2, and estimates indicating at least two of (a)–(c):

(a) Severely fragmented or known to exist at no more than 10 locations.

(b) Continuing decline, observed, inferred or projected, in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) area, extent and/or quality of habitat

(iv) number of locations or subpopulations

(v) number of mature individuals.

(c) Extreme fluctuations in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) number of locations or subpopulations

(iv) number of mature individuals.

2. Area of occupancy estimated to be less than 2000 km2, and estimates indicating at least two of (a)–(c):

(a) Severely fragmented or known to exist at no more than 10 locations.

(b) Continuing decline, observed, inferred or projected, in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) area, extent and/or quality of habitat

(iv) number of locations or subpopulations

(v) number of mature individuals.

(c) Extreme fluctuations in any of the following:

(i) extent of occurrence

(ii) area of occupancy

(iii) number of locations or subpopulations

(iv) number of mature individuals.

C. Population size estimated to number fewer than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a)–(b):

(a) Population structure in the form of one of the following:

(i) no subpopulation estimated to contain more than 1000 mature individuals, OR

(ii) all mature individuals are in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

D. Population very small or restricted in the form of either of the following:

1. Population size estimated to number fewer than 1000 mature individuals.

2. Population with a very restricted area of occupancy (typically less than 20 km2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

Source: IUCN. 2001. IUCN Red List Categories and Criteria version 3.1. http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria#critical (Accessed on 10 May 2012).

IUCN Categories

EXTINCT (EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
EXTINCT IN THE WILD (EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
CRITICALLY ENDANGERED (CR)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see another table below), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
ENDANGERED (EN)	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see another table below), and it is therefore considered to be facing a very high risk of extinction in the wild.
VULNERABLE (VU)	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see another table below), and it is therefore considered to be facing a high risk of extinction in the wild.

Source: IUCN. 2001. *IUCN Red List Categories and Criteria: Version 3.1*.

TABLE A-15

IUCN Red List of Bangladesh

Scientific Name	Status
Macaca arctides	VU
Melursus ursinus	VU
Dicerorhinus sumatrensis	CR
Rhinoceros sondaicus	CR
Rhinoceros unicornis	VU
Bos gaurus	VU
Bos javanicus	EN
Bubalus arnee	EN
Rucervus duvaucelii	VU
Francolinus gularis	VU
Pavo muticus	EN
Cairina scutulata	EN
Rhodonessa caryophyllacea	CR
Houbaropsis bengalensis	CR
Sypheotides indicus	EN
Grus antigone	VU
Sarcogyps calvus	CR
Pelecanus philippensis	NT
Prinia burnesii	NT
Chaetornis striatua	VU
Paradoxornis flavirostris	VU
Elachistodon westermann	DD
Crocodylus palustris	VU

Source: DoE and MoEF. 2010. *Fourth National Report to the Convention on Biological Diversity*.

TABLE A-16

CITES-Listed Animals and Plants in Bangladesh

ANIMALS (APPENDIX I)

#	Phylum	Class	Order	Family	Scientific Name
01	CHORDATA	MAMMALIA	PRIMATES	LORISIDAE	*Nycticebus bengalensis (Lacépède, 1800)*
02				CERCOPITHECIDAE	*Semnopithecus entellus* (Dufresne, 1797)
03					*Trachypithecus pileatus* (Blyth, 1843)
04				HYLOBATIDAE	*Bunopithecus hoolock* (Harlan, 1834)
05			LAGOMORPHA	LEPORIDAE	*Caprolagus hispidus* (Pearson, 1839)
06			CETACEA	PLATANISTIDAE	*Platanista gangetica* (Roxburgh, 1801)
07				DELPHINIDAE	*Orcaella brevirostris* (Owen in Gray, 1866)
08					*Sousa chinensis* (Osbeck, 1765)
09			CARNIVORA	CANIDAE	*Canis lupus* (Linnaeus, 1758)
10					*Canis lupus* (Linnaeus, 1758) ssp. *pallipes* (Sykes, 1831)
11				URSIDAE	*Helarctos malayanus* (Raffles, 1821)
12					*Melursus ursinus* (Shaw, 1791)
13					*Ursus thibetanus* (G. Cuvier, 1823)
14				FELIDAE	*Catopuma temminckii* (Vigors & Horsfield, 1827)
15					*Neofelis nebulosa* (Griffith, 1821)
16					*Panthera pardus* (Linnaeus, 1758)
17					*Panthera tigris* (Linnaeus, 1758)
18					*Pardofelis marmorata* (Martin, 1837)
19					*Prionailurus bengalensis* (Kerr, 1792)
20					*Prionailurus bengalensis* (Kerr, 1792) ssp. *bengalensis* (Kerr, 1792)
21			PERISSODACTYLA	RHINOCEROTIDAE	*Dicerorhinus sumatrensis* (G. Fischer, 1814)
22					*Rhinoceros sondaicus* (Desmarest, 1822)
23					*Rhinoceros unicornis* (Linnaeus, 1758)

24			ARTIODACTYLA	SUIDAE	*Sus salvanius* (Hodgson, 1847)
25				CERVIDAE	*Axis porcinus* (Zimmermann, 1780)
26					*Rucervus duvaucelii* (G. Cuvier, 1823)
27				BOVIDAE	*Bos gaurus* (C. H. Smith, 1827)
28					*Capricornis thar* (Hodgson, 1831)
29		AVES	CICONIIFORMES	CICONIIDAE	*Ciconia boyciana* (Swinhoe, 1873)
30			ANSERIFORMES	ANATIDAE	*Asarcornis scutulata* (S. Müller, 1842)
31			GRUIFORMES	OTIDIDAE	*Houbaropsis bengalensis* (Gmelin, 1789)
32			CHARADRIIFORMES	SCOLOPACIDAE	*Tringa guttifer* (Nordmann, 1835)
33			CORACIIFORMES	BUCEROTIDAE	*Aceros nipalensis* (Hodgson, 1829)
34					*Buceros bicornis* (Linnaeus, 1758)
35		REPTILIA	TESTUDINES	CHELONIIDAE	*Caretta caretta* (Linnaeus, 1758)
36			CROCODYLIA	GAVIALIDAE	*Gavialis gangeticus* (Gmelin, 1789)
37			SERPENTES	PYTHONIDAE	*Python molurus* (Linnaeus, 1758)
38		ELASMOBRANCHII	PRISTIFORMES	PRISTIDAE	*Anoxypristis cuspidata* (Latham, 1794)
39					*Pristis pectinata* (Latham, 1794)

Animals (APPENDIX I/r)

#	Phylum	Class	Order	Family	Scientific Name
1.	CHORDATA	MAMMALIA	MAMMALIA	DELPHINIDAE	*Orcaella brevirostris* (Owen in Gray, 1866)
2.				BALAENOPTERIDAE	*Balaenoptera acutorostrata* (Lacépède, 1804)
3.					*Balaenoptera musculus* (Linnaeus, 1758)
4.					*Balaenoptera physalus* (Linnaeus, 1758)
5.					*Megaptera novaeangliae* (Borowski, 1781)
6.			SIRENIA	DUGONGIDAE	*Dugong dugon* (P. L. S. Müller, 1776)
7.		AVES	FALCONIFORMES	ACCIPITRIDAE	*Aquila heliaca* (Savigny, 1809)
8.				FALCONIDAE	*Falco jugger* (Gray, 1834)
9.					*Falco peregrinus* (Tunstall, 1771)
10.		REPTILIA	TESTUDINES	CHELONIIDAE	*Chelonia mydas* (Linnaeus, 1758)
11.					*Eretmochelys imbricata* (Linnaeus, 1766)
12.			CROCODYLIA	CROCODYLIDAE	*Crocodylus porosus* (Schneider, 1801)

Animals (APPENDIX I/w)

#	Phylum	Class	Order	Family	Scientific Name
1.	CHORDATA	MAMMALIA	CETACEA	PHOCOENIDAE	*Neophocaena phocaenoides* (G. Cuvier, 1829)
2.				BALAENOPTERIDAE	*Balaenoptera edeni* (Anderson, 1879)
3.			CARNIVORA	MUSTELIDAE	*Lutra lutra* (Linnaeus, 1758)
4.			PROBOSCIDEA	ELEPHANTIDAE	*Elephas maximus* (Linnaeus, 1758)
5.		AVES	PELECANIFORMES	PELECANIDAE	*Pelecanus crispus* (Bruch, 1832)
6.		REPTILIA	TESTUDINES	GEOEMYDIDAE	*Batagur baska* (Gray, 1831)
7.					*Geoclemys hamiltonii* (Gray, 1831)
8.					*Melanochelys tricarinata* (Blyth, 1856)
9.					*Pangshura tecta* (Gray, 1831)
10.				CHELONIIDAE	*Lepidochelys olivacea* (Eschscholtz, 1829)
11.				TRIONYCHIDAE	*Aspideretes gangeticus* (Cuvier, 1825)
12.					*Aspideretes hurum* (Gray, 1831)
13.					*Aspideretes nigricans* (Anderson, 1875)
14.			CROCODYLIA	CROCODYLIDAE	*Crocodylus palustris* (Lesson, 1831)
15.			SAURIA	VARANIDAE	*Varanus bengalensis* (Daudin, 1802)
16.					*Varanus flavescens* (Hardwicke & Gray, 1827)
17.			SERPENTES	PYTHONIDAE	*Python molurus* (Linnaeus, 1758) ssp. *molurus* (Linnaeus, 1758)

Plants

#	Phylum	Class	Order	Family	Scientific Name
1.			ORCHIDALES	ORCHIDACEAE	*Paphiopedilum insigne* (W.Wall ex Lindl.) Pfitzer
2.					*Paphiopedilum venustum* (Wall. ex Sims) Pfitzer ex Stein

Source: CITES. http://www.cites.org/eng/resources/species.html

TABLE A-17

CMS-Listed Animals in Bangladesh

No.	Appendix	Class	Order	Family	Taxon and any Qualification
1.	I	Mammalia	Cetacea	Balaenopteridae	*Balaenoptera musculus*
2.	I	Mammalia	Cetacea	Balaenopteridae	*Megaptera novaeangliae*
3.	I	Reptilia	Crocodylia	Gavialidae	*Gavialis gangeticus*
4.	I/II	Mammalia	Cetacea	Platanistidae	*Platanista gangetica gangetica*
5.	I/II	Mammalia	Cetacea	Delphinidae	*Orcaella brevisrostris*
6.	I/II	Mammalia	Cetacea	Balaenopteridae	*Balaenoptera physalus*
7.	I/II	Aves	Pelecaniformes	Pelecanidae	*Pelecanus crispus*
8.	I/II	Aves	Anseriformes	Anatidae	*Aythya baeri*
9.	I/II	Aves	Anseriformes	Anatidae	*Aythya nyroca*
10.	I/II	Aves	Falconiformes	Accipitridae	*Haliaeetus leucoryphus*
11.	I/II	Aves	Falconiformes	Accipitridae	*Aquila clanga*
12.	I/II	Aves	Falconiformes	Accipitridae	*Aquila heliacal*
13.	I/II	Aves	Falconiformes	Falconidae	*Falco naumanni*
14.	I/II	Aves	Gruiformes	Gruidae	*Grus nigricollis*
15.	I/II	Aves	Charadriiformes	Scolopacidae	*Numenius madagascariensis*
16.	I/II	Aves	Charadriiformes	Scolopacidae	*Tringa guttifer*
17.	I/II	Aves	Charadriiformes	Scolopacidae	*Eurynorhynchus pygmeus*
18.	I/II	Aves	Passeriformes	Emberizidae	*Emberiza aureola*
19.	I/II	Reptilia	Testudinata	Cheloniidae	*Chelonia mydas*
20.	I/II	Reptilia	Testudinata	Cheloniidae	*Caretta caretta*
21.	I/II	Reptilia	Testudinata	Cheloniidae	*Eretmochelys imbricate*
22.	I/II	Reptilia	Testudinata	Cheloniidae	*Lepidochelys olivacea*
23.	I/II	Reptilia	Testudinata	Dermochelidae	*Dermochelys coriacea*
24.	II	Mammalia	Cetacea	Phocoenidae	*Neophocaena phocaenoides*
25.	II	Mammalia	Cetacea	Delphinidae	*Sousa chinensis*
26.	II	Mammalia	Cetacea	Delphinidae	*Orcaella brevirostris*
27.	II	Mammalia	Sirenia	Dugongidae	*Dugong dugon*

28.	II	Aves	Ciconiiformes	Ciconiidae	*Ciconia nigra*
29.	II	Aves	Ciconiiformes	Ciconiidae	*Ciconia ciconia*
30.	II	Aves	Ciconiiformes	Threskiornithidae	*Plegadis falcinellus*
31.	II	Aves	Ciconiiformes	Threskiornithidae	*Platalea leucorodia*
32.	II	Aves	Falconiformes	Pandionidae	*Pandion haliaetus*
33.	II	Aves	Falconiformes	Accipitridae	*Aviceda jerdoni*
34.	II	Aves	Falconiformes	Accipitridae	*Aviceda leuphotes*
35.	II	Aves	Falconiformes	Accipitridae	*Pernis ptilorhyncus*
36.	II	Aves	Falconiformes	Accipitridae	*Milvus milvus*
37.	II	Aves	Falconiformes	Accipitridae	*Milvus migrans*
38.	II	Aves	Falconiformes	Accipitridae	*Gyps fulvus*
39.	II	Aves	Falconiformes	Accipitridae	*Aegypius monachus*
40.	II	Aves	Falconiformes	Accipitridae	*Circaetus gallicus*
41.	II	Aves	Falconiformes	Accipitridae	*Circus aeruginosus*
42.	II	Aves	Falconiformes	Accipitridae	*Circus spilonotus*
43.	II	Aves	Falconiformes	Accipitridae	*Circus cyaneus*
44.	II	Aves	Falconiformes	Accipitridae	*Circus macrourus*
45.	II	Aves	Falconiformes	Accipitridae	*Circus melanoleucos*
46.	II	Aves	Falconiformes	Accipitridae	*Circus pygargus*
47.	II	Aves	Falconiformes	Accipitridae	*Accipiter badius*
48.	II	Aves	Falconiformes	Accipitridae	*Accipiter virgatus*
49.	II	Aves	Falconiformes	Accipitridae	*Accipiter nisus*
50.	II	Aves	Falconiformes	Accipitridae	*Accipiter gentilis*
51.	II	Aves	Falconiformes	Accipitridae	*Buteo buteo*
52.	II	Aves	Falconiformes	Accipitridae	*Buteo rufinus*
53.	II	Aves	Falconiformes	Accipitridae	*Aquila rapax*
54.	II	Aves	Falconiformes	Accipitridae	*Aquila nipalensis*
55.	II	Aves	Falconiformes	Accipitridae	*Hieraaetus pennatus*
56.	II	Aves	Falconiformes	Falconidae	*Falco tinnunculus*
57.	II	Aves	Falconiformes	Falconidae	*Falco amurensis*
58.	II	Aves	Falconiformes	Falconidae	*Falco subbuteo*

59.	II	Aves	Falconiformes	Falconidae	*Falco severus*
60.	II	Aves	Falconiformes	Falconidae	*Falco cherrug*
61.	II	Aves	Falconiformes	Falconidae	*Falco peregrines*
62.	II	Aves	Strigiformes	Strigidae	*Ninox scutulata*
63.	II	Aves	Strigiformes	Strigidae	*Asio flammeus*
64.	II	Aves	Galliformes	Phasianidae	*Coturnix coturnix coturnix*
65.	II	Aves	Charadriiformes	Burhinidae	*Burhinus oedicnemus*
66.	II	Aves	Charadriiformes	Laridae	*Sterna bengalensis* (African and Southwest Asian populations)
67.	II	Aves	Charadriiformes	Laridae	*Sterna albifrons*
68.	II	Reptilia	Crocodylia	Crocodylidae	*Crocodylus porosus*

Source: CMS. List of Range States of Migratory Species Included in the CMS Appencides. http://www.cms.int/pdf/en/CMS_Range_States_by_Species.pdf (Accessed on 10 May 2012).

TABLE A-18

Species Listed on Bangladesh Wildlife (Preservation) Order, 1973

Aminals Which are Open to Shooting and May Be Hunted on an Ordinary Game Hunting Permit

Order	Scientific Name	English Name
CRUSTANCEANS	*Brachyura*	Crab
AMPHIBIANSRANIDAE	*Rana tigrina*	Indian Bull Frog
	Rana hexadactyla	Green Frog
	Rana limnocharis	Cricket Frog
REPTILESCHELONIA	*Lissemys punctate punctata*	Flap shelled Spotted Turtle
	Kachuga tecta tecta	Roofed Turtale
	Testudo elongata	Clawtailed Turtle
BIRDS ANATIDAE	*Anas acuta*	Pintail
	Anas penelope	Shoveller
	Anas penelpe	Wigeon
	Anas strepera	Gadwall
	Anser anser	Grey Leg Goose
	Anser anser	Bar headed Goose
	Aythya baeri	Baer's pochard
	Aythya ferina	Common pochard
	Dendrocygna jabaica	Lesser Whistling Teal
	Netta rufina	Rederested Pchard
	Tedorna ferruginea	Brahminy Duck
BIRDS ARDEDAE	*Ardeola grayil*	Pond Heron or Paddy Bird
	Bubulcus ibis	Cattle Egret
	Egretta garzetta	Little Egret
BIRDS CHARADRIDAE	*Callinago stenura*	Pintail Snipe
	Charedrius dubius	Little Riged Plover
	Numenius arquata	Curlew
	Pulvialis dominica	Eastern Golden Plover
	Pulvialis squatorola	Grey Plover
	Tringa hypoleucos	Common Sandpiper
	Tringa neularia	Greens Ank
	Tringa ochropus	Green Sandpiper
	Tringa stagnatilis	Marsh Sandpipier
	Venellus cinereus	Greyheaded lapwing
PODUCIPEDIDAE	*Podiceps ruficollies*	Little Grebe
TIHRESKIORNITHIDAE	*Platalea Leucordia*	Spoon Bill
MAMMALS CARNIVORA	*Vulpes bengalensis*	Fox
LAGOMORPHAS	*Lepus nigricollis*	Rufous tailed Hare
ARTIODACTYLA	*Sus scrofa*	Wild Boar

Protected Animals, I.E., Animals Which Shall Not Be Hunted, Killed or Captured

Manmals

Order	Scientific Name	English Name
CARNIVORA	*Arctictis binturong*	Binturong
	Arcto galidia trivirgata	Small Toothed Palm Civit

	Cuon alpinus	Dhole
	Felis bengalensis	Leopard Cat
	Felis chaus	Jungle Cat
	Felis marmorata.	Marbled Cat
CARNIVORA	*Felis nebulosa*	Clouded Loepard
	Felis teemincki	Golden Cat
	Felis veverrina	Fishing Cat
	Helarctos malayanus	Sun Bear
	Herpestes edwardsi	Common Moangoose
	Hyeana hyeana	Hyeana
	Melursus ursinus	Sloth bear
	Peguna larvata	Masked Palm Civet
	Panthera pardus	Leopard
	Panthera tigris tigris	Bengal Tiger
	Paradoxurus hermaphroditus	Pllm Civet
	Salenarctos thibetanus	Asiatic Black Bear
	Viverricula indica	Small Indian Civet Panther
CETACEA	*Delphinus dielphis*	Common Dolphin
	Neomeris phocasnoides	Little Indian Porpoise
	Plantanista gangetica	Gangetic Dolphin
EDENTATA	*Manis crassicaudata*	Pangolin
	Manis javanica	Pangolin
HYSTRICIDAE	*Atherurus macrourus*	Brush-tailed Porcupine
	Hystrix hodgsonil	Indian crestless Porcupine
INSECTIVORA	*Suncus etruscus*	Phygmy Shrew
	Suncus marinas	Common Musk Shrew
	Talpa Micrura	Kastern Mole
LOGMORPHA	*Caprimulgus hispidus,.*	Assamcese Rabbit
MUSTELIDAE	*Arctonyx collaris*	Hag Badger
	Lutra cinerea	Clawless Otter
	Lutra lutra	Comment Otter
	Lutra perspicillata	Smooth Indian Otter
	Mellivora capemsis	Honey Badger
PRIMATES	*Hylobates hoolock*	Hoolock
	Macaca assamenasis	Assamese Macaque
	Macaca cynomolgus	Crab-Eating Monkey
	Macaca mulatta	Rhesus Monkey
	Nyctichebus coucang	Slow Loris
	Presbytis entellus	Langur
	Presbytis pileatus	Leaf Monkey
	Presbytis pileatus durga	Southern Capped Langur
RODENTIA	*Callosciurus erythracus*	Pallas's Squirrel
	Dreomys pygerythrus	Orange-belli
	Dreomys lokrish	Hoary-bellied Himalayan Squirrel
	Dreomys lokrish	Orange-bellied Himalayan Squirrel
	Funambulus palmaram	Indian Palm Squirrel
	Funambulus tristriatus	Three Striped Squirrel

	Hylopstes alboniger	Particoloured flying Squirrel
	Pataurista petaurista	Flying Squirrel
	Ratufa indica	Giant Squirrel
UNGULATA	*Antelope corvicarpa*	Antilope (Indian)
	Axis axis	Spotted Deer
	Axis porcimus	Hog Deer
	Box benteng	Banting
	Bos gaurus	Gaur, Bison
	Bos grontalis	Gayal, Bison
	Boselaphus tragocamalus	Nilgai
	Capriconis sumatrezensis	Serow
	Cervus duvancelie	Swamp Deer
	Cervus unicolor	Samber
	Elephas maximus	Elephant
	Muntiacus muntjak	Barking Deer
	Probalus nubalis	Water Buffalo
	Rhinoceros spp.	Lesser One Honed Rhinoceros

Reptiles

Order	Scientific Name	English Name
CETACEA	*Balanenoptera acutorostrata*	Little Pink Whale
	Balsenoptera musculus	Great Indian Fin Whale
CHELONIA	*Domonia hamiltonii*	Hamriltons Terrapin
	Lissemys punctata	Flap Shelled Spotted Turtle
	Morcnia ecellata	Bengal Eyed Terrapin
	Machuga recta tecta	Roof Turtle
	Testudo elongata	Claw-tailed Tortoise
	Terrapin nocoria	Bengal Three Keeled
	Trionyx tricarinata	Land Terrapin
	Trionyx nigricans	Sacred Black Mud Turtle
	Trionyx gangeticus	Ganges Soft Shell
	Trionyx hurum	Brown Soft Shell
EMYDOSAURIA	*Garialis gangelicus*	Gharial
	Crocodylus perosus	Estuarine Crocodile
SQUAMATA	*Enbydrina schistoza*	Beaked Deep Sea Snake
	Gecko gecko azhari	Merton's Tokay
	Python molurus	Rock Python
	Python reticulatus	Reticulated Python
	Typholpa diardi	Diads Worm-snake
	Varanus bengalensis	Grey Indian Monitor
	Varanus flavescens	Ruddy Snub nosed Monitor
	Varanus griseus caspius	Tricolour Caspian Monitor
	Varanus salvator	Ocillated Water Monitor
	Varanus nebulosus	Black Lizard

Aves

Order	Scientific Name	English Name

ACCIPITRIDAE	*Accipter bedius*	Skira
	Accipter trivirgatus	Crested Goshwk
	Aquila heliaca	Imperial Eagle
	Aquila promarina	Lesser Spotted Eagle
	Aquila rapax	Tawry Eagle
	Avideda jerdoni	Blyth's Baza
	Butastur teesa	White Eyed Buzzard Bagle
	Circaetus gallicus	Short Toed Eagle
	Circus aeruginosus	Marsh Herrier
	Circus macrourus	Pale Herrier
	Circus melanoleucos	Pied Herrier
	Circus pygargus	Montagu's Herrier
	Circus spilonotus	Eastern March Herrier
	Elanus caeruleus	Black Winged Kite
	Falco biarmicus	Larger Falcon
	Falco perigrinator	Shahree Falcon
	Falco perigrinus	Eastern Peregrine Falcon
	Falco serverus	Oriental Hobby
	Falcio tinnunculus	Kesteel
	Falco vespertinus	Eastern Reg-legge Dalcon
	Gyps bengalensis	White Backed Vulcher
	Haliasetus leucogaster	White Bellied Sea-eagle
	Haliasetus leucoryphus	Palla's Fishing Eagle
	Haliastur indicus	Bhahminy Kite
	Mieranaetus pennatus	Booted Hawk Eagle
	Ichthyophaga ichthayaetus	Grey Headed Fishing Eagle
	Ictinaetus malayensis	Black Eagle
	Lophortriorchis Kienerii	Rufous Bellied Hhawk Eagle
	Macrohierax melanoleucos	White Legged Fulconet
ACCIPITRIDAE	*Milvus migruns*	Pariah Kite
	Pandion haliaetus	Osprey
	Pernis ruficollis	Indian Honey Buzzard
	Spilomis cheela	Crested Serpent Eagle
	Spizactus limnactus	Changible Hawk Eayle
	Torgos calvus	Black or King Vulchar
ALAUOIDE	*Alauda gugula*	Eastern Skylark
	Calandrella acutirostris	Humes Short Toed Lark
	Erenoperix grisca	Ashy Crown Tinch Lark
	Mirafia ensthrostera	Red Winged Bush Lark
	Mirafia assanica	Singing Winged Bush Lark
	Mirafra assamica	Assam Winged Bush
ALCEDINIDAE	*Alcedo atthis*	Common Kingfisher
	Alcedo hercules	Blythis Kingfisher
	Alcedo meninting	Blue-eared Kingfisher
	Ceys erithacus	Three Toed Kingfisher
	Ceyyle laugubris	Greater Pied Kingfisher
ALLEEDINIDAE	*Ceyyle rudis*	Lesser Pied Kingfisher

	Haleyon ceromenda	Rudy Kingfisher
	Haleyon Chloris	White Coloured Kingfisher
	Haleyon pileata	Black Eapped Kingfisher
	Haleyon smynresis	White Brested Kingfisher
	Pelargopsis	Brown Winged
	amauroptera	Kingfisher
	Pelargopsis capensis	Stork-Billed Kingfisher
ANATIDAE	*Anas crecoa*	Common Teal
	Anas heecilorbyncha	Spotbill or Grey Duck
	Anas plantyrhynchos	Mallard
	Anas querguedula	Winged Teal
	Ansar fabilis	Forest Bean Goose
	Aytha fuligola	Tupted Pochard Duck
	Cairna scutulata	White Winged Wood Duck
	Dendrocygna bicolor	Large Whistling Teal
	Nattapus coromaudelianus	Cotton Teal
	Rhoduessa Caryophyllacea	Puck Teaded Duck
	Sarkidiornis molanotos	Mukta or Comb Duck
	Tadorma tadorna	Shel Duck
APODIADAE	*Apus affinis*	House Swift
	Apus mella	Alpine Swift
	Chaetura candakuta	White Throated Spine Tailed Swift
	Collocalia innominata	Edible Nest Swift let
	Cypsiurus parvus	Palm swift
	Hemiprocne longipennis	Crested Swift
ARDIEDAE	*Ardea cineoria*	Grey Heron
	Ardea imperialis	Giant White Billed Heron
	Ardea purpuria	Purple Heron
	Ardeala grayii	Chinese Pond Heron
	Butorides striatus	Little Green Heron
	Dupetor flavicolis	Black Bittern
	Egretta alba	Little Egret
	Egretta gularis	Indian Reef Heron
	Egretta infermedia	Smaller Egret
	Corsachius melanocephalus	Tiger Bittern
	Ixobrychus cinnamomeus	Chest Nut Bittern
	Ixobrychus sinensis	Yellow Bittern
	Nycticorax mucticorax	Night Heron
ARTAMIDAE	*Artamus fascus*	Ashy Swallow Shrike
BUCEROTIDAE	*Aceros nepalensis*	Fufous Necked Hornbill
	Anthracoceros maladaricus	Pied Hornbill
	Buceros bicornis	Great Hornbill
	Rhyliceos undulatus	Wreathed hornbill
BURIHHNIDAB	*Burhinus Cedicnemus*	Stone Curlew
	Esacus magnirostris	Great Stone Curlew
	Glareola lactea	Small Indian Pratincole
	Recurviresta avosetta	Avacot

	C. molaschistos	Smaller Cuckoo Shrike
	C. novaehbllandiae	Large Cuckoo Shrike
	Hempipus picatus	Pied Flycatcher Shrike
	Paricrocotus flammacus	Short Billed Minivet
	Pericrocotus cinnamomeus	Small Minivet
	Pericrocotus hammacus	Scarlet Minivet
	Pericrocotus solaris	Yellow Throated Minivet
	Tephrodurnis pordicerionus	Common Wood Shrike
	Tephrodurnis virgatus	Large Wood shrike
CAPITONIDAE	*Megalaima asiatica*	Blue Throated Barbet
	Megalaima australis	Blue Eared Barbet
	Megalaima baemacaphala	Crimson Breasted Barbet
	Megalaima lineate	Lineated Barbet
CAPRIMULGIDAE	*Caprimulgus affinis*	Franxlin's Night jar
	Caprimulgus indicus	Jungle Night Jar
	Caprimulgus macruius	Long Tailed Night Jar
CHARADIIDAE	*Arenaria interpres*	Turnstone
	Calidris albus	Sanderling
	Calidris alpinus	Dunlin
	Calidris minutus	Little Stint
	Calidris subminutes	Little Toed Stint
	Calidris temminckii	Termminck's Stint
	Calidris tenuirostris	Eastern Knot
	Calidris testaceus	Curlew Send Piper
	Capella media	Great Snipe
	Capella minima	Jack Snipe
	Capella solitaria	Solitary Snipe
	Charadrius alexandrinus	Chines Kentish Plover
	Charadrius alexadrinus	Large Sand Plover
	Charadrius mongolus	Lesser Sand Plover
	Charadrius placidus	Long Billed Ring Plover
	Eurynorhynchus pygmeum	Spoon Billed Sand Piper
	Linicola falcinellus	Broad Billed Sandpiper
	Limosa limosa	Black Tailed Godwit
	Linodromus sunipalmatus	Snipe Billed Godwit
	Philomachus pugnax	Ruft and Reeve
	Recurvirestra avosetta	Avocet
	Rostratula bengalensis	Painted Snipe
	Scolopax rusticola	Wood Cock
CHARADRDAE	*Tringa glareda*	Wood Sandpiper
	Tringa guttfar	Armstrongs Sandpiper
	Tringa terek	Terek Sandpiper
	Tringa totanus	Spoofed Red Shank
	Vanelllus indicus	Red Watted Lapwing
	Vanelllus leucurus	White Tailed Lapwing
	Vanelllus spinosus	Spar Winged Lapwing
	Vanelllus vanellus	Lapwing

CICONIIDAE	*Anas tomus oscitaus*	Open billed Stork
	Cinonia ciconia	Eastern White stork
	Cinonia episcopus	White Necked stork
	Cinonia nigra	Black Stork
	Ibis leucocephalus	Painted Stork
	Leptoptilos dubius	Greater Adjutant
	Leptoptilos javinicus	Lesser Adjutanat
	Xenorhynchus asiaticus	Black Nacked Stork
COLOMBIDA	*Chalcopnaps indica*	Emarald Dove
	Columba livia	Blue Rock Pigeon
	Columba punicea	Purple Wood Pigeon
	Columba ducula aenea	Green Imperial Pigeon
	Macropygia unchall	Bar-tailed Cuckoo Dove
	Ducula badia	Mountain Imperial Pigeon
	Streptopelia Chinensis	Spotted Dove
	Streptopelia orientalis	Rufous Turtle Dove
	Shreoptopelia trengucbarica	Red Turtle Dove
	Tyeran bicenota	Thich Billed Grreen Pigeon
	Tyeran bicinota	Orange-breasted Pigeon
	Tyeran curvirostra	Orange-breasted Pigeon
	Tyeran Phoeniciptera	Yellow Footed Pigeon
	Tyeran pomdadora	Grey Fronted Pigeon
CORACIIDAE	*Coracias benghalensis*	Indian Roller
	Eurystomus orientalis	Broad Billed Roller or Blue Tay
CORVIDAE	*Corvus macrorhynchos*	Jungle Crow
	Dendrocitta formosa	Grey Tree-pie
	Dendrocitta vagabunda	Rufous Tree-pie
	Kitta chinensis	Green Magpie
	Kitta crythrorhyncha	Red Billed Green Magpie
CUCULIDAE	*Cacomantis merulinus*	Plaintive Cuckoo
	Cacomantis Sonneratii	Banded Bay-cuckoo
	Centropus sinensis	Crow-pheasant
	Clamator jacobinus	Pied Crested Cuckoo
	Cuculus canorus	The Cuckoo
	Cuculus fugax	Hodgson's Hawk-Cuckoo
	Cuculus micropterus	Indian Cuckoo
	Cuculus poliocepbalus	Small Cuckoo
	Cuculus varius	Common Hawk-cuckoo
	Endynanuys scolopacea	Koel
	Rhopodytes tristis	Large Green Billed Malkoha
	Turniculus lugubris	Drongo Cuckoo
	Taccocua leschnaulti	Sirkeer Cuckoo
DICAEIDAE	*Dicaeum charysorrhem*	Yellow-vented Flower Pecker
	Dicaeum erythrorhynchos	Tickells Vented Flower Pecker
	Dicaeum concolor	Planncolured Flower Pecker
	Dicaeum Cruentatum	Scarletbacked Flower Pecker
	Dicaeum Trigonostigma	Orange Bellied Flower Pecker

DICRURIDAE	*Dicrurus adsimilis*	Black Drongo
	Dicrurus aenena	Bronzed Drongo
	Dicrurus remifer	Lesser Racket Tailed Drongo
	Dicrurus annectans	Crow Billed Drongo
	Dicrurus coernlescens	White Billed Drongo
	Dicrurus hottentuttus	Hair-crested Drongo
	Dicrurus leucophacus	Ashy Drongo
	Dicrurus paradiscus	Grater Racket Tailed Drongo
EMBERIZIDAE	*Melophus lathami*	Deccan Crested Bunting
	Emberiza spodocephala	Black-faced Bunting
	Emberiza Sureola	Yellow Breasted Bunting
ESTRILDIDAE	*Estrilda emamdara*	Red Munia
	Lonchura malabarica	White Throated Munia
	Lonchura punctualata	Chast Nut Munia
	Lonchura striata	Whitehacked Munia
	Lonchura punctulata	Spotted Munia
EURYLAIMIDAE	*Serilophus lunatus*	Gould's Broad Billed
FRINGILLIDAE	*Carpodacus erythrinus*	Common Rosefinch
DRUIDAE	*Anthropoides virgo*	Demoiselle Ccrane
HELIORNITHIDAE	*Helippais personata*	Masked Finfoot
HIRUNDINIDAE	*Delichon kashmiriense*	House Martin
	Hirundo daurica	Striated Swallow
	Hirundo rustica	Sand Martin
	Hirundo smitnii	Wire Bailed Swallow
	Hirundo striolata	Larger Straited Swallow
	Riparia paloudicala	Plain Sand Martin
	Riparia riparia	Collard Sand Martin
IRENIDAE	*Aegithina tiphia*	Common Lora
	Chloropsis aurifroms	Gold Fronted Chloropsis
	Chloropsis Cochirchmensis	Blue Winged Chloropsis
	Chloropsis hardwickil	Orange Tollied Chloropsis
	Irona puella	Fairy Blue Bird
JACANIDAE	*Hydrophazianus chirurgus*	Pheasant Tailed Jacana
	Metopidius idicus	Bronzed Winged Jacana
LANIDAE	*Lanius cristatus*	Brown Shrike
	Lanius schach	Black Headed Snrike
	Lanius tephronotus	Tipetan Shrike Large Cuckoo Shrike
LARIDAE	*Chlidonias hybrida*	Whiskered Tern
	Chlidonias lencoptera	White Winged Black Torn
	Gelocheliden nilotica	Gull Billed Tern
	Hydroprogne caspia	Caspian Tern
	Larus brunnicephalus	Brown Headed Gull
	Larus fuscus	Lesser Black Backed Owl
	Larus ichthyaetus	Great Black Head Gull
	Larus ridibundus	Black Headed Gull
	Rychope albicollis	Indian Skimmer
	Sterna acuticauda	Black Bellied Tern

	Sterna bergi	Large Erested Tern
	Sterna hirundo	Common Tern
	Sterna sibifrons	Little Tern
	Sterna surautia	Indian River Tom
MEROPIDAE	*Merops leschenaulti*	Chestnut-headed Bee- eater
	Merops oricutalis	Green Bee-eater
	Merops philippinus	Blue Tailed Bee-eater
	Nyctyonis athertoni	Blue Bearded Bee-eater
MOTACILLIDAE	*Anthus hodgsoni*	Chinese Three Pipit
	Anthus novaeseelandiae	Paddy Field Pipit
	Anthus Pelopus	Dark Pipit
	Anthus Motacilla alba	Pied or White Wagtail
	Motacilla Caspica	Grey Wagtail
	Motacilla citreola	Yellow Headed Wagtail
	Motacilla flava	Yellow Wagtail
MUSCICAPIDAE	*Acrocephalus agricola*	Paddy Field Warbler
	Acrocephalus concinens	Blunt Winged Paddy Field Warbler
	Acrocephalus dewatorum	Blythis Reed Warbler
	Acrocephalaus stentoeus	Great Reed Warbler
	Alcilppe commoda	Napal Babbler
	Alcippe rufogutaris	Red Throated Tit Babbler
	Bradypterus thoracicus	Spotted Bush Warbler
	Carrulax moniligerus	Great Necked Laughing Thrush
	Carrulax pectoralis	White Crested Laughing Thrush
	Chaetornis strisatus	Bristiled Grass Warbler
	Chrysomma Sinensis	Yellow Yed Babbler
	Cinclidium leicurum	White Tailed Blue Robin
	Cisticola exilis	Yellow Bellied Fentail Warbler
	Cisticola juncidis	Streaked Fentail Warbler
	Copsychus saularis	Magpie Robin
	Culicicafa ceybrensis	Grey Headed Fly Catcher
	Enicurus immaculatus	Black Backed Forktail
	Enicurus leschemsulti	Leschenaults Forktail
	Enicurus maculatus	Spotted Forktail
	Tnicurus schistaceus	Staty Backed Forktail
	Erithacus brunneus	Bhle Chat
	Erithacus calliope	Ruby Throat
	Erithacus cyane	Siberian Blue Chat
	Erithacus pectoralis	Himalayan Ruby Throat
	Erithacus arecicus	Blue Throat
	Gaurrulax delesserti	Delesserts Laughing Thrush
	Garrulax galbanus	Yellow Throated Laughing Thrush
	Garrulax phoeniceus	Crimson Winged Laughing Thrush
	Garrulax ruflcellis	Rufous Necked Laughing Thrush
	Garrulax virgatus	Streaked Laughing Thrush
	Graminicola lenghalensis	Large Grass Warbler
	Hippalais caligata	Booted Warbler

	Kiphirhyncus superciliaris	Slender Billed Scimitar Babler
	Leiothrix argentauris	Silver Eard Mosia
	Locustella certhiola	Palla's Grass Hopper Warbler
	Locustella lanceolata	Temminck's Grass Hopper Warbler
	Macronous gularis	Yellow Breasted Babbler
	Megalurus paluris	Straited Marsh Warbler
	Miroura pusilla	Lesser Scaly Breasted Wren Babbler
	Monarcha azurea	Black Naped Flycatcher
	Monticola solitarius	Blue Rock Thrush
	Muscicapa albicilla	Red Breasted Flycatcher
	Muscicapa banyumas	Large Billed Blue Fly Catcher
	Muscicapa poliogenys	Brooks Fly Catcher
	Muscicapa rubeculoides	Blue Throated Fly Catcher
	Muscicapa superciliaris	White Browed Blue Flycatcher
	Muscicapa thalassina	Verditer Flycatcner
	Muscicapa tickelliae	Thickell's Blue Flycatcher
	Orthtomus cucullatus	Golden Headed Tailor Bird
	Orthtomus sutorius	Tailor Bird
	Pachycophala cinera	Managrove Whistler
	Pavadoxornis ruficeps	Red Headed Barrot Bill
	Phoenicurus ochrunus	Black Redstart
	Phoenicurus suroreus	Daurian Redstart
	Phragmaticola acdon	Thick Billed Warbler
	Phylloscopus affinis	Thickell's Leaf Warbler
	Phylloscopus cautator	Black Browed Leaf Warbler
	Phylloscopus fuligiventer	Smoky Willow Warbler
	Phylloscopus fuscatus	Dusky Leaf Warbler
	Phulloscopus inornatus	Yellow Browed Leaf Warbler
	Phylloscopus mgnirostris	Large Billed Leaf Warbler
	Phylloscopus reguloides	Phythis Leaf Warber
	Phylloscopus trochiloides	Dull Green Leaf Warbler
	Pomatorhinus erythrogeny	Rustysheeked Scimitar Babbler
	Pomotorhinus hypoleucos	Large Scimitar Babbler
	Pomatohinus ruficolis	Rufous Necked Scimitar Babbler
	Prinia burnesi	Long Tailed Grass Warbbler
	Prinia flaviventris	Yellow Bellied Long Tailed Warbler
	Prinia gracilus	Streaked Longtailed Warbler
	Prinia hodgsonii	Franklinis Longtailed Warbler
	Prinia rufescens	Beavens Longtaiied Warbler
	Prinia socialis	Ashy Longtailed Warbler
	Prinia subslara	Tawny Flanked Longtailed Warbler
	Prinia sylvatica	Jungle Longtailed Warbler
	Pteruthius melanotis	Chestnut Throated Shrike Babbler
	Rhipidura albicollis	White Browed Fantail Flycatcher
	Rhipidura hyposantha	Yellow Bellied Fantail Flycatcher
	Ryhacomis fuliginonus	Phumbeoous Redstart
	Rimator malacoptilus	Long Billed Wren Babbler

	Saxicola caprata	Pied Bush Chat
	Saxicola ferrea	Barkgrey Bush Chat
	Saxicola jerdoni	Jerdon's Bush Chat
	Saxicola torguta	Stone Chat
	Seicecus burkei	Yellow Eyed Flycatcher Warbler
	Siachyris chrysaea	Goldex-headed Rubbler
	Stachyris rufifrons	Red-fronied Babbler
	Terpsiphone paradise	Paradise Flycatcher
	Trichastoma abotti	Abbot's Babbler
	Timalia pileata	Red-capped Babbler
	Turdoides earlei	Straited Babbler
	Turdoides striatus	Jungle Babbler
	Turdus ruficollis	Black Throated Thrush
	Yuhina castaniceps	Headed Yutina Chestnut
	Yuhina flavicollis	Yellow Napped Yutina
	Yuhina nigrementa	Black-clinned Yuhunia
	Yuhina antholeuca	White Bbellied Yuhunia
	Zoothera dauma	Golden Mountain Thrush
	Zoothera eitrina	Orange Headed Ground Thrush
NECTARINHDAE	*Aethopyga gouldiae*	Mrs. Gould's Sunbird
	Aethopyga siparaja	Yellow backed Sunbird
	Nectarinia Zeylonica	Purple Sunbird
	Arachnothera longirostris	Little Spider Hunter
	Arachnothera megna	Streaked Spider Hunter
	Nectarinia sperata	Van Hasselts Sunbird
	Nectarinia asiatica	Purple Romped Sunbird
OTIDIDAE	*Eupodotia bengalensis*	Bengal Horican
PARIDAE	*Parus majer*	Grey Tit
PELECANIBAE	*Pelecenus philippensis*	Spootted Billed Pelican
PHALACROCORACIDE	*Anhinga rufa*	Darter or Snak Bird
	Phalacrocorax fusciecllis	Shag
PHASIANIDAE	*Arborephila atrogularia*	White Cheekad Hill Patridge
	Arborophila rufogularis	Rufus Throated Hill Patridge
	Bambusicola fytctii	Bamboo Patridge
	Coturnix chinensis	Blue Breasted Quail
	Coturnix coromandelica	Rain quail
	Francolinus francotinus	Assam Black Patridge
	Francolinus gularis	Swamp Tartridge
	Gallus gallus	Red Jungle Fowl
	Lophura leucomelana	Black Breasted Kalij
	Pavo cristatus	Common Pea Fowl
	Pavo muticus	Burmese Fowl
	Polyplectron bicalcarats	Peacock Pheasant
PICIDAE	*Blythipicus pyrrhotis*	Red Eard Bay Wood- pecker
	Chrysocolaptes lercidus	Larga Golden Backed Wood Peacker
	Dendrocopos atratui	Stripe Breasted Pied Wood pecker
	Dendrocohos canicapillus	Grey-crowned Pigmy Wood Pecker

	Dendrocops mabrattensis	Yellow Fronted Pied Wood-Pecker
	Dendrocopos macei	Fulvous Breasted Pied Wood-pecker
	Dendrocopos namus	Pigmy Wood-pecker
	Dinopium bengalensis	Lesser Golden Backed Wood Pecker
	Dinopium javanensis	Golden Backed Three Toed Wood-pecker
	Dinopium marnathensis	Yellow Fronted Rised Wood-pecker
	Gecinulus grautia	Pale Headed Wood-pecker
	Hemicircus cancute	Heart Spotted wood-pecker
	Hypopicus hyperithrus	Rufous Bellied Wood- pecker
	Jynx torguilla	Wryneck Wood-pecker
	Micropternus breachyurus	Rufous Wood-pecker
	Mulleripicus pulveulentus	Great Slaty Wood-pecker
	Picunus innominatus	Speckled Piculet
	Picus canus	Black Naped Green Wood-Pecker
	Picus chorolophus	Small Yellow-naped wood-pecker
	Picus harinucha	Large Yellow-naped Wood-pecker
	Picus myrmecophoneus	Little Scaly Billed Green Wood-pecker
	Sasia ochracea	Rufous Piculet
PITTIDAE	*Pitta brachyura*	Indian Pitta
	Pitta cyanea	Blue Pitta
	Pitta moulccensis	Blue Winged Pitta
	Pitta nepalensis	Blue Napped Pitta
	Pitta sordida	Green Breasted Pitta
PLOCEIDAE	*Ploceus bengalensis*	Black-throated Baya
	Ploceus manyar	Streaked Baya
PODARCIDAE	*Patrachostomus hodgsoni*	Hodgson's Frognouth
PSITTACIDAE	*Loriculus vernalis*	Lorikeet
	Psittacila alexandri	Red-breasted Parakeet
	Psittacila cyanocephala	Bloom heoded Parakeet
	Psittacila eupatria	Large Indian Parakeet
	Psittacila finschil	Burmess Slaty Headed Parakeet
	Psittacila krameri	Roseringed Parakeet
	Psittacila roseata	Eastern Blossom Headed Parakeet
PTEROCLIDAE	*Pterocles indicus*	Painted Sandgrouse
PYCNONOTIDAL	*Criniger flaveolus*	White Throated Bulbul
	Hypsipetes flavalus	Brown Cared Bulbul
	Hypsipetes madagascariensis	Black Bulbul
	Hypsipetes virescens	Rufous Bellied Bulbul
	Hypsipetes viridiscens	Olive Bulbul
	Pycnontus atriceps	Black peaded Bulbul
PYCNONOTIDAL	*Pycnontus cafex*	Redvented Bulbul
	Pycnontus flavescens	Blyth's Bulbul
	Pycnontas jacosus	Red-whiskered Bulbul
	Pycnontus Melanictorus	Black headed yellow Bulbul
	Spizixos canifrons	Pinch-billed Bulbul
RALLIDAE	*Amaurornis abool*	Brown Crane
	Amaurornis fuscus	Rudy Crane

	Amaurornis phoenicurus	White breasted Waterhen
	Amaurornis spp	Elwesc crane
	Falica atra	Coot
	Gallicrex cinerea	Water cock, kora
	Gallinula chloropus	Moorhen
	Porphyrio prophyrio	Purple Moorhen
	Rallus aquaticus	Water rail
SITTIDAE	*Sitta castanea*	Chestnut bellied Nuthatch
	Sitta formosa	Beautiful Nuthatch
	Sitta frontalis	Velselfronted Nuthatch
STRIGIDAE	*Athene brama*	Spotted Owlet
	Asio flammeus	Short earned Owl
	Bubo bubo	Eagle owl
	Bubo flavipes	Tawny fish Owl
	Bubo nipalensis	Focrest eagle Owl
	Bubo zeylonensis	Brown fish Owl
	Glancidium brodii	Pigmy Owlet
	Glaudidium cucucloides	Barred Owlet
	Ninox scutulata	Brown Hawk Owl
	Otus spilocephalus	Collard Scops Owl
	Otus Scops	Scops Owl
	Otus spilocephalus	Spotted Scops Owl
	Phodilus badius	Bay Owl
	Tyto alba	Barn Owl
	Tyto capensis	Grass Owl
STURNIDAE	*Acridotheres fusces*	Jungle Myna
	Acridotheres ginginianus	Bank Myna
	Acridotheres javanicus	Short Crested Myna
	Acridotheres tristis	Common Myna
	Aplonis panayensis	Glossy Starling
	Gracula religiosa	Grackle or Hill Myna
	Saroglossa spiloptera	Spotted Winged Stare
	Sturnus contra	Pied Myna
	Sturnus malabaricus	Grey Headed Myna
	Sturnus pagodarum	Brahminy Myna
THRESKIORNITHIDAE	*Plegadis falcinellus*	Glossy Ibis
	Pseudibis papillosa	Black Ibis
	Threskiornis melanocephala	White Ibis
TROGONIDAE	*Harpactess arythrocephalus*	Red Headed Trogon
TURNICIDAE	*Turnix suscitator*	Common Bustard Quail
	Turnix sylvatica	Little Bustard Quail
UPUPIDAE	*Upupa epops*	Hoopee
ZOSTEROPIDAE	*Zosterops pallpehrosa*	White Eye

Source: Farooque, M. and S. R. Hasan. 2004. *Laws Regulating Environment in Bangladesh*, 2nd ed.