

Chapter 1

Chapter 1
INTRODUCTION

1.	Introduction	Page
1.1	Background (Justification for NCSA)	3
1.2	Concept of Capacity Building	4
1.3	Goals and objectives	4
1.4	Profile of Bangladesh	5
1.5	Methodology (NCSA preparation process / NCSA steps Operational principles / NCSA preparation strategy)	6
1.6	Organization of final report	8

Chapter 1

INTRODUCTION

1.1 BACKGROUND

The issue of capacity building has become a major priority to the Global Environment Facility (GEF), within the global conventions and the international community as a whole. The World Summit on Sustainable Development (WSSD) and the Second GEF Assembly reaffirmed the priority of building the capacity of developing countries. The GEF Secretariat, in consultation with the Implementing and Executing Agencies, has developed a strategic framework to give greater focus on capacity building of developing countries for global environmental management.

Bangladesh is a signatory to a number of Multilateral Environmental Agreements (MEAs) including the Rio Conventions on biological diversity, climate change and desertification. However, the country's capacities at individual, institutional and systemic levels to implement these conventions are limited. It is considered appropriate to build capacity of the country while the Rio Conventions are in different stages of implementation. Need is also felt to enhance the technical capacity of the country to take part in the global negotiation processes and link decisions taken at the global level to matching actions at the country level.

The primary objective of the GEF-supported window on National Capacity Self-Assessment (NCSA) is to identify country level capacity building needs and priorities for global environmental management. Bangladesh participates in this assessment, recognizing that the NCSA window will also be used to enhance synergies among the activities related to the Rio Conventions. In this backdrop, Bangladesh developed a proposal and received funding for PDF-A from GEF /UNDP. The present National Capacity Self- Assessment Project is the outcome of the PDF-A phase. The project is being funded by the GEF/UNDP and implemented by the Ministry of Environment and Forest (MoEF) with the technical support of IUCN-The World Conservation Union, Bangladesh Country Office.

The overall aim of NCSA is to provide Bangladesh with the opportunity to identify priority capacity needs in order to effectively address crosscutting global environmental issues. This enabling activity is to conduct a country-driven self-assessment and develop a strategy and action plan for capacity building in the environmental sector of the country. This project will enable the country to develop a plan of action to achieve global environmental management objectives in the context of the three conventions relevant for NCSA: the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and United Nations Convention to Combat Desertification (UNCCD). The focus of this project is to capture the concerns related to critical capacity constraints for implementing the MEAs; formulate strategic plan how to develop national capacity for thematic issues as well as issues that cut across focal areas; increase awareness on various issues with regard to national capacity for the MEAs; and link past and ongoing activities for the MEAs with overall national development policies.

With a view to developing capacity building in Bangladesh for global environmental management, the National Capacity Self-Assessment Project was approved by the GEF on 12 November 2004 for a period of 16 months. The PRODOC was signed between the Government of Bangladesh (Economic Relations Division and MoEF) and UNDP on 29 December 2005. The Ministry of Environment and Forests approved the Technical Project Proposal (TPP) on 18 September 2005 for implementation of the project commencing from February 2006.

1.2 CONCEPT OF CAPACITY BUILDING

The term “capacity building” is used in many contexts, often with little reflection regarding its meaning. Over the last few years experts from many countries have been moving towards a common definition of the term and there is now general agreement that “capacity building” can be taken as “the actions needed to enhance the ability of individuals, institutions and systems to make and implement decisions and perform functions in an effective, efficient and sustainable manner”.

At the individual level, capacity building refers to the process of changing attitudes and behaviors, most frequently through imparting knowledge and developing skills through training. However, it also involves learning-by-doing, participation, ownership, and processes associated with increasing performance through changes in management, motivation, morale and levels of accountability and responsibility.

Capacity building at the institutional level focuses on overall organisational performance and functioning capabilities, as well as the ability of an organization to adapt to change. It aims to develop the institution as a total system, including its constituent individuals and groups, as well as its relationship to the outside. In addition to improvements in physical assets, such as infrastructure, institutional capacity building involves clarification of missions, structures, responsibilities, accountabilities and reporting lines, changes in procedures and communications and changes in the deployment of human resources.

At the systemic level capacity building is concerned with the creation of “enabling environments”, i.e. the overall policy, economic, regulatory, and accountability frameworks within which institutions and individuals operate. Relationships and processes between institutions, both formal and informal, as well as their mandates, are important.

Capacity building can occur at local, national or global levels and amongst any individual or group of stakeholders – individuals, entities or institutions, as well as at an overall systems level. Interactions between the different levels are also important to overall capacity. Capacity is relevant in both the short term (for example, the ability to address an immediate problem) and the long term (the ability to create an environment in which particular changes will take place). Capacity may imply “action”, or “inaction”, depending on the result desired. Capacity building does not always involve the creation of new capacity, but often the redeployment or release of latent capacities.

1.3 GOAL AND OBJECTIVES

The overall aim of the GEF-supported NCSA in Bangladesh is to provide the country with the opportunity to take the lead in articulating its own capacity needs and priorities with respect to the global environment management taking into account the three fundamental global conventions i.e. UNFCCC, CBD and UNCCD. The primary goal of the NCSA process in Bangladesh is to identify, through a country-driven consultative process, priorities and needs for capacity building to protect the global environment. The specific objectives to be accomplished through the NCSA include:

- To identify, confirm or review priority issues for action within the thematic areas of biodiversity, climate change and desertification/land degradation;
- To explore related capacity needs within and across the three thematic areas;
- To strengthen national procedures to negotiate and implement the global environmental conventions;
- To integrate national data collection and reporting for various conventions;
- To propose a unified capacity building strategy and action plans for future external funding and assistance;
- To formulate an integrated institutional framework to coordinate and monitor the implementation of the strategy and action plans;
- To retain and utilize existing capacity and linkage with institutional framework;
- To link country action to the broader international environmental management and sustainable development framework.

1.4 PROFILE OF BANGLADESH

1.4.1. Environmental profile of Bangladesh

Boundary and topography: Bangladesh is a deltaic country bounded on its three sides – west, north, and east – by India. Bangladesh shares a common border with Myanmar in the southeastern part. In the south, Bangladesh has a long coastline along the Bay of Bengal. The total area of the country is 147,570 sq. km. Except for patches of the hilly areas in the southeast and northeast, and high lands in the northern and northwestern regions, the country basically consists of low, flat and fertile lands. Ground slopes of the country extend from north to south and the elevation ranges from 60 m mean sea level at the northern boundary to 1 m in the coastal area in the south. Flood plains constitute 80% of the lands, hills about 12% and terrace or uplifted blocks, about 8%.

Rivers and wetlands: Bangladesh has around 310 rivers with a total length of 24,140 km. Among them, 54 rivers originate in India, which all eventually flow into the Bay of Bengal. These include the three major rivers, the Ganges, the Brahmaputra (Jamuna) and the Meghna (GBM), which together constitute the largest river network in the world. These rivers carry a total of approximately 1250 million units of water per year, 93% of which flows into Bangladesh from India. The rivers also carry about 2.0 billion tons of sediment annually to the Bay of Bengal. Wetlands or marshes belonging to topographically depressed areas, known as *haors, baors and beels*, account for 0.9% of the country area of which again, 60% are located in the north-eastern regions.

Climate, rainfall, temperature and sea level rise: Bangladesh generally enjoys sub-tropical monsoon climate. The average annual rainfall varies from 1400 mm to 4500 mm. About 80% of the total rainfall of the country occurs during the monsoon. The highest rainfall is recorded in Chittagong (southeast) and north-eastern part of Sylhet while the lowest occurs in the northern and western parts of Bangladesh.

“At present, a small (very light) decreasing trend of rainfall over the south-east area and rising trend over the western and north –western area of Bangladesh is observed. But the annual total rainfall over Bangladesh is likely to increase by 295.94mm and 542.55 mm by 2050 and 2100 years respectively.”

“The annual mean maximum temperature is likely to rise 0.40 degree C and 0.73 degree C by 2050 and 2100 years respectively whereas the annual mean minimum temperature is likely to rise 0.40 degree C and 0.08 degree C by the years 2050 and 2100 respectively. But overall, annual mean temperature over Bangladesh is likely to increase by 0.22 degree C and 0.41 degree C by 2050 and 2100 years respectively.”

“Sea Level: There is an increasing trend of sea level rise at about 4.0 mm / year at Hironpoint, 6.0 mm / year at Meghna Estuary and 7.8 mm / year near Cox’s Bazar.”

Biodiversity: Bangladesh is endowed with rich and diverse genetic resources of flora and fauna because of its bio-climatic environment and its location at the complex interface of the Himalayan and the Southeast Asian bio-geographic regions. It has about 5000 species of flowering plants and 1500 species of fauna. The biodiversity wealth was much greater a century ago. At present, 129 species including 37 mammals, 21 reptiles, 69 birds and 2 amphibians are on the IUCN Red List of endangered species. A further 308 species are listed as rare or doubtful. Nearly 50% of all the wildlife species of the country are marked as threatened. Some 27-plant species are listed as threatened or endangered.

Forests in Bangladesh: The forests cover about 17% of the total land area. The country produces timber, bamboo and cane. The Sundarbans, the largest mangrove forest in the world is located in the south-western part of the country. Varieties of wildlife are found in the forest areas. The Sundarbans is the home of the ‘Bengal tiger’, deer, monkey, wild boar and crocodile. A few hundred species and sub-species of birds including many migratory and seasonal birds are found in the country.

1.4.2 Socio-Economic Indicator of Bangladesh

.....
(To be constituted)

1.5 METHODOLOGY

1.5.1 NCSA PREPARATION PROCESS

The National Capacity Self-Assessment (NCSA) for global environmental management is a living document which has been prepared through a massive consultative process. It is a national document owned by the people. The concerned ministries/divisions, Government department / agencies, research organizations, academics from the universities, civil societies, NGOs, development partners, experts, environmental practitioners, press as well as electronic media and other relevant stakeholders have been involved in this process. Both the top-down and bottom-up approaches have been followed during the preparation of NCSA. The concerned ministries/ divisions have consulted to take a stock of the completed, on-going and up-coming environmental related projects.

The first step for preparation of this significant document was to determine the methodology. This was accomplished through the Inception workshop held on 30 July 2006. The next step was to conduct thematic group meetings with the expertise/ knowledgeable persons and focused group meetings with the end users / field level stakeholders. Public opinion on the NCSA was also sought through website and press media. At the middle of the project period, a draft NCSA report has been prepared and placed in the mid-term national workshop held on 17-18 April 2007. After receiving opinion from the workshop, the NCSA document has been revised. A peer group was formed to scrutinize the laps and gaps of the capacity needs under the Rio conventions. Time to time development of the NCSA preparation stages has been informed to the Project Steering Committee (PSC) to get its feedback.

Box - : Advertisement on the daily news paper seeking public opinion

News Paper	Version	Date	Day
The Daily Star	English	09 February 2007	Friday
The New Age	English	13 February 2007	Tuesday
The Prothom Alo	Bangla	24 February 2007	Saturday
The Daily Ittefaq	Bangla	23 February 2007	Friday
The Jugantor	Bangla	23 February 2007	Friday
The Sangbad	Bangla	23 February 2007	Friday
The Samakal	Bangla	23 February 2007	Friday

The input of International Consultant and National Consultants has been taken during the preparation of NCSA. The vital policy-makers particularly the Ministers / State Ministers / Adviser of the concerned ministries have been involved to ensure political commitment on the NCSA process. The draft final NCSA document would be submitted to the final national workshop for vetting. Finally it would be placed to the PSC for approval. Last but not the least, the GEF *Guide for Self-Assessment of Country Capacity Needs for Global Environmental Management* has been followed to plan the Bangladesh NCSA document. A road map for preparation of NCSA is shown at Box 1 of this chapter of report.



1.5.2 OPERATIONAL PRINCIPLES

In accordance with the GEF broad guidelines, the following operational principles will be useful in formulating the Bangladesh NCSA for effective capacity building in order to manage the global environmental issues:

- a) Ensure national ownership, leadership and political commitment;
- b) Ensure multi-stakeholder consultations and decision-making;
- c) Base capacity building efforts in self-needs assessment;
- d) Adopt a holistic approach to capacity building;
- e) Integrate capacity building in wider sustainable development efforts;
- f) Promote partnerships;
- g) Accommodate the dynamic nature of capacity building;
- h) Adopt a learning-by-doing approach;
- i) Combine programmatic and project-based approaches;
- j) Combine process as well as product-based approaches;
- k) Promote regional approaches.

1.5.3 NCSA PREPARATION STRATEGY

Bangladesh NCSA will be a country-driven process facilitated by the multi-stakeholders. The main strategies of Bangladesh NCSA will be as follows:

- a. Optimal utilization of dormant capacity;
- b. Use of provisions and obligations of the Rio Conventions;

- c. Comprehensive stakeholder participation;
- d. Long-term approach within the sustainable development context
- e. Designating a Focal Point in every vital sector
- f. Avoiding duplication and promoting coordinated efforts in a synergistic way
- g. Expert evaluation;
- h. External feedback and sharing of experience; and,
- i. Development of activity matrix.

1.5.4 THE NINE STEPS OF NCSA

- Step 1: Planning the NCSA process;
- Step 2: Creating and maintaining effective high-level support;
- Step 3: Stocktaking;
- Step 4: Preparing thematic assessment;
- Step 5: Preparing the cross-cutting assessment;
- Step 6: Drafting the National Capacity Development Action Plan;
- Step 7: Drafting the NCSA Report;
- Step 8: Obtaining high-level approval of the action plan;
- Step 9: Monitoring implementation of the action plan;



Fig.1: Inaugural session of NCSA Inception workshop

1.6 Organization of final report

(To be reconstituted)

Chapter 2

Chapter 2

CLIMATE CHANGE

SN	Particulars of Contents	Page No
2.0	Significance and History of UNFCCC 2.0.1 Significance 2.0.2 History of UNFCCC 2.0.3 History of Kyoto Protocol 2.0.4 Objectives of UNFCCC	11 11 11 11 12
2.1	Obligation under UNFCCC 2.1.1 Principles of the Climate Change Convention 2.1.2 Key Obligation under UNFCCC and KP 2.1.3 Specific Obligation / Commitments – Mitigation 2.1.4 Five Year Programme of Work - Adaptation 2.1.5 Other obligations 2.1.6 Key Decisions	12 12 13 14 15 16 17
2.2	Current situation and Stocktaking 2.2.1 First National Communication 2.2.2 National Adaptation Programme of Action 2.2.3 Designated National Authority 2.2.4 Climate Change Cell: 2.2.5 Current Status of CDM Projects in Bangladesh 2.2.6 Completed and On-going Projects / Programmes <ul style="list-style-type: none"> • Mitigation • Adaptation 2.2.7 Post 2012 Climate Change Regime	19 19 19 20 21 21 22 25
2.3	Priority Environmental Issues (PEIs) 2.3.1 PEIs identified in NAPA Regional Workshop 2.3.2 PEIs identified in the Thematic Group Meeting of NCSA <ol style="list-style-type: none"> a. Mitigation b. CDM c. Adaptation d. Post 2012 Climate Change 	25 25 26
2.4	Identifying Capacity Development (CD) needs 2.4.1 CD Needs for Mitigation 2.4.2 CD Needs for CDM 2.4.3 CD Needs for Adaptation 2.4.4 CD Needs for Post 2012 Climate Change	28 30 31 34 36
2.5	Capacity Development Action Plan 2.5.1 Potential Sectors for CDM in Bangladesh	37 42

Chapter 2

CLIMATE CHANGE

2.0 Significance and History

2.0.1 Significance

Climate change is considered as one of the most serious threats to the world's environment – with its potential negative aspects on human health, food security, agriculture, fisheries, biodiversity, water, economic activities and other natural resources. According to IPCC, the effect of climate change has already been observed. The average temperature of the earth's surface has increased by 0.6 °c in the late 1800s. It is apprehended that the temperature would rise by another 1.4 to 5.8 °c by the year 2100. The prime reasons for mounting temperature are industrialization, the burning of coal, oil, gasoline, fossil fuel and cutting of forests. These activities have increased the amount of "Green House Gases" in the atmosphere – especially carbon dioxide, methane, CFC and nitrous oxide. These gases are harmful to life support system on the earth. 1990s appeared to have the warmest decade of the last millennium and 1998 was the warmest year. The global warming is apprehended to lead a higher atmospheric temperature, high intensity of rainfall, increased natural disasters (flood and cyclone), more frequent and prolonged droughts and a sea level rise along the coastal area of low lying countries like Bangladesh.

2.0.2 History of United Nations Framework Convention on Climate Change

Growing public concern over global environmental issues pushed the international community to reach an unprecedented agreements on the need to protect the global environment during the 1990s. Scientific assessment of climate change science, impacts, adaptation and vulnerability has played important role in framing a convention on climate change and established different scientific groups under convention and protocol. Recognizing the needs of policy-makers for authoritative and up-to-date scientific information, the World Meteorological Organization (WMO) and the UN Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988. Following a proposal by the Government of Malta, Climate Change for the first taken by the UN General Assembly in 1988 and adopted resolution 43/53 of 6 December 1988 on the "Protection of the Global Climate for Present and Future Generation of Mankind". With a view to reducing the adverse effects of climate change, the United Nations Framework Convention on Climate Change (UNFCCC) was finalized and adopted on 09 May 1992 in New York, USA. The convention was opened for signature at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil, on 4 June 1992 and came into force on 21 March 1994. Today 186 governments are Parties to the Convention. Bangladesh signed the Convention on 9 June 1992 and ratified it on 16 April 1994.

2.0.3 History of Kyoto Protocol

Conference of the Parties to the United Nations Framework Convention on Climate Change at its Third Session (COP3) in Kyoto, Japan agreed to a protocol known as "Kyoto Protocol". This protocol is the first legally binding agreement to reduce emission of greenhouse gases not controlled by other protocol including Montreal Protocol to Ozone Depleting Substances (ODS). The protocol has agreed to reduce average 5.2 percent of greenhouse gases of Annex-I country parties relative to 1990 level by 2008 to 2012 refer as first commitment period. Article 3.2 of the Protocol also stated that each Party included in Annex I shall, by 2005, have made demonstrable progress in achieving its commitments under this Protocol.

After a long period of negotiations, from 1997 to 2004, the Kyoto Protocol came into force on 16 February 2005 after ratification by Russia. Countries that ratified this protocol commit to reduce their emissions of carbon dioxide and other greenhouse gases, or engage in emissions trading if they maintain or increase emissions of these gases. It is to be noted that present shape of Kyoto Protocol is not effective enough as a number of compromises have already been made, and one of the major world emitters has withdrawn her support from Kyoto commitment. Increasing emission trend of Annex-I country parties shows lack of their commitment to the problem. GHG inventory of Annex-I country parties, excluding countries in economic transition, showed that their emission has increased 8.4 percent by 2002 over 1990 level.

Box - : History of Climate Change Convention and Kyoto Protocol

Climate Change & Kyoto Protocol

May, 1992	UNFCCC adopted framework to address Global Climate Change
March, 1995	UNFCCC came into force
June, 1992	Bangladesh signed UNFCCC
April, 1994	Bangladesh ratified UNFCCC
October, 2003	Designated National Authority (DNA) Established in Bangladesh
February, 2005	Kyoto Protocol entered into force Following Russian ratification of the Kyoto Protocol
December, 1997	Kyoto Protocol was adopted at the 3 rd session of the COP to the UNFCCC held in Kyoto, Japan
October, 2001	Bangladesh ratified Kyoto Protocol

2.0.4 Objectives of UNFCCC

The “ultimate objective” of the UN Framework Convention on Climate Change (UNFCCC) is “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (Article 2, UNFCCC). Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. The Framework Convention does not specify such “level of GHG concentration” and “dangerous anthropogenic interference” is also undefined. Timeframe for stabilization is also undefined in the convention. Initially, reduction of green house gas (GHG) was mainly a voluntary commitment on the part of the signatories. In the third conference of parties (COP 3) held in Kyoto in 1997, GHG emission reduction became legally binding.

2.1 Obligations under UNFCCC

2.1.1 Principles of the Framework Convention on Climate Change

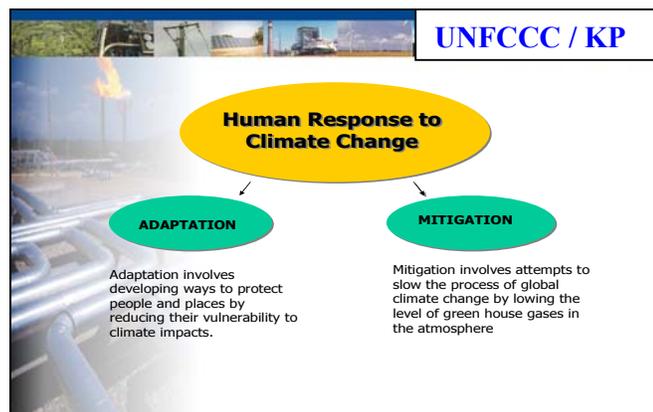
- *The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof. This principle does not preclude developing country and first growing economy not to take any measure in combating climate change.*

- The *specific needs and special circumstances of developing country Parties*, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, *that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration*. The special circumstances of developing country Parties is defined under article 4.8 and 4.9.
- *The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects*. Where there are threats of serious or irreversible damage, *lack of full scientific certainty should not be used as a reason for postponing such measures*, taking into account that *policies and measures to deal with climate change should be cost-effective* so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.
- The Parties have a right to, and should, *promote sustainable development*. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and *should be integrated with national development programmes*, taking into account that economic development is essential for adopting measures to address climate change. This principle is leading the concept of mainstreaming, widely talked inside and outside the convention, climate change into development activities.
- The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.

2.1.2 Key Commitments under UNFCCC and KP

The United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol (KP) have recognized both mitigation and adaptation as response measures to the problem of anthropogenic climate change. Reduction of greenhouse gases which known as “mitigation” is the key measure to address the root cause of anthropogenic climate change where scientific knowledge and technologies of north are dominating. Activities related to cope with adverse effect of climate change including variability and extreme events known as “adaptation” is context specific and therefore same approach and technology will not be applicable for all. This is gradually being accepted both by scientific and negotiating communities. It is expected that the Forth Assessment Report will bring more evidence of climate change impacts and adaptation will get more prominence in the negotiations.

Box: --- Human Response to Climate Change



Under Article 4 of the Convention, both developed and developing countries have agreed to take measures to limit emissions and promote adaptation to future climate change impacts; submit information on their national climate change programmes and inventories; promote technology transfer; cooperate on scientific and technical research; and promote public awareness, education, and training. The Protocol also reiterates the need to provide "new and additional" financial resources to meet the "agreed full costs" incurred by developing countries in carrying out these commitments.

.....**Box**
.....

Reduction Target under Kyoto Protocol

Kyoto is a 'cap and trade' system that imposes national caps on the emissions of Annex I countries. On average, this cap requires countries to reduce their emissions 5.2% below their 1990 baseline over the 2008 to 2012 period. Although these caps are national-level commitments, in practice most countries will devolve their emissions targets to individual industrial entities.

.....
.....

2.1.3 Specific Obligations / Commitments relating to Mitigation

The specific obligations / commitments under the UNFCCC specifically mentioned in the article 4. These are as follows:

1. Each Party included in Annex I, in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall:
 - (a) Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as:
 - (i) Enhancement of energy efficiency in relevant sectors of the national economy;
 - (ii) Protection and enhancement of sinks and reservoirs of greenhouse gases not controlled by the Montreal Protocol, taking into account its commitments under relevant international environmental agreements; promotion of sustainable forest management practices, afforestation and reforestation;
 - (iii) Promotion of sustainable forms of agriculture in light of climate change considerations;
 - (iv) Research on, and promotion, development and increased use of, new and renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies;
 - (v) Progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse gas emitting sectors that run counter to the objective of the Convention and application of market instruments;
 - (vi) Encouragement of appropriate reforms in relevant sectors aimed at promoting policies and measures which limit or reduce emissions of greenhouse gases not controlled by the Montreal Protocol;
 - (vii) Measures to limit and/or reduce emissions of greenhouse gases not controlled by the Montreal Protocol in the transport sector;
 - (viii) Limitation and/or reduction of methane emissions through recovery and use in waste management, as well as in the production, transport and distribution of energy;

- (b) Cooperate with other such Parties to enhance the individual and combined effectiveness of their policies and measures adopted under this Article, pursuant to Article 4, paragraph 2(e) (i), of the Convention. To this end, these Parties shall take steps to share their experience and exchange information on such policies and measures, including developing ways of improving their comparability, transparency and effectiveness. The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session or as soon as practicable thereafter, consider ways to facilitate such cooperation, taking into account all relevant information.
2. The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.
 3. The Parties included in Annex I shall strive to implement policies and measures under this Article in such a way as to minimize adverse effects, including the adverse effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, especially developing country Parties and in particular those identified in Article 4, paragraphs 8 and 9, of the Convention, taking into account Article 3 of the Convention. The Conference of the Parties serving as the meeting of the Parties to this Protocol may take further action, as appropriate, to promote the implementation of the provisions of this paragraph.
 4. The Conference of the Parties serving as the meeting of the Parties to this Protocol, if it decides that it would be beneficial to coordinate any of the policies and measures in paragraph 1(a) above, taking into account different national circumstances and potential effects, shall consider ways and means to elaborate the coordination of such policies and measures.

Under the Kyoto Protocol (KP) agreed in the Third Session of the Conference of the Parties in the Kyoto, Japan, the Annex-I country parties committed to reduce their greenhouse gases 5.2 percent below 1990 level by 2008 to 2012.

2.1.4 Five Year Programme of Work – Adaptation

Five year programme of work on impacts, vulnerability and adaptation to climate change The COP, by its decision 1/CP.10, requested the SBSTA to develop a structured five-year programme of work of the SBSTA on the scientific, technical and socio-economic aspects of impacts of, and vulnerability and adaptation to, climate change, which would address the following issues: methodologies, data and modeling; vulnerability assessments, adaptation planning, measures and actions; and integration into sustainable development in the context of the terms of reference of the SBSTA as referred to in Article 9 of the Convention and to hold an in-session workshop during SBSTA 22 to facilitate the development of this five-year programme of work.(UNFCCC, 2006).Subsequently CoP-11 through decision 2 CP/11 adopted the five year programme of work developed by SBSTA addressing issues of vulnerability, impacts and adaptation to climate change.

The programme of work comprises two thematic areas, each with several action-oriented sub-themes:

- a) Impacts and vulnerability:
 - i) Promoting development and dissemination of methodologies and tools for impact and vulnerability assessments, such as rapid assessments and bottom-up approaches, including as they apply to sustainable development;
 - ii) Improving collection, management, exchange, access to and use of observational data and other relevant information on current and historical climate and its impacts, and promoting improvement of observations, including the monitoring of climate variability;

- iii) Promoting the development of, access to, and use of information and data on projected climate change;
 - iv) Promoting understanding of impacts of, and vulnerability to, climate change, current and future climate variability and extreme events, and the implications of sustainable development;
 - v) Promoting the availability of information on the socio-economic aspects of climate change and improving the integration of socio-economic information into impact and vulnerability assessments;
- b) Adaptation planning, measures and actions:
- i) Promoting the development and dissemination of methods and tools for assessment and improvement of adaptation planning, measures and actions, and integration with sustainable development;
 - ii) Collecting, analyzing and disseminating information on past, and current practical adaptation actions and measures, including adaptation projects, short- and long-term adaptation strategies, and local and indigenous knowledge;
 - iii) Promoting research on adaptation options and the development and diffusion of technologies, know-how, and practices of adaptation, particularly addressing identified adaptation priorities and building on lessons learned from current adaptation projects and strategies;
 - iv) Facilitating communication and cooperation among and between Parties and relevant organizations, business, civil society, and decision makers and other stakeholders;
 - v) Promoting understanding and the development and dissemination of measures, methodologies and tools including for economic diversification aimed at increasing economic resilience and reducing reliance on vulnerable economic sectors, especially for relevant categories of countries listed in Article 4, paragraph 8, of the Convention.

Bangladesh can benefit from the activities to be undertaken in the following areas: methods and tools, data and observations, climate modeling, scenarios and downscaling, climate related risks and extreme events, socio-economic information, adaptation planning and practices, research and technologies for adaptation. Since SBSTA five-year programme is an agreed list of activities under the process of UNFCCC, Bangladesh may approach to bilateral or multilateral source of funding for the implementation of these programmes.

2.1.5 Other Obligations

The following obligations vest on the signatories to the UNFCCC:

- Article 3(3): Adopting measures to prevent and minimize the factors responsible for climate change;
- Article 3(4): Adopting appropriate policies to integrate UNFCCC obligations with national development programmes;
- Article 4: Periodic national inventories of GHG emission; programme for the control of climate change; incorporate suitable policies for the control of climate change in national plans;
 - ⇒ Periodic report on mitigation measures;
 - ⇒ Formulation and implementation of programmes for control of climate change;
 - ⇒ Incorporation of suitable policies for the control of climate change in national plans including education and training policies to enhance public awareness vis-a-vis climate change;
 - ⇒ Developing appropriate integrated plans for coastal zone management;
- Article 5: Research and systematic observation to strengthen national scientific and technical research capacities;
 - Undertaking research and impact assessment on the social, economic and environmental policies;

- Article 6: Strengthening capacities within the means of the signatories keeping harmony and consistency with their national law and regulations;
- Article 7: Conference of parties for periodic examination of the obligations of the signatories, and preparing guidelines for inventories of GHG;
- Article 12: Communication and mechanism of implementation to be brought to the attention of COPs;
- Article 13: Multilateral consultative process for resolving issues arising out of implementation of the provisions of UNFCCC.

2.1.6 Key Decisions

First Session of the Conference of the Parties to UNFCCC established the Ad hoc Group on Berlin Mandate (AGBM) to carry out a process that would enable it to take appropriate action beyond the year 2000, including the strengthening of the commitments of the Annex I Parties through a protocol or other legal instrument. Ministerial Declaration of the Second Session of the Conference of the Parties to UNFCCC confirmed the findings of the IPCC Second Assessment Report (SAR) and calling for “legally binding” commitments and the US announced its support for a legally binding protocol or other legal instrument. The Third Session of the UNFCCC adopted legally binding instrument “Kyoto Protocol (KP)” with ambition of limiting and reducing the greenhouse gas emissions.

The Kyoto Protocol on Climate Change (COP3)

The Kyoto Protocol to the UNFCCC was adopted by COP-3, in December 1997 in Kyoto, Japan, after intensive negotiations. Most industrialized nations and some central European economies in transition (all defined as Annex B countries) agreed to legally binding reductions in greenhouse gas emissions of an average of 6 to 8% below 1990 levels between the years 2008-2012, defined as the first emissions budget period. The United States would be required to reduce its total emissions an average of 7% below 1990 levels, however neither US Government did not sent the protocol to Congress for ratification. The US Government rather explicitly rejected the protocol in 2001.

In order to achieve reduction target the Protocol also established Three Flexible Mechanisms i.e. a) Joint Implementation, b) Emission Trading, and c) Clean Development Mechanism. Bangladesh is eligible to participate in the Clean Development Mechanism (CDM) to help Annex-I countries to meet their commitment and promote sustainable development of Bangladesh.

Buenos Aires Plan of Action (COP4)

COP-4 took place in Buenos Aires in November 1998. It had been expected that the remaining issues unresolved in Kyoto would be finalized at this meeting. However, the complexity and difficulty of finding agreement on these issues proved insurmountable, and instead the parties adopted a 2-year "Plan of Action" to advance efforts and to devise mechanisms for implementing the Kyoto Protocol, to be completed by 2000. The Plan contains the Parties' resolution to demonstrate substantial progress on a) the financial mechanism; b) the development and transfer of technology; c) the implementation of FCCC Articles 4.8 and 4.9, as well as Protocol Articles 2.3 and 3.14 etc.

Marrakech Accords (COP7)

At the COP-7 meeting in Marrakech, Morocco October 29-November 10, 2001, negotiators in effect completed the work of the Buenos Aires Plan of Action, finalizing most of the operational details and setting the stage for nations to ratify the Protocol. The completed package of decisions is known as the Marrakech Accords. The United States delegation continued to act as observers, declining to participate in active negotiations. Other parties continued to express their hope that the United States would re-engage in the process at some point, but indicated their intention to seek ratification of the requisite number of countries to bring the Protocol into force (55 countries representing 55% of developed country emissions of carbon dioxide in 1990). A target date for bringing the Protocol into force was put forward to the World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa the August-September 2002.

The Conference of the Parties also established two funds under the convention i.e. a) Special Climate Change Fund (SCCF), and b) Least Developed Countries Fund (LDCF) to prepare national strategy to address adaptation to climate change. A LDC Expert Group (LEG) and their Terms of References also adopted in COP7. It also established Adaptation Fund (AF) under the Kyoto Protocol.

The Special Climate Change Fund was established to finance developing country activities in (1) adaptation, (2) technology transfer, (3) key sectors (energy, transport, industry, agriculture, forestry and waste management), and (4) economic diversification for countries with economies dependent on the fossil fuel sector. The Least Developed Country Fund was established to support preparation and implementation of National Adaptation Programmes of Action – a prioritised list of urgent and immediate adaptation projects, identifying those priority activities “whose further delay could increase vulnerability, or lead to increased costs at a later stage” (decision 28/CP.7). The operational modalities and procedures have been finalized and one project for Bhutan has also been approved under this fund.

The Adaptation Fund is intended to fund concrete adaptation projects and programmes in developing countries that are particularly vulnerable to the adverse effects of climate change. The funding is provided by a 2% levy on proceeds from Clean Development Mechanism (CDM) projects (excluding those undertaken in LDCs), and “other sources”. The total scale of the Adaptation Fund will therefore depend on the volume of CERs purchased through the CDM and the market value of those CERs.

Montreal Package Decision (COP11)

The meeting, the 11th Conference of the Parties (COP) to the UNFCCC, was also the first Meeting of the Parties (MOP) to the Kyoto Protocol since their initial meeting in Kyoto in 1997. It was therefore one of the largest intergovernmental conferences on climate change ever. The event marked the entry into force of the Kyoto Protocol.

The Kyoto process triggered by Article 3.9 of the Protocol and called the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol has the charge of negotiating post-2012 commitments for developed country parties. In Montreal, parties set no deadline for these negotiations, specifying only that they conclude in time to “ensure...no gap” between commitment periods.

Decision 1/CMP.11 “Consideration of commitments for subsequent periods for Parties included in Annex I to the Convention under Article 3, paragraph 9, of the Kyoto Protocol” is a formal start to discuss future commitment. Decision 1/CP.11 “Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention” is a non-binding setting to exchange experiences and analyse strategic approaches for long-term cooperative action to address climate change. Another stream of discussion is going on under “Gleneagles Plan of Action” where climate change has been recognized as one of the important elements along with energy.

Progress in Nairobi (COP12)

Government negotiators at the United Nations Climate Change Conference in Nairobi continued two processes launched last year in Montreal to consider next steps in the international climate effort, and agreed in the final hours to open another track to review the Kyoto Protocol. In two weeks of talks, parties also agreed on modest steps on adaptation, debated approaches to reducing deforestation and accelerating technology transfer, and heard proposals from South Africa and Brazil on ways to promote stronger action by developing countries.

Despite the lack of progress on future commitment and long-term cooperation, the Parties agreed the principles and modalities of the Adaptation Fund under the Kyoto Protocol. The Parties have agreed “the Adaptation Fund should operate under the authority and guidance of and be accountable to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol”. It had also decided that “membership of the governing body of the Adaptation Fund shall be from Parties to the Kyoto Protocol, following a one-country-one vote rule and have a majority of Parties not included in Annex-I to the convention”. The eligibility

criteria and priority areas will be finalized at their next Subsidiary Bodies Meeting in May 2007 and the institution at the next COP/MOP in 2007. This will enable the most vulnerable countries to access the funds to implement concrete adaptation projects which are needed urgently.

2.2 CURRENT SITUATION AND STOCKTAKING

UNFCCC acknowledged necessity to address adverse impacts of climate change as a common concern of humankind through mitigation or adaptation measures. Adaptation will become increasingly difficult and more costly and some adverse impacts such as the loss of rare species or the melting of glaciers cannot be reclaimed by adaptation measures at all.

Article 4 under the frameworks convention on climate change has stated a number of commitments both for Annex-I and Non-annex I country parties. The Kyoto Protocol created opportunity to participate in Clean Development Mechanism projects. Article 6 under the Convention also allows parties to implement activities on education, awareness raising and training. Subsequent decisions under the Convention and Kyoto Protocol also brought Government of Bangladesh under several obligations in mandatory and voluntary nature. The key commitments and obligations under the Convention and Protocol are given below:

Table 1. Key Commitments and Obligations under the Convention and Protocol

Commitment to the UNFCCC	Status of Implementation	Involved Parties
Preparation and Submission of the National Communication	Submitted in October 2002	DoE , MoEF has involved a consulting house for preparing this National Document which was later on reviewed by a technical team engaged by the Government
National Adaptation Programme of Action (NAPA)	Submitted in 2005 as response to the decision of CoP7.	MoEF involved all relevant agencies and institutes to prepare this national document.
Establishment of Designated National Authority (DNA) to support CDM Project in Bangladesh	DNA is established in 2003	MoEF involved research institutes working on CDM

2.2.1 Submission of First National Communication

The Government of Bangladesh has prepared and submitted Initial National Communication (INC) in October 2002 The National Communication includes national circumstances, mitigation, GHG inventory, vulnerability, adaptation to climate change and a strategy toward climate change response. The Second National Communication is under preparation process.

2.2.2 National Adaptation Programme of Action

National Adaptation Programme of Action (NAPA) for Bangladesh has been prepared by the MOEF, as a response to the decision of the Seventh Session of the Conference of the Parties (CoP7) of the UNFCCC. The preparation process was followed by the generic guiding principles outlined in the annotated guideline prepared by LDC Expert Group (LEG). Involvement of different stakeholders was an integral part of the preparation process for assessing impacts, vulnerabilities, adaptation measures keeping urgency and immediacy principle of the NAPA. Policy makers of Government, local Government (Union Parishad) representatives (Chairman and Members), scientific community, members of the various research institutes, researchers, academics, teachers (ranging from primary to tertiary levels), lawyers, doctors, ethnic groups, media, NGO and CBO representatives and indigenous women contributed to the development of the NAPA for Bangladesh. NAPA includes

immediate and urgent needs for Bangladesh to address adaptation to climate change. It has identified 15 priority activities including general awareness raising, technical capacity building and implementation of projects in different vulnerable areas for an amount of US\$ 73.70 million (Annex- ...). The six Sectoral Working Groups of NAPA were :

- a) Agriculture, Fisheries and Livestock coordinated by Bangladesh Agricultural Research Council (BARC),
- b) Forestry, Biodiversity and Land-use coordinated by IUCN, Bangladesh,
- c) Water, Coastal Zone, Natural Disaster and Health coordinated by Water Resources Planning organization (WARPO),
- d) Livelihood, Gender, Local Governance and Food Security coordinated by Bangladesh Institute for Development Studies (BIDS),
- e) Industry and Infrastructure coordinated by Department of Environment (DoE), and
- f) Policies and Institutes coordinated by Bangladesh Centre for Advanced Studies (BCAS).

2.2.3 Establishment of Designated National Authority

In order to participate in the Kyoto Protocol CDM process for generating Certified Emission Reduction (CER), the Government has set up a two tier Designated National Authority (DNA) on 13 October 2003. The lower tier which is known as National CDM Committee – operational body of the DNA – is headed by the Secretary, MoEF. It is performing all CDM related activities including preliminary approval of CDM projects. The upper tier, known as the CDM Board, is headed by the Principal Secretary to the Hon'ble Prime Minister gives the final endorsement of the approved projects. The main task of the DNA is to approve CDM projects, which can eventually be registered by the CDM Executive Board of the UNFCCC. The Bangladesh DNA has approved 4 projects till date. The DoE is providing secretarial support to the Bangladesh DNA.

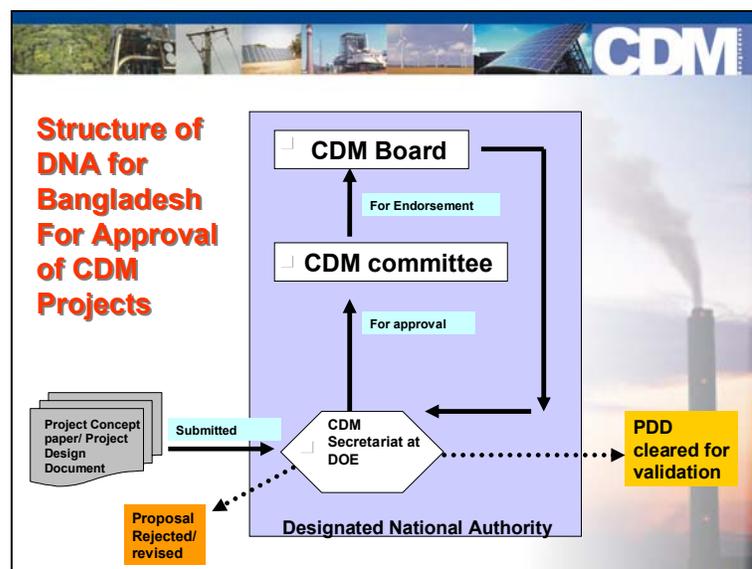


Figure 1. The DNA Chart Showing the CDM Project Approval Process for Bangladesh

2.2.4 Climate Change Cell

The Climate Change Cell has been established in the Department of Environment (DOE) in 2004 under the Comprehensive Disaster Management Program (CDMP) of the Government. It responds to the recognition that Bangladesh is particularly vulnerable to the effects of climate change and that the scale and frequency of climate-related disasters is likely to increase. The Cell provides the central focus for the Government's climate change related work, operating as a unit of DoE. Its objective is to enable the management of long term climate risks and uncertainties as an integral part of national development planning. This will also contribute to strengthen the capacity of Bangladesh disaster management system to reduce unacceptable risks and improve response and recovery activities. The Cell focuses on the following four main areas:

- Building the capacity of Government to coordinate and integrate the climate change issues;
- Strengthening existing knowledge and availability of information on impact prediction and adaptation to climate change;
- Awareness raising, advocacy and coordination with partners across Government, NGOs, Civil society, private sector and development partners;
- Improving capacity to adapt livelihoods to climate change in the agriculture sector.

2.2.5 Current Status of CDM Projects in Bangladesh

Clean Development Mechanism (CDM) was devised to help Annex I (developed) countries meet their Green House Gas (GHG) emission reduction targets in a cost-effective manner by allowing them to acquire certified emission reductions (CERs) from abatement projects in non-Annex I (developing countries). Apart from having global benefits, CDM projects should also promote sustainable development in non-Annex I countries.

According to Article 12 of the Kyoto Protocol, the "purpose of the Clean Development Mechanism shall be to assist Parties not included in Annex I in achieving sustainable development, and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3".

Highly innovative, CDM has the potential to meet the needs of both developing and industrialized countries. It could help solve non-Annex I countries' capital needs for the financing of technology transfer for clean, energy efficient economic development and for addressing environmental issues such as loss of biodiversity, while also providing a lower cost, more flexible alternative for Annex I countries to meet emissions reduction targets.

The CDM aims to direct private-sector investment into emission reduction projects in developing countries while promoting sustainable development in these countries. In return, the developed countries receive credits against their Kyoto targets. CDM projects that reduce emissions of green house gases will create Certified Emission Reductions (CERs) which can then be used by Annex I parties (and their private entities) in greenhouse gas reduction projects as well as to facilitate the transfer of new technologies that reduce green house gas (GHG) emissions in non-Annex-I countries. CDM project portfolio of Bangladesh is shown in [Table 1](#).

Table 1: Summary Of The Current CDM Project Portfolio

SI.	Name	Estimated Emission Reduction Tons of CO2e/ Yr.	Estimated Emission Reduction Tons of CO2e/10 Yr.
1	REGISTERED PROJECTS (2)		
	• Landfill Gas Extraction and Utilization at Matuail Landfill Site, Dhaka	80,000	800,000
	• Composting of Organic Waste in Dhaka (700 tons/day)	89,259	892,590
2	UNDER VALIDATION (2)		
	• 30,000 Solar Home Systems in Non-Grid Areas	10,000	100,000
	• Promotion of 1,00,000 Compact Fluorescent Lamps in Rural Areas	5,000	50,000
3	PROJECT BEING SUBMITTED FOR DNA APPROVAL (3)		
	• Bundled Co-composting Projects in Eight Secondary Towns of Bangladesh	13,500	135,000
	• Landfill Gas Extraction and Utilization at Raufabad Landfill Site, Chittagong.	25,000	250,000
	• Composting of Organic Waste in Chittagong (200 tons/ day)	17,250	172,500
4	PROJECTS IN PIN STAGE (1)		
	• Industrial Co-generation Project at Monno Fabrics (11 MW)	8,000	80,000
Total Emission Reduction from Current 8 Projects		248,000	2.480,000

Apart from aforementioned projects following projects are in a concept stage.

- Bundled Efficient Brick Klin Project (Fuel Switching/ Energy Efficiency)
- Poultry Waste Management Project (Waste Sector)
- Use of SPV Pumps for Irrigation (Fuel Switch)

2.2.6 Completed and On-going Projects and Studies on Climate Change

Government of Bangladesh and NGOs have completed a significant number of projects and studies to understand the impact and vulnerability of climate change and adaptation strategies and some of them include (in the light of mitigation and adaptation):

Mitigation

- Bangladesh Climate Change Study
- Asia Least Cost Greenhouse Gas Abatement Strategy, ALGAS (Bangladesh Chapter)
- Climate Change in Asia: Bangladesh
- Institutional Strengthening for the Phase-out of Ozone Depleting Substances (Phase-I and Phase-II)
- Conversion to CFC-free Technology in the Manufacture of Aerosol Products
- The ban on the use, production and marketing of polyethylene shopping bags is considered as a historic step in this regard which has been implemented from 2002

- The Environment Conservation Rules, 1997 has been amended and under the amended rules, use of Catalytic Converter and Diesel Particulate Filter for Petrol and Diesel driven vehicles respectively has been made mandatory
- National Action Plan for Bangladesh on Control and Prevention of Air Pollution and Its Transboundary Effects
- Preparation of Initial National Communication in Response to the UNFCCC
- Institutional Strengthening for the Phase-out of Ozone Depleting Substances (Phase-III)
- Air Quality Monitoring Project (AQMP)
- Implementation of a National Program for Recovery and Recycling of Refrigeration
- Restricting the use of old and dilapidated vehicles and three wheelers with two-stroke engines and initiating a project on use of Compressed Natural Gas (CNG) in the vehicles instead of gasoline to reduce the vehicular emission of CO₂ and other harmful airborne particles and air pollution
- Ministry of Communication has also taken a step for a total ban on plying of two strokes three wheelers in Dhaka City from January 2003, followed by the introduction of CNG run auto-rickshaws
- A ban has been imposed on plying in Dhaka City from 1 January 2002 of Bus, Minibus, Microbus, and Taxi older than 20 years and Truck, Mini truck, Tank lorry, Van older than 25 years
- Installing chimneys with the height of 120ft in the brick kilns and promoting the manufacture of concrete block brick blocks has also proven to be effective decisions towards curbing air pollution
- In October 2002, MoEF submitted its Initial National Communication to the UNFCCC which includes national circumstances, a GHG inventory, and chapters on vulnerability and adaptation to climate change, mitigation and a climate change response strategy

Adaptation

- Vulnerability and Adaptation to Climate Change
- Coastal and Wetland Biodiversity Management Project
- Formulation of National Programme Based on Agenda-21 adopted at the Earth Summit in Rio de Janeiro, 1992
- Coastal and Wetland Bio-diversity Management in Cox's Bazar and Hakaluki Haor
- Several sub-projects under the Sustainable Environment Management Programme (SEMP)
- 25 studies under the Flood Action Plan (FAP) after the disastrous floods of 1987 and 1988
- Project on Forestry Resources Master Plan
- Projects on Integrated Coastal Zone Management (ICZM) and Meghna Estuary Study (MES)
- Strengthening of the monitoring and warning systems of the disastrous events of weather, such as, tropical cyclones and floods in the respective concerned institutions
- Construction of riverbank and coastal embankments to protect vulnerable areas from monsoon flooding
- Construction of more than 2000 cyclone shelters for safety of the vulnerable population during cyclonic storms and associated surges

- Steps to solve the transboundary water issues with India along the Ganges and signed a bilateral treaty with India on the sharing of Ganges water
- Creation of reserve forests and sanctuaries for conservation and preservation of biodiversity
- Inclusion of climate change issues and other environmental concerns in the curricula of the general and specialized education system of the country
- Conducting awareness campaign, in active cooperation of the civil society and the NGO community, among the general masses through the news and electronic media, leaflets, posters, rallies, seminars, symposium, observance of various environment related days and discussion meetings about various environmental issues including climate change
- Continuous drive towards roadside plantations and plantations on fallow lands. The Department of Forest has raised artificial mangroves in the coastal zone in an area of 113 thousand hectares. Besides, there is a program for plantation in the coastal zone aiming at the environmental and ecological conservation and income generation of the poor people living in those areas
- Strengthening medical education, research and health care and health awareness programs
- Reducing Vulnerability to Climate Change (RVCC) is a community-based project funded by CIDA and implemented by CARE Bangladesh in the southwestern region of Bangladesh. It has produced valuable knowledge and information about community-based adaptation to climate change and these results will be integrated into the future work
- The contribution of BARI and some other universities relating to the development of salt tolerant species
- National Environment Management Action Plan (NEMAP) addressed scoping, assessment and identification of needs and priorities for sustainable environment management
- Sustainable Environment Management Program (SEMP) was designed to enhance national capacity to enable sustainable environmental management. The 2nd phase of SEMP has been named Sustainable Environmental Governance and is commencing this year.
- Bangladesh Environmental Management Project BEMP is to increase the capacity for sustainable environmental management in Bangladesh, by strengthening the institutional capacity of the DoE to enable it to carry out its legislative powers and functions
- Integrated Coastal Zone Management Program (ICZMP) deals with sustainable development of the coastal zone of Bangladesh and developed a coastal zone policy, coastal development strategy and a process to develop priority investment plans accommodating climate change concerns
- Livelihood adaptation to Climate Change (LACC) in Drought Prone Areas is jointly implemented by the Food and Agriculture Organization (FAO) and the Department of Agriculture Extension (DAE), under Climate Change Cell, Department of Environment. The project tried to address the needs of farmers and agricultural crops in drought prone and drought affected areas of Bangladesh with regard to risk management and adaptation in related livelihoods
- Adaptation Research of Climate Change Cell on the following:
 - a. Adaptive Crop Agriculture including innovative Farming Practices in the Haor Basin
 - b. Adaptive Crop Agriculture including innovative Farming Practices in the Coastal Zone of Bangladesh
 - c. Climate Change and Health Impacts
 - d. Crop Insurance as a Risk Management Strategy in Bangladesh
 - e. Climate Change, Gender and vulnerable Groups in Bangladesh
- An Adaptation Research Advisory Committee (ARAC) has been formed with senior researchers and experts to oversee the whole Adaptation Research Activities at the field level and guide them to get tangible deliverables for the farmers, researchers, academicians and policy makers

2.2.7 Post 2012 Climate Change Regime

There is no formal proposal from Bangladesh on Beyond 2012 and discussion in the country. But Bangladesh has participated in a number of international and regional meetings where Beyond 2012 issue has been discussed. Representatives of the government in different international meetings and negotiations urge for deeper cut of greenhouse gases and more support for adaptation in future. Crediting period must be expanded beyond 2012 and longer period for effective implementation. Adaptation measures must be implemented soon.

Recently Bangladesh Centre for Advanced Studies (BCAS), International Institute of Environment and Development (IIED) and European Capacity Building Initiative (ECBI) has organized training for South and Southeast Asian negotiators in Bangladesh where it has discussed a number of negotiating issues.

2.3 PRIORITY ENVIRONMENTAL ISSUES (PEIs)

Climate is an important determinant of the geographical distribution, species composition and productivity of forests and changes in the climatic regimes can modify the pattern and productivity irreversibly, affecting traditional livelihoods, forest-based industries, soil and water resources. The Third Assessment Report of IPCC WG II appends that in the event of 0.5^oC to 2.0^oC rise in temperature, sea level rise would be exacerbated, inundating 15% of the Sundarbans of Bangladesh and leading to primary and secondary impacts such as loss of species and loss of biodiversity. According to the IPCC, at least one-third of the forests will be adversely affected by climate change, reducing carbon sinks, soil fertility and precipitation and conversely increasing the incidence of pests, forest fires and natural disasters.

2.3.1 PEIs identified in NAPA Regional Workshop

The key environmental issues as identified during the NAPA regional workshops held in the four major divisions of the country have also been short-listed here. Identified key environmental issues are as follows:

In the Khulna division, the major issues were:

- Water logging
- Salinity Intrusion
- Lack of safe drinking water
- Cyclone/Tidal bore
- Flood (Rainfall and riverine flood)
- Drainage congestion

In Rajshahi division, following were the key issues:

- Drought/dryness/lack of rainfall in dry season
- Lowering ground water level
- Shortage of surface water/dried up water bodies
- Flood (riverine and flash flood)
- Lack of safe drinking water
- Severity of winter and summer/variability of temperature
- Excessive fog
- Hot wind
- River bank erosion
- Temperature related health disorders
- Drainage congestion

In Sylhet Division, the prioritized issues were:

- Flash flood
- Sedimentation on river and canals
- Excessive rainfall/ variability of rainfall
- Declining aquatic flora and fauna (*nalkhagra, hijol, karoch, kolmi* etc.)

- Drought/shortage of surface water in dry season
- Variability of seasons
- Severity of winter and summer/variability of temperature
- Waterlogging and drainage congestion.

In Chittagong division, the key stresses identified were:

- Cyclone/ Tidal bore
- River/coastal erosion
- Salinity.
- Deforestation/ Deterioration of forest resources
- Irregular rainfall/ excessive rainfall at a time
- Drainage congestion
- Flood (flash and hilly flood)
- Salinity related health disorders (Blood Pressure, Water Borne Diseases, skin diseases etc.)
- Water logging and drainage congestion.

2.3.2 PEIs identified in the Thematic Group Meeting of NCSA

The Priority Environmental Issues (PEIs) identified through the various Thematic Group (TG) meetings have been summarized in the following section:

a. Mitigation

Climate Change induced priority issues are:

- Sea level rise in the coastal areas of Bangladesh;
- Temperature rise and its impact on agricultural output, human health, infrastructures and energy consumption;
- High intensity of rainfall causes flash flood;
- Increased natural disasters (floods and storm surges);
- Frequent and prolonged floods;
- Scientific prediction of climate change phenomenon is still lacks in Bangladesh;
- Scarcity of fresh water due to less rain and higher evapo-transpiration in the dry season;
- Drainage congestion due to higher water levels in the confluence with the rise of sea level;
- Widespread drought in the northern region;
- Wider salinity intrusion in the surface, ground and soil in the coastal zone;

b. Clean Development Mechanism

- Except waste projects (landfill gas to power and composting), maximum 30% of the investment can be covered by CERs. There is need for local financing to match rest 70% of investment.
- With the current interest rate of commercial banks many projects seems difficult to realize or IRR becomes not very attractive.
- There is a problem of clear-cut baseline identification for many biomass and poultry waste management projects.
- Low level of awareness amongst the financial, private and public sector about CDM opportunities.
- Many energy and waste sector CDM project requires bundling approach. Identification of right institution for bundling of the projects is in some instances a big barrier to implement the projects.



CURRENT ISSUES IN CARBON MARKET DEVELOPMENT

- ❑ Except waste projects (landfill gas to power and composting), maximum 30% of the investment can be covered by CERs. There is need for local financing to match rest 70% of investment.
- ❑ With the current interest rate of commercial banks many projects seems difficult to realize or IRR becomes not very attractive.
- ❑ There is a problem of clear-cut baseline identification for many biomass and poultry waste management projects.
- ❑ Low level of awareness amongst the financial, private and public sector about CDM opportunities.
- ❑ Many energy and waste sector CDM project requires bundling approach. Identification of right institution for bundling of the projects is in some instances a big barrier to implement the projects.

The TG meeting identified following issues/constrains in CDM:

- CER (Certified Emissions Reduction) can differ across projects and regions. For instance, hydro power generation projects will have CER of about 5-10% and might not be feasible;
- It was argued that developing countries shall remain poor under the CDM mechanism because of the current mode of trade in emissions and it is not viewed as a win-win situation;
- In adequate knowledge in Government machinery about the investments in CDM Project.
- Soft loan financing is a major barrier for Bangladesh.
- Lack of inter-ministerial coordination and conflicts within government policies.
- Institutional memory is not retained in bureaucracy and focal points are regularly changed or transferred in the government's administrative system.

c. Adaptation

Adaptation to Climate Change is a growing concern, but it still receives less attention in the international policy arena than efforts to mitigate climate change. This is of particular relevance to poor countries, which contribute little to increasing atmospheric concentrations of greenhouse gases, and yet suffer disproportionately from the affects of climate change due to their location in some of the most vulnerable parts of the world and their low capacity to cope with climate change.

Whilst adaptation is prevalent throughout the UNFCCC, it has less 'backup' from the researcher community than mitigation, and has only seriously been on the agenda for the last 3-4 years. Climate change is a reality, climate change is happening, and the need to adapt cannot be avoided.

Though there are evidence of increasing international commitment to adaptation, but lack of associated funding, and lack of linkages with relevant work on poverty. How to reach the poorest communities remains problematic, and stakeholders must realize that working with the poor is expensive and adaptation projects are difficult to deliver in practice. The inherent un-replicability of adaptation projects, each will need to be site/community specific and the fact many are likely to be small-scale, if they are to enhance local livelihoods is a major challenge for international institutions, particularly donors, and means thought must be given by these institutions to becoming more responsive and flexible to these realities.

The level of research on adaptation to climate change has been relatively poor to date, particularly when compared with the level of research effort invested in mitigation.

- Bangladesh cannot harness a lot of opportunities for funding because of its poor skills to design projects properly;
- Absence of proper coordination and understanding among relevant ministries and agencies.
- Poor and weak infrastructure of the country is unable to adapt with natural calamities;
- Vulnerable community housing system is a major curse due to poverty;
- Sustainability of good programme / project becomes an issue;
- Shortage of manpower or experts is a major impediment to adaptation.
- Retaining institutional memory has become a problem because government jobs are transferable;

d. PEIs in Post 2012 Climate Change Regime

Sir Nicholas Stern's report on 'Economics of Climate Change' was a 'must read' for all professionals dealing with climate change – where he has computed that devoting 1% of the current world GDP to climate change mitigation and adaptation measures could actually save about 20 times of the cost that will have to be incurred in future to do the same. He added further that the developed or industrialized nations are responsible for accelerating climate change phenomenon because of their irrational behaviour. Before the 1990s, they contributed over 80% of the global emissions and LDCs, as the worst victims of climate change, lack the capacity to overcome its impacts. The PEIs as identified by the TGs meetings are as follows:

- Till date the emission level has increased to 22%-23% by the developed countries
- The glaciers serve a purpose of reflecting the UV ray away from the earth surface. As the glacier melting is taking place due to increase in temperature, more UV ray will come directly to the earth surface.
- Centrally the federal Govt. of America is not yet committed to Kyoto Protocol (KP).
- Institutional capacity loss is one of the major problems in Bangladesh
- Scientific basis of climate change is still lacks in the context of Bangladesh
- Every other 2/3 years the system has to start with fresher/ new people
- At the individual level capacity is very isolated

2.4 IDENTIFYING CAPACITY DEVELOPMENT NEEDS

MoEF is the Official Focal Point of the UNFCCC and DoE as a technical wing of the MoEF carryout the activities related to the framework convention and protocol. It is revealed that the MoEF and DoE closely work with other government and non-government department and research institutes in Bangladesh. Therefore, capacity of the both government and non-government organizations is important in meeting commitment under the framework convention and protocol.

Conference of Parties and Meeting of the Parties to Framework Convention and Protocol are being attended by the Ministry of Environment and Forest as focal point from the very beginning and negotiating different articles of the convention and protocol. However, there is lack of institutional memory due to changes in personnel in the ministry. Existing government policy either does not permit or lack of initiative from the ministry to utilize experiences and capacity of the government officials in the international negotiations.

It is important to note that MoEF has nominated Director Technical of the Department of Environment to attend in almost all international negotiations under the framework conventions. Therefore, institutional memory and capacity lie mostly with the Department of Environment. It is worth mentioning that Bangladesh lead the LDC group for two years in the climate change negotiations due to its excellent performance. The recently established

Climate Change Cell is helping negotiators for better preparations, carrying out studies to create knowledgebase and training for awareness raising among the government officials.

In the international negotiations, involvement of representatives from the NGOs became common in Bangladesh without financial commitment from the government. This increases capacity of the negotiating team and shows good working relationship between government and non-government organizations.

Capacity of Other Government and Non-Government organisations

As mentioned earlier that other government and non-government organizations played important role in complying commitments under the Framework Convention and Protocol. A summary of their capacity is given below.

Table 3. Summary of Technical Capacity of Other GOs and NGOs

Name of the Organization	Area of Technical Capacity	Involvement
Bangladesh Agricultural Research Council (BARC)	Modelling of impacts, vulnerability and adaptation of agriculture to climate change. Modelling done on major crops DESAT	US Climate Change Country Study and NAPA. They are also involved in other modelling exercise.
Bangladesh Centre for Advanced Studies (BCAS)	Climate Change Scenario Generation using General Circulation Model (GCM) Modelling of impacts, vulnerability and adaptation of water resources to climate change using GIS Assessment adaptation for different sector using quantitative and qualitative methodologies Preparation of GHG inventory for Energy, Agriculture and Forestry Sector Design and Development of CDM Projects Design and Development of Community Based Adaptation Projects Community Risk Assessment and Action Plan Development Development of position for negotiations	All major national studies on climate change impacts and adaptation. ALGAS NAPA SSN-CDM RVCC SSN Adaptation ABD CDM Initiative Negotiation Capacity building training for negotiators CBA Workshop Establishment of DNA CDMP DFID
Bangladesh Institute of Development Studies (BIDS)	Economic assessment of impacts and adaptation Livelihood GHG and Mitigation strategies (MARKEL)	ADB Study ALGAS US Climate Change Study NAPA
Bangladesh University of Engineering and Technology (BUET)	GHG Inventory Future Scenario Development and Mitigation Strategies (LEAP)	US Climate Change Study ALGAS Establishment of DNA
Bangladesh Unnayan Parishad (BUP)	Water Policy Vulnerability and Adaptation Assessment Scenario Development using RCM and GCM	US Climate Change Study ALGAS NAPA
Centre for Environment and Geographic Information Services (CEGIS)	Modelling of Water Resources Salinity Intrusion Impacts on livelihoods	NAPA CDMP DFID
Institute of Water Modelling	Modelling of Water Resources Salinity Intrusion	
Waste Concern	Design and Development of CDM Projects New Methodology Development for CDM	Establishment of DNA
Water Resource Planning Organization (WARPO)	Policy and Planning	NAPA

2.4.1 CD Needs for Mitigation

Capacity Building at the Individual Level

- Individual capacity to be enhanced in the concerned Government Department with special priority on DOE, Bangladesh Metrological Department, SPARRSO, for monitoring the Sea Level Rise, temperature rise etc;
- Sensitization of the policy makers and all relevant ministries such as MoEF, MoL, MoA, MoFL, is crucial ;
- Civil society and private sector cooperation needed to be developed
- Networks among Government agencies relevant to climate change is needed to be strengthened to disseminate existing knowledge;
- Climate Change Cell at DOE should develop a forum through e-mail service where individual can share experience;
- Individual capacity of the concerned Government officials needed to be enhanced in terms of understanding the negotiation processes of international conventions as well as protocols;
- DOE should take lead to initiate/organize different forums with relevant experts to strengthen individual capacity in term of adaptation, mitigation and negotiation;
- The younger professionals needed to develop their expertise on environmental issues;
- Different funding possibilities should be made available to the younger professional/ concerned personnel to pursue higher education regarding climate change;
- Utilization of the existing capacity is very important;

Capacity Building at the Institutional Level

- The capacity of the Climate Change Cell of DOE needed to be enhanced. Climate change cell at DOE should have a permanent institutional setup for carrying out long term climate change related activities. Experts / academics needed to be involved in the process;
- Apart from the Govt. bodies, the capacity of the private sector, NGOs and academics needed to be strengthened;
- Internalization of climate change understanding is also needed within the system of GoB;
- Continuity of the institutional memory is inevitable. Mechanism to be developed to keep the institutional memory within the government system;
- Initiative to be taken to strengthen the capacity of the public and private Universities such as DU, KU, CU, RU, NSU, BRAC, EWU, IUB and etc.
- A win-win situation is to be created to develop a partnership and linkage between the public and private sector, NGOs and academicians ;
- Digital Elevation Model (DEM) should be introduced at all water monitoring spots;
- Emphasis to be given to provide with technical support, tools (software) to the research centers ;
- Subcontracting or outsourcing of the activities related to climate change to other research organizations/institutions;

Capacity Building at the Systemic Level

- Strengthening the GHG monitoring system in Bangladesh;
- Strengthening of the coastal environmental monitoring system in Bangladesh;
- Focal point to be identified for separate conventions/protocols in the concerned ministries/ departments;
- Module to be developed in the concerned training institute for the different professionals / service cadre such as civil service, teachers, police, custom officials etc;
- Incorporation of climate change module in all the foundation courses provided by PATC, NAEM, Academy for Planning and Development;
- Prior to negotiation or any other meeting, briefing sessions to be organized facilitated by experts and debriefing sessions to be organized after participating any international meeting for sharing knowledge;

- Priority should be given to select the Bangladesh delegation based on knowledge and relevancy of the key officials for the CoPs as well as SBSTA meetings of the conventions;
- Integrated coastal zone development project in respect of climate change keeping in mind about sea level rise;
- Water management improvement projects considering probable climate change impacts;
- Detailed study on GHG mitigation mechanisms and policy options;
- Research on climate change impacts, vulnerability and adaptation;
- Research on the improvement of the design criteria and development of the suitable technology adaptive to the changed scenarios due to climate change;
- Strengthening of the disaster monitoring and warning system;
- Study of climate change impacts on agriculture, crop production and human health;
- Study of the impact of climate change on existing sewerage and drainage systems and urban water supply schemes;
- Study on impact of climate change on existing flood control, irrigation and drainage project;
- Study on ecosystem management, bio-diversity and wild life conservation and protection;
- Study of the change of agro-ecological zone, droughts and floods in Bangladesh at the changed scenario;
- Study of tropical cyclones using numerical models;
- Sector specific emission coefficient is necessary for preparation of a comprehensive national GHG inventory. Forestry, Agriculture and Waste Sector are key for Bangladesh in this respect.

2.4.2 CD Needs for CDM

The Government and the public sector are important players in the CDM process in Bangladesh. A limited number of very sketchy capacity building efforts have been undertaken for this group. The most telling example is that many members of the DNA (those representing other ministries and government agencies) have not received any training despite repeated requests from them.

Data Deficiency for Defining Baseline: Several projects have found that most industrial establishments do not maintain data properly. Also, because of widespread pilferage of electricity and gas, industrial establishments do not want to reveal their actual energy consumption and output. In several cases, the specifications of the energy consuming equipment could not be provided. On top of all this, policy confusion from the Government's side creates a very difficult situation for establishing baseline. Thus establishing baseline for CDM projects proved to be very difficult and frustrating.

Management Deficiency in Private Sector Establishments: The Japanese team investigating the opportunities for cogeneration especially highlighted the management deficiencies in the private sector industrial establishments. They found that most industrial units were operating on an informal management structure, and would not be able to comply well with the monitoring and verification requirement of the CDM. The changes that would be required in these establishments would increase the operation period transaction cost significantly.

Low Level of Awareness in the Private Sector: The general lack of awareness in the private sector about CDM has been pointed out by all studies and projects dealing with CDM. The Japanese team, which actually visited a number of private sector industrial establishments, found it extremely frustrating that they had to first offer a lesson on CDM before they could even mention cogeneration. In general, Bangladeshi entrepreneurs are first-cost sensitive. Energy efficiency, energy management and cleaner production are of little significance to Bangladeshi industrialists because energy prices are low, and in many cases they do not pay for their full consumption. Therefore, unless effective CDM awareness among the private sector industrialists can be achieved, not many will come forward because the benefits of the CDM process is not readily apparent to them. Bangladeshi entrepreneurs are extremely risk-

averse. CDM projects despite the CER subsidy remain risky projects. Bangladeshi private sector is only likely to be interested if low interest credit is made available. This would thus require the even-more-risk-averse lending institutions to change their outlook and fund CDM projects. A two-pronged capacity building effort needs to be pursued vigorously. A partnership needs to be forged between the NGOs, which can supply the CDM expertise, and the DNA, which in Bangladesh has been entrusted with the promotional role. For this, adequate funding from bilateral, multilateral and other international Climate Change organizations can be mobilized.

CDM is, by and large, an unfamiliar concept for many of the prospective CDM project developers. It is expected that more and more CDM projects will be developed as awareness rises and capacity increases. It is however worth pointing out that in the context of Bangladesh at the present time CDM in the energy sector suffers from the following three shortcomings:

1. The potential for renewable energy technologies other than PV has been identified to be low;
2. Not only is the total energy consumption very low, but also all large energy consuming industries are in the public sector, and it is here that the greatest potential lie; and
3. The small-scale nature of many energy consuming activities in the private sector imply that these have to be bundled to have a reasonable size project.

Renewable Energy Potential – Several studies have revealed that renewable energy technology potential is low in Bangladesh. This statement must however be immediately qualified by adding that these studies have been neither extensive nor rigorous. As the cost of renewable technologies come down, the potential will certainly rise. Moreover, CDM is concerned with individual projects and not the total potential. Thus, even if there is only 300 MW of wind potential, twenty 15-MW CDM projects can be developed. The PV dissemination program is doing fairly well, and total installed capacity stands at over 3 MW.

Most CDM Potential are in the Public Sector – The low energy consumption certainly limits the potential, but in a developing country like Bangladesh, energy consumption is continuously increasing (> 6% per year). This implies that the future consumption will be significant. Most of this increased consumption is expected to occur in the private sector. As is well known, developing country entrepreneurs routinely opt for the cheapest technology. These inexpensive technologies have a feature that they are energy inefficient, and can consume 50 to 100% more energy compared to the state-of-the-art or advanced technologies. If entrepreneurs desiring to set up new industries can be targeted so that they opt for cleaner technologies, then considerable sustainable development can be achieved and many CDM projects can be implemented. There are several ways to make new industrial efforts to take cognizance of CDM. It can be achieved through lending institutions that provide loans or through utilities that give connection for electricity and gas. The easiest, however, is through the Department of Environment (DoE) whose certification is required to set and operate any energy consuming industrial activity. Since the DNA is located in the DoE, this is an ideal match. The promotional role of the DNA can be suitably fulfilled by providing advise to new industrial ventures as to how they can take advantages of the opportunities arising out of the CDM.

Bundling of Small-scale Projects for Private Sector CDM Projects – The bundling of small-scale projects can be an important issue for Bangladesh, because many potential CDM sectors in the private sector are small-scale activities. BCAS and Waste Concern are also tinkering with the concept. It would be very helpful if the Executive Board or CDM think-tanks came up with some guidelines and models for bundling small-scale projects.

Despite the limitations discussed above, there exist potential for CDM projects as evidenced by the on-going efforts. One thing is definite, and that is, the potential of many CDM technologies have not been assessed in any systematic manner. Moreover as newer technologies, which increase the efficiency of utilization, become available in the future, the existing potential will naturally increase. The important issue is that the existing potential is not being harnessed. If CDM is correctly applied at least a dozen projects can be formulated immediately.

Several CDM awareness raising and project development activities have been initiated. Some of these have concluded, while others are ongoing. These projects have revealed a lot about the CDM process in Bangladesh. The lessons learned from the various CDM related projects that have taken place until August, 2006 could be summarized as follows:

- (i) Lack of technical data and information to accurately define the baseline and the project
- (ii) Management deficiency in private sector industrial establishments
- (iii) Low level of awareness of energy efficiency, energy management and cleaner production and in particular of the opportunities under CDM in both public and private sector establishments
- (iv) Insufficient cooperation from the relevant Government departments mainly because of the lack of awareness about CDM

Data Deficiency for Defining Baseline – Several projects have found that most industrial establishments do not maintain data properly. Also, because of widespread pilferage of electricity and gas, industrial establishments do not want to reveal their actual energy consumption and output. In several cases, the specifications of the energy consuming equipment could not be provided. On top of all this, policy confusion from the Government's side creates a very difficult situation for establishing baseline. Thus establishing baseline for CDM projects proved to be very difficult and frustrating.

Management Deficiency in Private Sector Establishments – The Japanese team investigating the opportunities for cogeneration especially highlighted the management deficiencies in the private sector industrial establishments. They found that most industrial units were operating on an informal management structure, and would not be able to comply well with the monitoring and verification requirement of the CDM. The changes that would be required in these establishments would increase the operation period transaction cost significantly.

Low Level of Awareness in the Private Sector – The general lack of awareness in the private sector about CDM has been pointed out by all studies and projects dealing with CDM. The Japanese team, which actually visited a number of private sector industrial establishments, found it extremely frustrating that they had to first offer a lesson on CDM before they could even mention cogeneration. In general, Bangladeshi entrepreneurs are first-cost sensitive. Energy efficiency, energy management and cleaner production are of little significance to Bangladeshi industrialists because energy prices are low, and in many cases they do not pay for their full consumption. Therefore, unless effective CDM awareness among the private sector industrialists can be achieved, not many will come forward because the benefits of the CDM process is not readily apparent to them. Bangladeshi entrepreneurs are extremely risk-averse. CDM projects despite the CER subsidy remain risky projects. Bangladeshi private sector is only likely to be interested if low interest credit is made available. This would thus require the even-more-risk-averse lending institutions to change their outlook and fund CDM projects. A two-pronged capacity building effort needs to be pursued vigorously. A partnership needs to be forged between the NGOs, which can supply the CDM expertise, and the DNA, which in Bangladesh has been entrusted with the promotional role. For this, adequate funding from bilateral, multilateral and other international Climate Change organizations can be mobilized.

Importance of Capacity Development in Relevant Government Departments – As mentioned in several places in this document, the Government and the public sector are important players in the CDM process in Bangladesh. A limited number of very sketchy capacity building efforts have been undertaken for this group. The most telling example is that many members of the DNA (those representing other ministries and government agencies) have not received any training despite repeated requests from them.

The final conclusion is that adequate funding must be made available to the poorly-funded DoE, which houses the DNA, to be able to discharge the functions and duties as required to promote and approve CDM projects. One source can of course be CDM project approval fee. In this early stage of CDM, a large fee will certainly be a severe deterrent for project developers, and many innovative ideas may not be pursued because of high transaction cost.

It is highly unlikely that the Government will be able to find funds from its own resources given the heavy demand from other priority sectors. The funds must therefore come from multilateral/bilateral organizations and developed country trust funds earmarked for Climate Change (CC). International CC NGOs can also be sources of capacity building funds. Some bilateral funds are available, but the DNA has not been able to write a proposal to access those. During the last five years, NGOs and research institutes have received substantial funds for capacity building and preparing project pre-feasibilities. Such funds are expected to continue for some time. These activities have all taken place in an uncoordinated manner, and mainly to satisfy the requirements of the funding agencies. The DNA should coordinate these activities, and tap into these funds to pursue its promotional role. In the longer term, however, a combination of CDM approval fee and funds from the private sector and lending institutions may be appropriate for DNA activities.

Thematic group also identified the following capacity needs in the different levels:

Individual level

- Lack of skill and knowledge amongst the private and public sector to bring in CDM investments into the country, including carbon trading;
- Need for project identification and preparation of good CDM proposals ;
- Inadequate research and development of renewable forms of energy, carbon dioxide sequestration technologies and innovative environmentally sound technologies;
- Lack of methane recovery and collection from aerobic composting;
- Need for training programmes and awareness creation campaigns for relevant industries, industrialists, and chambers (FBCCI/CDDI etc;)
- Low awareness levels amongst civil servants, judiciary officers, banks, especially Bangladesh Bank ;
- Corporate Social Responsibility (CSR) opportunities are not harnessed properly;

Institutional level

- Absence of the promotion of sustainable forms of forestry and agriculture in light of climate change considerations;
- Measures to limit and/or reduce emissions of greenhouse gases not controlled by the Montreal Protocol in the transport sector;

Systemic level

- No progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse gas emitting sectors;;
- No focal point or fixed representatives from the government to attend all the meetings/conferences (CoP/MoP) for retaining institutional memory;
- Lack of solidarity between LDCs (developing countries of Asia and Africa);
- Policy and institutional setup for one point delivery system of CDM project to attract investors in private and public sector.

2.4.3 CD Needs for Adaptation

Ministry of Planning and Finance are most influential in shaping national development policies in the country likewise any other country. Therefore, persuasion is necessary to motivate for mainstreaming adaptation to climate change.

More interaction among WB, IMF and other funding agencies and reduce gap between UNFCCC and funding agencies also necessary to integrate climate change adaptation in to investment. At national level, decentralization of planning and involvement of local government and people in planning and implementation. Participatory planning and need assessment is also necessary. Involvement of local level relevant stakeholders (NGO, CBOs) in monitoring performance will build confidence of the local community.

More interaction and dialogue with local level people and strengthening of local government can help effective channeling of local and community aspiration and interest in the national policy development process. Local level MP can also play important role but interest should be there.

Planning cell of the ministry is traditionally being formulated programme and project and therefore building their capacity will help in integrating climate change in the programme and project. It is also necessary to build capacity of the Ministry of Planning and Ministry of Finance to understand implication of climate change on development.

Assessment of technology transfer for adaptation

In the Report on the Seminar on the development and transfer of technologies for adaptation to climate change, Note by the secretariat (FCCC/SBSTA/2005/8), dated 16 September 2005, Para 76 (g) addressing links with other processes notes that "The EGTT could contribute directly to the programme of work on adaptation in the area of technologies for adaptation and in related subject areas. Possible areas of work on technologies for adaptation should be further discussed. "

Bangladesh draws attention to the above, and requests the secretariat to take action in this respect.

This is particularly important since it is noted in the same Paragraph (76) of the report that:

- (a) Technologies for adaptation: further work is needed to address issues relating to cross sectoral implications of these technologies, to how to deal with these technologies as opposed to technologies to address climate vulnerability, and to how to strengthen the work on specific activities for these technologies such as information development, awareness raising, planning, design, implementation and monitoring
- (b) Endogenous technologies for adaptation: it was noted that many local technologies for adaptation to climate change are available in developing countries. The issue is therefore on how to promote their deployment and diffusion and, in many cases, this relates to the scarcity of financial resources
- (c) Financing: further work is needed to enhance the prospects for financing these technologies, including on better defining and preparing adaptation projects and on engaging the insurance industry. These aspects could be addressed at the follow-up workshop on innovative options for financing technology transfer
- (d) A compendium/guide on technologies for adaptation may be necessary to further promote dissemination of information on these technologies. Additional outreach efforts are needed to increase awareness and reach all stakeholders, including farmers and local communities.

Individual level

- No alternative focal points within ministries, resulting in discontinuity of institutional memory;
- Absence of specialized training on negotiation skills and capacity building amongst key officers of related agencies;

Institutional level

- No paradigm shift i.e. shifting from traditional planning to climate resilient development planning;
- Inadequate adaptation measures mainstreamed with other sectoral development agenda;
- NGOs and CBOs not always incorporated in capacity development plans and programmes;
- Networking or maintaining a roster of specialists of the three conventions is not practiced and sharing of information between departments/agencies is not carried out;
- No training assigned at Academy for Planning and Development on adaptation to climate change;

Systemic level

- No available module for policy makers and educationists for capacity building training on environmental issues;
- Integration and mainstreaming climate change considerations into national development projects ;

2.4.4 CD Needs during Post 2012 Climate Change Regime

Post 2012 climate change regime may also be developed based on the outlines of “Gleneagles Plan of Action” particularly on the following areas:

- Transforming the way we use energy i.e. promoting energy efficient buildings, appliances, surface transport, aviation, industry;
- Powering a cleaner future i.e. cleaner fossil fuels, renewable energy, electricity grids etc;
- Promoting research and development ;
- Financing the transition to cleaner energy;
- Managing the impact of climate change i.e. monitoring and data interpretation, risk management;
- tackling illegal logging;

Individual level

- Policy makers and all relevant ministries such as MoEF, MoL, MoA, MoFL, etc are not aware
- Public-Private-Partnerships need to be developed
- Networks among Government agencies relevant to climate change is almost non-existent
- Individual capacity of the concerned Government officials is very weak in terms of understanding the negotiation processes of international conventions
- Young professionals are not included in the processes and there are lack of education/skill development opportunities for young professionals
- Support training

Institutional Level

- Experts/academics are not involved in the process of climate change planning
- Climate change understanding is not internalized within the system of GoB
- Continuity of the institutional memory is not in place and there is no mechanism for this
- Capacity of the public and private universities is not adequate
- Partnerships and linkages between the public and private sector, NGOs and academicians is very poor
- Technical support, tools (software) to the research centers are not provided
- Establishment of professional network

Systemic Level

- Very weak GHG monitoring system in Bangladesh and almost no coastal environmental monitoring system currently
- No designated focal points for separate conventions/protocols in the concerned ministries/ departments
- No existing module in the concerned training institutes for the different professionals/service cadre such as civil service, teachers, police, custom officials
Priority is not always accorded to select the Bangladesh delegation based on knowledge and relevancy of the key officials
- Need mechanism for capacity retention and enhancement of the existing departments and institutions in the government and non-government organizations. Network of Institutions many help in this regard.

2.5 CAPACITY DEVELOPMENT ACTION PLAN (CDAP)

The inadequate human capacity and technology to monitor dynamics of anthropogenic emissions, lack of a regulatory framework, and limited research and development programs on climate change are key factors constraining adaptation to and mitigation of climate change in Bangladesh. Existence of a national environment policy largely focusing on environment conservation, the on-going preparation of the NAPA and good will of international community to address climate change provided opportunity to address climate change issues.

Action should be taken to improve monitoring of the dynamics of emissions and develop local emission factors. Studies should also be conducted on extreme weather events, vulnerability and impact assessment of climate change, and results documented and disseminated. Great emphasis should be put on developing adaptation and mitigation programs drawing from the NAPA and a policy and regulatory framework for implementation of such programs should be put in place. To ensure effective implementation of such programs, policy and regulatory frameworks, human resource and facilities in relevant line ministries, particularly the Department of Environment, Bangladesh Meteorology Department, SPARRSO should be strengthened in terms of technologies and skills to monitor dynamics of emissions in Bangladesh. Implementation of the above interventions is expected to contribute to the expansion of the knowledge base on climate change and strengthened institutional capacity to formulate and implement programs on monitoring, adaptation and mitigation of climate change.

Focal Area: Mitigation in the Energy Sector

No	Output	Activities	Nature of CD	Time frame	Implementing Agency
1.	Efficient use of energy in the energy-intensive sectors through reduced GHG emissions	1.1 Replacement of fluorescent lamps and incandescent bulbs with electronic ballast, reflectors and compact bulbs	Ins	L	PDB/DESA/ PetroBangla
		1.2 Use of high efficiency motors in industries	Ins	M	
		1.3 Replacement of old refrigerators with new high energy efficient models	Ind	S	
2.	Waste products from industries used for combustion in co-generation processes	2.1 Converting wood waste to bio-gas	Ins	S	
		2.2 Recovering heat from high-temperature waste heat sources to steam	Ins	M	
3.	Improved cooking stoves used in rural areas	3.1 Substitution of wood fuel in cooking stoves in rural homes, schools, hospitals etc	Ind	M	BCSIR
4.	Small-scale photovoltaic plants or other renewable energy options installed in remote areas	4.1 Installation of solar panels	Ins	S	BCSIR
		4.2 Construction of small run-off-river hydro power plant	Ins	M	PDB/DESA
		4.3 Construction of wind mills in favorable areas	Ins	L	PDB/DESA

Focal Area: Mitigation in the Transportation Sector

No	Output	Activities	Nature of CD	Timeframe	Implementing Agency
1.	Natural gas (compressed) used as the principal source of fuel instead of gasoline/petroleum products	1.1 Conversion of car engines to CNG	Ind	S	PetroBangla
2.	Number of vehicles emitting GHGs reduced	2.1 Increasing vehicular sales taxes, fuel taxes and road charges	Ins	S	BRTA
		2.2 Stimulating car pooling through subsidies in the transport sector	Ins	S/M	BRTA/BRTC
3.	New vehicles imported are more energy efficient	3.1 Levying stringent trade regulations, tariffs aimed at fuel efficiency and domestic fuel taxes	Sys	M/L	BRTA

Focal Area: Mitigation through the Forestry Sector

No	Output	Activities	Nature of CD	Timeframe	Implementing Agency
1.	Carbon sinks expanded through afforestation/increasing stock of carbon in existing forests	1.1 Reduce the rate of deforestation	Ins	S/M	Forest Department
		1.2 Conserve and protect forested areas	Ins	M	Forest Department
		1.3 Encourage intercropping and agroforestry	Ins	M	Forest Department
		1.4 Introduce urban forestry practices in fallow lands	Ins	M	Forest Department
2.	Increased efficiency of wood use and enhanced utilization of wood	2.1 Improving technical efficiency of wood recovery through improved harvesting and milling techniques to reduce waste	Ins	M	Timber Merchants
		2.2 Increasing the merchantable uses of wood from existing harvests	Ins	S/M	Timber Merchants

Focal Area: Mitigation through the Agriculture Sector

No	Output	Activities	Nature of CD	Timeframe	Implementing Agency
1.	Anaerobic fermentation/production of methane from flooded rice field reduced	1.1 Construction of small-scale digesters for gas recovery and use in rural areas	Ins	M	BRDB
		1.2 Conversion of lagoons for trapping methane by placing impermeable layer	Ins	M	
2.	Biomass crops used as substitute for fuel	2.1 Encouraging plantation of biomass crops (woody crops/corn) instead of existing crops	Ins		Department of Agricultural Extension

Focal Area: Mitigation through the Waste Management Sector

No	Output	Activities	Nature of CD	Timeframe	Implementing Agency
1.	Methane generated from landfill sites recovered and used to produce energy	1.1 Safe handling and collection of methane from landfill sites for generation of power	Ins	M/L	PDB/ Municipal Corporation
2.	Quantity of landfill waste reduced through source reduction, recycling etc	2.1 Sorting of waste at source and recycling of wastes such as glass/paper	Ins	S/M	Municipal Corporation/ Waste Concern

*** LEGEND

- Ind: Individual Capacity, Ins: Institutional Capacity, Sys: Systemic Capacity
- L: Long Term , M: Medium Term , S: Short Term

Focal Area: Mitigation

SN	Output	Activities	Nature of *CD	Timeframe **	Implementing Agency
	Education, training & awareness	Initiate dialogue with high level policy makers in the Ministry with special thrust on the Ministry of Environment & Forest, Ministry of Finance and Planning etc to demonstrate importance of climate change adaptation and linkage with development efforts.			
		Date collection and analysis, including through the enhancement of systematic observation and monitoring networks for sector specific emission data. This will help in preparing national GHG inventory and development of sector specific CDM Project.			
		Modelling, in particular related to general circulation models and their down scaling to regional and national levels for better impacts and adaptation assessment. Existing institutes having			

SN	Output	Activities	Nature of *CD	Timeframe **	Implementing Agency
		experiences and involved in the modelling exercise can be a starting point.			
		Capacity building for planning department of the sectoral ministries can be initiated for integrating adaptation to climate change. A module can also be developed and taught in the Public Administration Training Course particularly for Deputy Secretary and higher level.			
		Education, training and awareness rising for development organization working at community level are necessary.			
		Carrying out pilot and demonstration projects on adaptation to climate change to show effectiveness of community based adaptation project and livelihood improvement.			
		Promoting the transfer of technologies for adaptation			
		Capacity building of the members of the Designated National Authority on CDM modalities and procedures, and how it functions.			

Table 4: CD Action Plan for CDM

Output/Activities	Level (Individual, Institutional and Systemic)	Timeframe	Actors/Implementing Agencies
Skill development and amongst public and private sector regarding CDM investments	Individual		
Training on design and proposal writing for CDM projects	Individual		
Awareness campaigns relevant industries/chambers, civil servants, judiciary, banks etc	Individual		
Promotion of sustainable forms of agriculture and forestry	Institutional		
Measures to limit GHG in the transport sector	Institutional		
Progressive reduction and phasing out of market imperfections in all GHG emitting sectors	Systemic		
Focal points from government agencies to retain institutional memory	Systemic		
Coalition of LDCs (Asia and Africa) for better bargaining power	Systemic		

Table 5: CD Action Plan for Adaptation

Output/Activities	Level (Individual, Institutional and Systemic)	Timeframe	Actors/ Implementing Agencies
Designation of alternative focal points for Rio conventions in all ministries/agencies	Individual		
Specialized training on negotiation skills for key officials	Individual		
Mainstreaming climate resilient development planning for all projects/programmes	Institutional		
Networking and information sharing amongst agencies/departments	Institutional		
Module for policy makers on environmental issues	Systemic		

CDAP: Community Based Adaptation

No	Output	Activities	Nature of CD	Time Frame	Implementing Agency
1.	Enhanced education, awareness and training	• Inclusion of climate change related issues in primary/secondary curricula	Sys	S/M	Board of Education Relevant Ministries
		• Awareness programmes regarding the outbreak and treatment of diseases triggered by climate change	Ind	M	Ministry of Health DPHE
2.	Improved health, hygiene and sanitation	• Establishment of mobile clinics under Government supervision	Ins	M	Ministry of Health DPHE
		• Increase number of cyclone shelters, with storage facilities for food, essentials and livestock	Ins	M/L	LGED DPHE Disaster Management Bureau
		• Ensuring water availability through setting up deep tube wells and rain water harvesting	Ins	M	LGED DPHE
3.	Livelihoods and Alternative Income Generating Activities	• Collection and preservation of indigenous/local varieties of seeds that are salt tolerant or less water intensive and drought resistant	Ind/Ins	M	Department of Agricultural Extension
		• Diversification of crops for better adaptation, including cultivation of medicinal plants and temperature tolerant varieties such as wheat/vegetables	Ind/Ins	S/M	Department of Agricultural Extension
		• Provision of micro credit to the affected, coupled with technical know-how for developing their secular occupations	Ind	S	BRDB

Table 6: CD Action Plan for Post 2012 climate regime

Output/Activities	Level (Individual, Institutional and Systemic)	Timeframe	Actors/ Implementing Agencies
Awareness campaigns for relevant ministries	Individual		
Development of public-private partnerships	Individual		
Networking amongst government agencies regarding climate change issues	Individual		
Provision of opportunities for young professionals to learn about climate change	Individual		
Institutional memory retention through internalizing climate change considerations within GoB system	Institutional		
Capacity enhancement of public and private universities through training	Institutional		
Creation of linkages and partnerships between private sector, NGOs, academicians etc	Institutional		
Technical support and tools made available to research centers	Institutional		
Establishment of GHG emissions monitoring system	Systemic		
Designation of focal points within the ministries	Systemic		
Development of module for civil service, teachers, police, customs officials etc	Systemic		

2.5.1 Potential Sectors for CDM in Bangladesh

Following areas are probable CDM projects

- i. Methane recovery from landfill with or without electricity generation
- ii. Composting of urban solid waste
- iii. Biogas from a wide variety of wastes
- iv. Solar home systems in off grid areas
- v. Efficient lamps to replace incandescent light bulbs
- vi. Efficient brick manufacturing
- vii. Sugar cogeneration

These options are discussed below. It should be emphasized that these are near term opportunities. With increase in the carbon price and or breakthrough in new technologies like Solar cells, fuel cells, biomass gasification, etc., newer options will emerge.

i. Methane recovery from landfill

Of these seven categories, recovery of Landfill Gas has the most potential. The outskirts of all major cities are becoming severely environmentally hazardous areas due to open and haphazard dumping of urban solid wastes. The recovery of landfill gas has been shown to be financially very profitable because the CDM financing amounts to more than 150% of the investment. If a portion of the benefits of the CDM project can be channeled to convert these dumps into sanitary landfills, the country will benefit tremendously because the municipal corporations simply do not have the money to upgrade the exiting landfills.

ii. Composting of urban solid waste

Composting of urban solid waste has have also been shown to be viable CDM project. The output from the composting plants is a saleable product and along with the prevention of landfillgas emission, which would otherwise have occurred, this is a good CDM project.

iii. Biogas from a wide variety of wastes

Biogas can be derived from a wide variety of wastes, such as (a) poultry droppings (b) tannery waste (c) effluent from food processing industries (d) human excreta, and (e) sewage, to replace fossil fuel directly or after electricity generation

Biogas production from the five categories of waste mentioned above can not only give the business enterprise a fuel to replace their present fossil fuel use, but also tackle their aggravating environmental concerns.

iv. Solar home systems in off grid areas

Of all the renewable energy options for Bangladesh, solar photovoltaic has been identified by various independent sources as the potential area. The prospects for wind, mini/micro hydro plant based biomass technologies have been shown to have limited prospects. With regards to wind and hydro projects, it is important to add that the potential has not been mapped to the any extent to be able to outright dismiss these. It must always be remembered that in all countries of the world there will always be some prospects of these technologies. The prospect for plant-based biomass (husk, straw) is also limited because these products are all have preset uses. Moreover, removing these free or cheap sources of fuel from the rural poor may have other consequences like loss of soil quality and deforestation. Solar Home Systems (SHS) can have a tremendous potential because even in the best scenario in the next 20 years 20% of the area of Bangladesh will remain outside the grid. Due to increasing prosperity and widespread availability of electronic entertainment (Television, radio, music systems) and communication conveniences (mobile telephone) there is increasing demand for electricity in all places of Bangladesh. It must be appreciated that 20% of the households mean nearly 5 million homes, 20% of that is a million homes. The present SHS dissemination program has achieved only 50,000 or so units.

v. Efficient lamps to replace incandescent light bulbs

The prospect of efficient lighting comes about from the fact that nearly 25% of the total demand for electricity in country is lighting. This is easy to appreciate because the combined demand for the households and commercial sectors is more than the industrial sector, and even in the industrial sector, there is a considerable amount of lighting load. The huge lighting demand as may be appreciated creates a huge peak demand during the evening hours. This is causing the utility great difficulties because they have to operate expensive peaking plans. In reality, the utility cannot deliver the peak load and as much as 20% of the highest peaks during the year are managed by load shedding. The rural load is predominantly lighting using incandescent light bulbs. Through a suitably designed dissemination program, the use of CFLs can reduce emissions significantly and in the process reduce the peak demand. An innovatively designed CDM project can certainly have an impact in this area.

vi. Efficient brick manufacturing

The production process of bricks in Bangladesh uses crude inefficient technologies and coal as their fuel. Over 90% of the bricks are manufactured in this manner. The emission from brickfields constitutes more than 10% of the total GHG emission from the energy sector. Use of efficient technology, retrofitting the exiting technology and fuel switching from coal to natural gas can have a big impact on GHG emission.

vii. Sugar cogeneration

Sugar cogeneration is a well-known GHG emission option. The 20 sugar mills in the country can be potential candidates for this technology. The only drawback is that all these mills are public sector entities and are losing concerns. If those challenges can be tackled CDM projects can be done in this sub-sector.

Cogeneration - policy to buy electricity from cogenerators required

CD FOR MITIGATION AS CDM MINUTES

In response to this question, a few ideas were thrown as given below. These should be sufficiently elaborated with examples. In addition, more suggestions on activities for capacity building in mitigation should be made.

- Establishment of baseline situations is an area where capacity needs to be developed, along with appropriate monitoring.
- Project identification is essential and capacity building is needed for that.
- Capacity building is needed to prepare good CDM proposals.
- Also on carbon trading – selling and buying of carbon certificates, which is comparable with share market.

- Capacity enhancement is also required for understanding the CDM project life cycle at both private and public sectors.
- Training programmes and awareness creation campaigns for
 - i. relevant industries,
 - ii. industrialists, and
 - iii. chambers (FBCCI, etc.) have to be conducted for proper understanding of the issues, concerns and opportunities.
- Civil servants and judiciary officers should be sensitized, trained and aware of the CDM projects and associated issues to ease different stages of project approval.
- Increase awareness levels of banks, especially Bangladesh Bank (for easier financing of environmental projects) so that as a priority they will be friendly while approving of environmental projects.
- A good understanding of project monitoring and evaluation is also required at implementation and management levels.

CD AP AS ADAPTATION MINUTES

Tentative project proposal for capacity development in adaptation (Both in Public and Private Sectors)

Bangladesh has recently developed a strategic framework for climate risk management and adaptation at individual, institutional and systematic level. The framework shall guide preparing Micro level Climate Risk Reduction and adaptation action plan (CRRAP) and sectoral CRRAP defining risk environment charactering following aspects

- Natural conditions (endowment, availability and quality of natural resource base; geo-physical characteristics; climate-induced primary phenomena etc.);
- Status of physical infrastructure including their concentration, placement, quality, relevance and how these infrastructures behaving to the natural capital flowing pattern;
- Socioeconomic condition of the population in the defined area; and
- Institutional environment including policy regime and support services;

Formulation of Micro-level Risk Reduction Action Plans following the participatory processes which have been carried out for identification of risk environment would eventually lead to development of Climate Risk Reduction Action Plans (CRRAP), which should ideally be formulated at community levels (i.e., 'local' levels or at the smallest/bottom-most tier of local government system in the country in question). It should be based on the principle of participation as well as of integration across sectors and scales.

CDAP AS PER POST 2012 CC REGIME

- Integrated coastal zone development project in respect of climate change keeping in mind about sea level rise;
- Water management improvement projects considering probable climate change impacts;
- Detailed study on GHG mitigation mechanisms and policy options;
- Research on climate change impacts, vulnerability and adaptation;
- Research on the improvement of the design criteria and development of the suitable technology adaptive to the changed scenarios due to climate change;
- Strengthening of the disaster monitoring and warning system;
- Study of climate change impacts on agriculture, crop production and human health;
- Study of the impact of climate change on existing sewerage and drainage systems and urban water supply schemes;
- Study on impact of climate change on existing flood control, irrigation and drainage project;
- Study on ecosystem management, bio-diversity and wild life conservation and protection;
- Study of the change of agro-ecological zone, droughts and floods in Bangladesh at the changed scenario;
- Study of tropical cyclones using numerical models;

Chapter 3

Chapter 3

BIODIVERSITY

SN	Particulars of Contents	Page No
3.1	Biodiversity 3.1.1 Significance of Biodiversity 3.1.2 Convention on Biological Diversity (CBD) 3.1.3 Objectives of the CBD	48 48 49 49
3.2	Obligation under the CBD 3.2.1 Bioprospecting and ABS issues 3.2.2 Cartagena Protocol on Biosafety & Transboundary Movement of GMOs 3.2.3 CBD 2010 Countdown	49 50 51 53
3.3	Current situation and Stocktaking 3.3.1 Bioprospecting and ABS issues 3.3.2 Biosafety 3.3.3 CBD 2010 Countdown	55 57 57 58
3.4	Priority Environmental Issues 3.4.1 Bioprospecting and ABS issues 3.4.2 Biosafety 3.4.3 CBD 2010 Countdown	63 64 65 66
3.5	Identifying Capacity needs 3.5.1 Bioprospecting and ABS 3.5.2 Biosafety Need Assessment 3.5.3 CBD 2010 Countdown Capacity Needs	66 66 67 68
3.6	Capacity Development Action Plan 3.6.1 CD on Bioprospecting and ABS 3.6.2 CD on Biosafety 3.6.3 CD on CBD 2010 Countdown	69 69 71 73

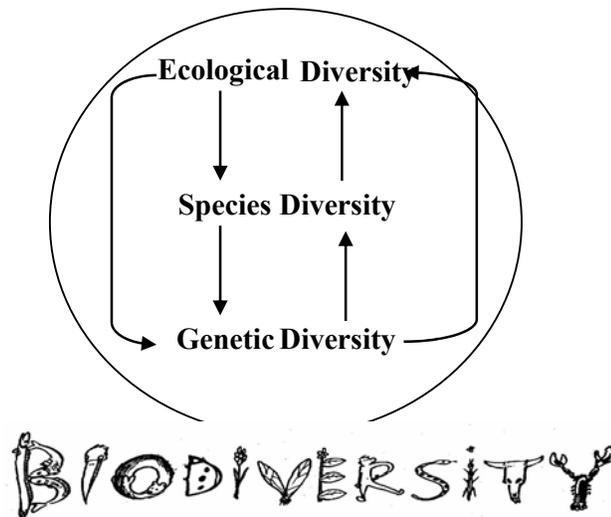
Chapter 3

BIODIVERSITY

The Earth's biological resources are vital to humanity's economic and social development. There is a growing recognition that biological diversity is a global asset of tremendous value to present and future generations. At the same time, the threat to species and ecosystems has never been so great as it is today. Species extinction caused by human activities continues at an alarming rate. The world community is now conscious about the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components (CBD convention).

The term 'Biological diversity' means the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. The term 'Ecosystem' means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (Art 2, CBD). The shortest definition is of Global Biodiversity Strategy (WRI, IUCN and UNEP, 1992) which regards biodiversity as the totality of genes, species, and ecosystems in a region. According to di Castri & Younes (1996), a representation of biodiversity based on its components and their interactions is given below:

Fig -1: Complex Interaction of Biodiversity in a Greater Ecosystem



3.1.1 Significance of Biodiversity

Biodiversity is an essential resource base for development and livelihood security through provision of biological resources and ecosystem services. Through agriculture, forestry and fisheries biodiversity provides food and fiber; medicine and timber and contributes significantly to national economies and employment. Ecosystems provide essential services including nutrient cycling, air and water purification, flood and drought mitigation, and soil recuperation. These services can not always be measured in terms of money alone (WRI, 2002).

The direct economic benefits of biodiversity run into trillions of dollars per year (Constanza et al., 1997). While recognition of the values of the goods and services that biodiversity offers – both direct and indirect – are increasing, the relationship between the role of biodiversity in environmental sustainability, poverty reduction and sustainable development need closer attention and understanding.

3.1.2 Convention on Biological Diversity (CBD)

The Convention on Biological Diversity (CBD) is the main international instrument for addressing the biodiversity issues. The convention was finalized in Nairobi , Kenya in May 1992 and opened for signature at the United Nations Conference on Environment and Development (UNCED) held in Rio –de- Janeiro, Brazil on 05 June 1992. It entered into force on 29 December 1993. Bangladesh signed this document on 05 June 1992 and ratified the same on 20 March 1994. The CBD provides a comprehensive and holistic approach to the conservation of biological diversity, the sustainable use of natural resources, the fair and equitable sharing of benefits deriving from the use of genetic resources. This convention has 42 Articles.

3.1.3 Objectives of the CBD

“The objectives of this Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources...” (Article 1 CBD).

All the contracting parties are supposed to follow the requirements stated in these Articles. The CBD guide book has identified the following six thematic areas.

1. Inland water biodiversity
2. Marine and coastal biodiversity
3. Agricultural biodiversity
4. Forest biodiversity
5. Dry and sub-humid lands biodiversity and
6. Mountain biodiversity.

Besides these it has also identified the following nine items as cross cutting issues.

1. Invasive alien species
2. Scientific assessments
3. Ecosystem approach
4. Indicators
5. Global taxonomy initiative
6. Protected areas
7. Technology transfer / cooperation
8. Strategic environmental assessment and
9. Environmental impact assessment.

This convention has rightly identified and emphasized upon the ‘Research and Training’ in matters of identification, conservation and sustainable use of the biological diversity, vide its Article 12.

3.2 Obligations under the CBD

The CBD is a comprehensive agreement covering a very large number of issues and effective implementation of this convention would require technical, financial and institutional support. The CBD provides an important framework for the conservation and sound management of natural resources. As a signatory to this Convention, the Government of Bangladesh agrees to:

- To ensure “appropriate access” to genetic resources and “the fair and equitable sharing of benefits” arising out of the utilization of genetic resources.(Article 1)
- To develop national strategies, plans or programs for the conservation and sustainable use of the nation’s biological diversity and integrate with other relevant sectors of the nation (Article 6).
- To identify the components of biodiversity, processes that may adversely affect biodiversity, establish a data base and put in place a good and effective monitoring system (Article 7).
- To ensure in-situ and ex-situ conservation of the biodiversity components of the country of origin and establish protected areas in all the original ecosystems and put in place a good management systems for these protected areas (Article 8).

- To adopt measures for ex-situ conservation of genetic resources of the country of origin and to put in place a good and effective system for its management and regulations (Article 9).
- To adopt sustainable use of the biodiversity components and integrate them into the decision making processes (Article 10).
- To adopt measures for economic and social incentives for biodiversity conservation (Article 11).
- To put in place education, training and research programs especially for the identification of the components of biodiversity with the focus on effective biodiversity conservation (Article 12).
- To put in place a state run public awareness program for the conservation of biodiversity (Article 13).
- To make the “Impact Assessment” obligatory may be through EIA, with the focus of minimizing the adverse impact of any development activities or human intervention, on the biodiversity of the country (Article 14).
- To develop rules and regulations to allow lawful access to the genetic resources of the country, lawful exchange scientific information among the contracting parties and safe as well as lawful handling of biotechnology and distribution of its benefits within the country (Articles 15, 16, 17 & 19). Article 15 (i) affirms “sovereign rights of states over their natural resources” and provides that “the authority to determine access to genetic resources rests with the national governments” and is “subject to national legislation”.
- To promote international co-operations on scientific and technical aspects related to biodiversity (Article 18).
- To provide financial support to the Conservation of Biodiversity and develop mechanisms there to (Articles 20 & 21).
- To abide by the decisions and obligations of COPs (Article 23).
- To submit to the COPs as when required reports on CBD very often on the format provided by the COP Secretariat (Article 26).

3.2.1 Bioprospecting

The term ‘Bioprospecting’ means value addition of biological components. It also signifies the search for plant and animal species from which medicinal drugs and other commercially valuable compounds can be obtained. Plant genetic resources are the key components of any agricultural production system- indeed of any ecosystem. Without them, no natural, evolutionary adjustment of the system changing environmental and biotic condition would be possible. Agricultural science would not have the basic materials for their introduction, domestication and improvement programmes. Yet, predominant patterns of agricultural growth have eroded biodiversity in agro-ecosystem including plant genetic resources, livestock, insects and soil organisms. This erosion has caused economic losses, jeopardizing productivity and food security, and leading to broader social cost. The genetic resources of actual or potential value to food and agriculture are also being lost at an alarming rate due to habitat destructions, land degradation, over-exploitation of water resources, industrial, agriculture, forestry practices and urban expansion. Hence scientific management of these invaluable resources has assumed greater significance over time.

The important elements/conditions for access being considered in the ecosystem include the following:

- (i) Access within the Bangladesh Plant Genetic Resources (PGRs) and among its constituent’s organizations/ universities.
- (ii) Access to national institutes/organization/universities falling outside Bangladesh including private sectors and companies.
- (iii) Access to non-nationals.
- (iv) (a) Access to Consultation Group on International Agricultural Research Centres (CGIAR), (b) access to multilateral basis, and (c) cooperation.

The essential areas/elements to be addressed by the authority concerned are the following:

- (i) Joint exploration, sharing of collected materials, Material Acquisition Agreement (MAA), custodianship/ownership.
- (ii) Exchange of germplasm, international trials and nurseries.
- (iii) Sanitary and phytosanitary measures.
- (iv) Multilateral exchange and use.

3.2.2 Cartagena Protocol on Biosafety and Transboundary Movement of GMOs

The Cartagena Protocol on Biosafety (CPB) was adopted on 29 January 2000 in Montreal. Right from the outset of Biosafety negotiation, the US had led a sustained and aggressive campaign to keep Genetically Modified Organisms (GMOs) from being regulated by an international UN regime. At the final stages of the negotiations, the US garnered the support of other countries from the South – Argentina, Chile and Uruguay. Together with Canada and Australia they formed the formidable 'Miami Group' that is largely blamed for scuttling the scheduled conclusion and adoption of the Protocol in Cartagena (Columbia) in February 1999. It took all the diplomatic acumen of the Chair of the meeting, against the backdrop of the aborted Seattle meeting of the WTO, to resuscitate the negotiations which finally led to its adoption in 2000 in Montreal. It is called the Cartagena Protocol on Biosafety to honor Colombia, which hosted the Extraordinary Conference of the Parties in Cartagena in 1999.

The consensus protocol document is predictably weak and its domain considerably weakened – despite the efforts of the developing world—organized as 'The Like Minded Group', and, the European Union. Nonetheless, it is possible to salvage some key beneficial provisions out of this protocol.

Upon entry into force in 2004, the first and only Protocol to the Convention on Biological Diversity, it provides a framework for addressing environmental impacts of bioengineered products (referred to as Living Modified Organisms or "LMOs" / Genetically Modified Organisms or "GMOs") that cross international borders.

Bangladesh ratified the CPB on 5 February 2004, which came into force on 5 May 2004. Government of Bangladesh has put the emphasis on positive development of biotechnology in the policy regime. Harvesting the beneficial aspects of modern biotechnology is very crucial for the overall development of a country like Bangladesh, at the same time, the essence of the precautionary approach to mitigate the possible adverse or harmful effects of GMOs to the biodiversity, environment and human health must be realized.

Bangladesh's mandates and obligations under Cartagena Protocol for conservation of biodiversity in Bangladesh:

Being a party to the Convention on Biological Diversity (CBD), Bangladesh is committed internationally to implement the obligations of the convention and the protocol. Under the CPB, Bangladesh's mandates and obligations for conservation of Biodiversity, precisely, are as follows:

- **Assessment and Management of Risks:** Any development of GMOs be done in a manner that prevents or reduces risks to biodiversity and human health <Article 2(2)>.
- **Extent of Risk Management:** Measures based on risk assessment shall be imposed to the extent necessary to prevent adverse effects of GMOs on the conservation and the sustainable use of biodiversity (and human health). <Article 16(2)>
- **Duration for observation:** As part of risk management, any development of GMOs must undergo '...an appropriate period of observation that is commensurate with its life-cycle or generation time before it is put to its intended use. <Article 16(4)>
- **Risk assessment modalities:** Risk assessment has to be carried out in accordance with Annex III of the protocol. This Annex sets out the general principles, the methodology and the points to consider in carrying out the risk assessment.

- **Obligation for Advanced Informed Agreement (AIA):** To make decisions on the import of GMOs intended for introduction into the environment based on a scientific risk assessment and within 270 days of notification of intent to export. GMOs intended for direct introduction into the environment are subject to the more stringent AIA procedure.
- **Commodity Requirements/Biosafety Clearinghouse:** The agreement requires governments to provide the Biosafety Clearinghouse with information concerning any final decisions on the domestic use of any GMO commodity within 15 days of making a decision.
- **Development of the National Biosafety Framework (NBF):** The prime objective of CPB is to provide the basis of establishing regulatory regime by each party to ensure safe transfer, handling, transit, transboundary movement, development, field trial and commercial release of GMOs.
- **Adherence to the precautionary principle:** This principle is clearly embedded in the protocol. The objective of risk assessment as set out in Annex III is 'to identify and evaluate the potential adverse effects of living modified organisms on the conservation and sustainable use of biological diversity in the likely potential receiving environment.'

Paragraph 4 of Annex III of the protocol states that 'Lack of scientific knowledge or scientific consensus should not necessarily be interpreted as indicating a particular level of risk, an absence of risk, or an acceptable level of risk'. This clearly suggests that where there is a lack of clear scientific knowledge or there is no clear scientific consensus, it is yet permissible to conclude that risk may exist. This could shape the nature of research and development methodologies.

Box - I : Basics of the Cartagena Protocol

What it does?

- The Protocol establishes an internet-based "Biosafety Clearing-House" to help countries exchange scientific, technical, environmental and legal information about LMOs.
- It creates an advance informed agreement (AIA) procedure that in effect requires exporters to seek consent from importers before the first shipment of LMOs meant to be introduced into the environment (such as seeds for planting, fish for release, and microorganisms for bioremediation).
- It requires bulk shipments of LMO commodities, such as corn or soybeans that are intended to be used as food, feed or for processing, to be accompanied by documentation stating that such shipments "may contain" living modified organisms and are "not intended for intentional introduction into the environment."
- The Protocol establishes a process for considering more precise identification of LMO commodities in international trade.
- The Protocol includes a "savings clause" that makes clear the Parties' intent that the agreement does not alter the rights and obligations of governments under the WTO or other existing international agreements.
- It assists developing countries in building their capacity for managing modern biotechnology.

What it does not do?

- The Protocol does not address food safety issues. Food safety is addressed by experts in other international fora.
- It does not require segregation of bulk shipments of commodities that may contain LMOs.
- It does not change rights and obligations of the parties under the WTO or other international agreements in any way.
- It does not subject shipments of bulk commodities to the Protocol's AIA procedure, which would have significantly disrupted trade in bulk commodities and would have jeopardized food access, without commensurate benefit to the environment.
- It does not require detailed identification requirements for bulk commodity shipments. (Any such requirements will be subject to a further negotiation to be concluded no later than two years after the Protocol enters into force).

- The Protocol does not require consumer product labeling. The mandate of the Protocol was to address potential risks to biodiversity that may be presented by LMOs. Issues related to consumer preference were not part of this negotiation. The Protocol's requirement for documentation identifying bulk commodity shipments as "may contain LMOs", and as "not intended for direct introduction into the environment" will be accomplished through shipping documentation.

 Source: NBF prepared by DoE

3.2.3 CBD 2010 Countdown

Goals and sub targets to implement CBD 2010 targets

COP 04 adopted the Strategic Plan for the Convention on Biological Diversity (Decision VI/26). In its mission statement, Parties committed themselves to a more effective and coherent implementation of the three objectives of the Convention, to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth (CBD, 2006).

The COP 07 (Decision VII/30) adopted a framework towards the 2010 goals and targets. This framework included seven focal areas. Eleven goals have been set under these 7 focal areas and each goal has one or more targets. These are in Annexure II of Decision VII/30 where the Parties decided to establish goals and sub- targets for each of the identified focal areas to clarify the 2010 global biodiversity target and promote coherence among the programmes of work of the Convention. These are reproduced below:

Focal Area: Protect the components of biodiversity

Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes

- Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.
 Target 1.2: Areas of particular importance to biodiversity protected

Goal 2. Promote the conservation of species diversity

- Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups
 Target 2.2: Status of threatened species improved.

Goal 3. Promote the conservation of genetic diversity

- Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.

Focal Area: Promote sustainable use

Goal 4. Promote sustainable use and consumption.

- Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and Production areas managed consistent with the conservation of biodiversity.
 Target 4.2: Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced
 Target 4.3: No species of wild flora or fauna endangered by international trade

Focal Area: Address threats to biodiversity

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

- Target 5.1: Rate of loss and degradation of natural habitats decreased

Goal 6. Control threats from invasive alien species

- Target 6.1: Pathways for major potential alien invasive species controlled.
 Target 6.2: Management plans in place for major alien species that threaten ecosystems, habitats or species.

Goal 7. Address challenges to biodiversity from climate change, and pollution
Target 7.1: Maintain and enhance resilience of the components of biodiversity to adapt to climate change
Target 7.2: Reduce pollution and its impacts on biodiversity

Focal Area: Maintain goods and services from biodiversity to support human well-being

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods

Target 8.1: Capacity of ecosystems to deliver goods and services maintained.
Target 8.2: biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained

Focal Area: Protect traditional knowledge, innovations and practices

Goal 9. Maintain socio-cultural diversity of indigenous and local communities

Target 9.1: Protect traditional knowledge, innovations and practices
Target 9.2: Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing

Focal Area: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Target 10.1: All transfers of genetic resources are in line with the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements.
Target 10.2: Benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources

Focal Area: Ensure provision of adequate resources

Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention

Target 11.1: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.
Target 11.2: Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.

Capacity building constraints

The following are the capacity building constraints in conserving the biological diversity in Bangladesh:

- Inadequate capacity to implement CBD 2010 targets and sub- targets due to gaps in information and knowledge
- Absence of integrated policy framework to protect and conserve biodiversity; sectoral and issue-based policies vested with different sectoral agencies work at cross purposes;
- Poor policy implementation and inadequate enforcement of regulatory framework, often because of weak political and social commitments;
- Inadequate budgetary, technical manpower and know-how to implement the CBD obligations;
- Poor understanding and awareness among the stakeholders; inadequate networking and poor information sharing system on the CBD issues;
- Overall low priority of environmental issues including the CBD in the national policy making organs.

3.2 Current Situation and Stocktaking

Biodiversity in Bangladesh

It is generally known that the biodiversity in Bangladesh is very rich. But there is no authentic report stating the total number of species of flora and fauna that are found in Bangladesh. There is a mention in the Biodiversity status report of Sundarbans prepared by IUCN in 2003, that there are 113 species of mammals, 628 species of birds, 126 species of reptiles, 22 species of amphibians, 708 species of fishes, 400 species of mollusks and about 5000 species of flora are found in Bangladesh. Sundarban, the largest contiguous tract of mangroves in the world is rich in biodiversity. It has 66 species of plants, 300 species of birds, 50 species of reptiles, 8 species of amphibians, 177 species of fishes, 24 species of shrimps, 7 species of crabs, 2 species of gastropods, 6 species of pelecypods, 8 species of locust lobsters, 3 species of turtles, 50 species of mammals, etc. (Siddiqi 2001). It is fact that the exact species of flora and fauna found in Bangladesh is still not known.

Floral Biodiversity

The flora may broadly be grouped into the following five categories, namely Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. Hassan (2003) reported that following.

SI No	Categories	Recorded	Estimated
1	Algae	3,600	6,000
2	Bryophytes	290	400
3	Pteridophytes	200	250
4	Gymnosperms	5	5
5	Angiosperms	3,000	5,000

Source: Hassan (2003)

Faunal Biodiversity

A complete list of fauna found in Bangladesh is not available. Rashid (2003, 2004) reported that there are 4469 numbers of species fauna are recorded in Bangladesh. According to him the details are as under.

Taxonomic Group		Number of species	
Major	Detailed Groups		
Monera (Eubacteria, etc.)		166	
Protista (Protozoan, Viruses, etc.)		341	
Animalia: Invertebrates	Poriferans	7	
	Cnidarians	68	
	Platyhelminths	23	
	Nematodes	105	
	Annelids	62	
	Arthropods	1547	
	Molluscs	347	
	Echinoderms	6	
	Animalia: Vertebrates	Fishes	735
		Amphibians	23
Reptiles		136	
Birds		778	
Mammals		125	
Total Species		4,469	

Source: Rashid (2003, 2004)

Ecosystem Diversity

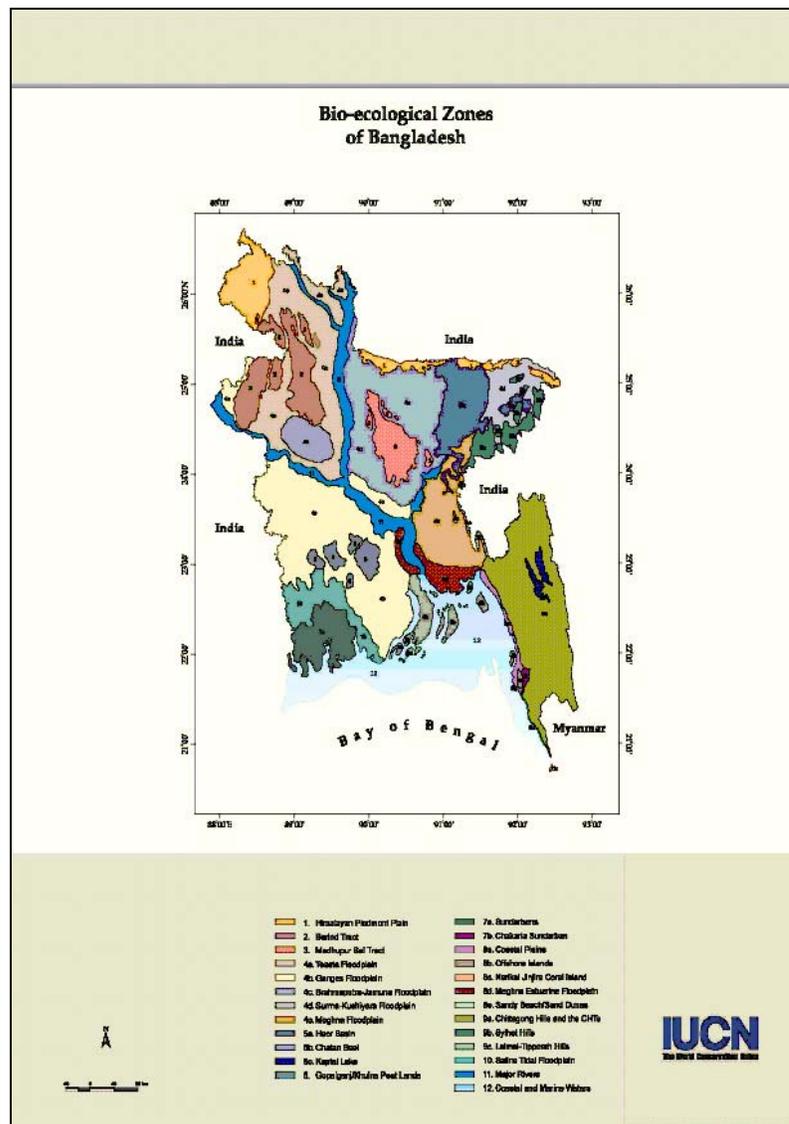
Ecosystem diversity is another important feature to be examined in connection with the biodiversity. The ecosystems of Bangladesh can be placed under 4 broad categories, namely (i) Coastal and Marine Ecosystem, (ii) Inland Freshwater Ecosystem, (iii) Terrestrial Forest Ecosystem and (iv) Man-made Ecosystem (Daniels, 2003). Forests are important ecosystems. From ecological view points the following five forest types have been identified in Bangladesh.

1. Tropical wet evergreen forests:
2. Tropical semi ever green forests:
3. Tropical moist deciduous forests:
4. Fresh water wetland forests:
5. Mangrove forests:

FAO has identified 20 Eco-Zones globally. On the basis of that Bangladesh has the following two eco-zones.

- Tropical Rain Forest and
- Tropical Moist Deciduous Forest

Nishat *et al.* (2002) divided Bangladesh into 12 broad bio-ecological zones. A map showing the delineation of these bio-ecological zones is given below:



Source: Bio-ecological zones of Bangladesh (Nishat *et al.* 2002)

In Bangladesh, many plant and animal species have been lost due to over-exploitation, destruction as well as fragmentation habitats. Many species are now threatened / endangered. Already 64 species of vertebrates' animals, 40 species of mammals, 38 species of birds, 21 species of reptiles and 23 species of fish can no longer be found in Bangladesh (Bangladesh Observer, 2003). Many insect species are not seen which were prevalent 30 years ago or so. According to IUCN Bangladesh (2000), many species of animals are threatened in Bangladesh due to various reasons. Biodiversity could provide sustainable food security in Bangladesh (Islam, 2004).

3.2.1 Bioprospecting and ABS

Bangladesh current position in access and benefit sharing of natural resources:

- No specific agency is responsible for genetic resources in Bangladesh to serve as a national contact point for accessing genetic resources.
- Germplasm exchange is made based on mutual trust and on reciprocal basis.
- No standard 'Material Transfer Agreement' is available.
- A draft on "Plant Variety and Farmers Right Protection Act" has been prepared by Ministry of Agriculture (MOA). The provisions of the Act include creation of a 'gene fund'. Among other sources gene fund will also come from sharing of benefit from the utilization of genetic resources.
- Three *ex situ* genebanks with medium term storage facilities have been established in Bangladesh. Genebanks are located at the (1) Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, (2) Bangladesh Rice Research Institute, Joydebpur, Gazipur, and (3) Bangladesh Jute Research Institute, Sher-E-Bangla Nagar, Manik Mia Avenue, Dhaka. About 6249 accession of rice, 5631 accession of jute and 565 accession of wheat, 1750 accession of pulses, 604 accession of oilseeds, 3522 accession of vegetables, 158 accession of spices have been stored in BARI genebank. Moreover a field genebank is maintained by the Sugarcane Research Institute. About 1362 sugarcane germplasm is maintained in the field genebank.
- Bangladesh has already prepared "National Biodiversity Strategy and Action Plan" (NBSAP) to fulfill its commitment as per Article 6 of the CBD. NBSAP needs to implement immediately to harvest its outcome.
- Stocktaking activities are under way through a FAO project on Plant Genetic Resources for Food and Agriculture (PGRFA) on 20 priority areas of PGRFA. The stock taking activities concentrate on
 - (a) State of diversity;
 - (b) The state of *in situ* management;
 - (c) The state of *ex situ* management;
 - (d) The state of use;
 - (e) The state of national programme, training needs and legislation;
 - (f) Monitoring and early warning system; and
 - (g) Promoting public awareness.
- On farm conservation and documentation of local varieties of rice in the coastal areas of BRRI;
- Bangladesh Forest Research Institute (BFRI) and Bangladesh Council of Scientific and Industrial Research (BCSIR) are also maintaining germplasm with medicinal importance in their nursery.
- Genetic finger-printing of 157 varieties of major crops: A study completed under Seed Industry Development Project of MOA. The project was coordinated by Bangladesh Agricultural Research Council (BARC).
- A compilation of medicinal plant of Bangladesh has been done by the Ministry of Health and Family Welfare;

3.2.2 Biosafety

Current situation and stocktaking activities undertaken in Bangladesh in response to Biosafety including risk assessment and risk management are as follows:

- Bangladesh has formulated Biosafety Guidelines in 1999 and updated in 2006 ;
- Bangladesh has also developed National Biosafety Framework (NBF) in 2006;

- Establishment of Biosafety Clearing House is under way for effective Implementation of NBF;
- Preparation of National Biosafety Rules is under process;
- Workshop and Training on Risk Assessment and Risk Management on GMOs with participation of various stakeholders have been organized by DoE, BARC, South Asia Biosafety Programme (SABP) and American Biotechnological Project (ABSP). Biotech experts are more or less familiar with the issues of Biosafety thanks to the activities like workshop and training sponsored by various agencies as mentioned above;
- Survey conducted on existing capacity of Biotechnology and Biosafety;
- Survey conducted on existing regulations with relevance to Biosafety and Biotechnology.

3.2.3 CBD 2010 Countdown

Goals and Targets for 2010 Vis-à-Vis Bangladesh Situation

COP 04 adopted the Strategic Plan for the Convention on Biological Diversity. It decided to go for effective implementation of CBD objectives to achieve by 2010 a significant reduction of the current rate of biodiversity loss. The COP 07 (decision VII/30) adopted a framework towards the 2010 goals and targets. This framework included seven focal areas. Eleven goals have been set under these 7 focal areas. Each goal has one or more targets. These are in Annexure II of decision VII/30. These decisions are reproduced with Bangladesh compliance/ position as under:

Focal Area I Protect the components of biodiversity

- Goal 1.** Promote the conservation of the biological diversity of ecosystems, habitats and biomes
- Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.
- Target 1.2: Areas of particular importance to biodiversity protected
- Goal 2.** Promote the conservation of species diversity
- Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups
- Target 2.2: Status of threatened species improved.
- Goal 3.** Promote the conservation of genetic diversity
- Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.

Bangladesh situation

Effective conservation involves legal and operational aspects. Bangladesh has three acts, namely Forest Act, Wildlife Conservation Act and the Environment Protection Act. Roughly 10% of the area of Bangladesh is Reserved Forest. Out of that about 10% area has been declared as "Protected". The list of Protected Areas (PAs) is given in **Annexure 08**. The total area of all these are only 10% of the Reserved Forest. Thus 1% of the country is under conservation effectively. Some other patches of Reserved Forest Areas have been notified as Eco-Parks but they have no additional conservation legal backup than that of the Reserved Forest. A proposal was prepared to revise the Wildlife Act in 2005 incorporating legal backups towards the "Safari Parks", "Eco-Parks", etc. but it is yet to be finalized. Though some of the biodiversity hot spots have been identified and declared as ECAs (Ecologically Critical Areas); no effective operational arrangement has been put in place for their proper management. The two projects, namely Conservation of Biodiversity, Marine Park Establishment and Ecotourism Development Project at St. Martin's Island and Coastal & Wetland Biodiversity Management Project (CWBMP) are working in some ECAs towards the conservation. Being these activities are project based, their sustainability is not ensured.

With respect to the conservation of agricultural biodiversity, a few gene-banks have been put in place. Regarding the conservation of fish diversity, some community affords have been taken mostly through project based activities. The taxonomic identification of the species is very poor, basically because of the serious shortage of good taxonomists. Except the Red Data Book of Animal prepared by IUCN Bangladesh (2000), no substantial works have been done in this area. A good, comprehensive and up dated listing of the endangered or

threatened species of flora and fauna of Bangladesh is yet to be tabled. In view of the requirements for the proper implementation of CBD, The Red Book on Vascular Plants by Bangladesh National Herbarium is not out of question (Khan et al. 2001). Complete inventory of flora and fauna of Bangladesh is yet to be done. Sporadic works are now being compiled in an encyclopedia by the Asiatic Society of Bangladesh.

Focal Area II Promote sustainable use

Goal 4. Promote sustainable use and consumption.

Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed in consistent with the conservation of biodiversity.

Target 4.2: Unsustainable consumption, of biological resources, or those impacts upon biodiversity, reduced.

Target 4.3: No species of wild flora or fauna endangered by international trade.

Bangladesh situation

The first requirement is to identify the production areas of biodiversity-based products. Management of these areas prohibiting unsustainable harvest or consumption comes next. Some measures have been taken under GEF funded SEMP and NBSAP Project towards the establishment and strengthening of institutional, administrative and legislative arrangement for the development of integrated management of Coastal and Wetland ecosystem. This may have some impact on sustainable management of a small ecosystem. But these are project based. Nothing comprehensive has been done as yet in this connection.

Being a signatory to CITES, the international trades of endangered species are well regulated by the Government through FD under the provisions of prevailing Acts and Rules especially under those of Wildlife Act. Bangladesh has to come up with more vigorous programme in this focal area.

Focal Area III Address threats to biodiversity

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

Target 5.1: Rate of loss and degradation of natural habitats decreased

Goal 6. Control threats from invasive alien species

Target 6.1: Pathways for major potential alien invasive species controlled.

Target 6.2: Management plans in place for major alien species that threaten ecosystems, habitats or species.

Goal 7. Address challenges to biodiversity from climate change and pollution

Target 7.1: Maintain and enhance resilience of the components of biodiversity to adapt to climate change

Target 7.2: Reduce pollution and its impacts on biodiversity

Bangladesh situation

The National Land Use Policy (enunciated vide notification number BHU MA/SHA-5/BHUMI NEETI/01/2001/150 dated June 13, 2001) has the provisions of restriction to convert forest land to other purpose. The Environmental Protection Act has also prohibition on collecting soil by cutting the hills. If these provisions are properly applied, the rate of land degradation will reduce.

The MOEF has formed a technical committee with representatives from concerned GOs and NGOs to prepare thematic report on alien species. The questionnaire received from the CBD secretariat will be used. The committee is working on that. In fact no organized program to identify the alien species in Bangladesh has yet been launched. However, the following species are known to be alien in the country:

Flora: *Tectona grandis*, *Gmelina arborea*, *Syzygium grande*, *Dalbergia sissoo*, *Swietenia macrophylla*, *Acacia auriculiformis*, *Acacia mangium*, *Cassia siamea*, *Luecacia leucocephala*, *Eucalyptus camaldulensis*, *Eichhornia crassipes*, etc.

Fauna: *Trichogaster pectoralis*, *Carassius auratus*, *Tilapia mossambica*, *Lebistes reticulatus*, *Cyprinus carpio*, *Ctenopharyngodon idellus*, *Hypophthalmichthys molitrix*, *Oreochromis niloticus*, *Puntius gonionotus*, *Cyprinus carpio*, *Aristichthys nobilis*, *Mylopharyngodon piceus*, *Clarias grandis*, *Pangasius sutchi*, *P. giganticus*, etc. (Source : NBSAP)

Government of Bangladesh is yet to undertake any program towards the adaptation of climate change in terms of biodiversity. However, some of the NGOs especially the IUCN, Bangladesh and BCAS are working on a program of climate change especially on the awareness raising aspects of the climate change. The Environment Act has the provisions to act against pollutions. But the implementation of the Act is very weak and the net effect is not yet perceivable. Along with the industrial pollution to river water there is a serious pollution from agricultural fields due to excess use of fertilizers and insecticides, especially in the tea garden areas. The Government does not have the manpower to act on these in time. These indicate that in this focal area the progress achieved by Bangladesh is extremely low.

Focal Area IV Maintain goods and services from biodiversity to support human well-being

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods

Target 8.1: Capacity of ecosystems to deliver goods and services maintained.

Target 8.2: biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained

Bangladesh situation

There is no legal instrument on maintaining the capacity of an ecosystem. The Land Use policy has the prohibitions on land use change. The Forest Policy has the provisions for sustainable and integrated management. These may be put to use towards the sustainable use. Recently some of the protected areas and wetland have been put under co-management program undertaken by Nishorgo Support Project and Tanguar haor Project. These are looking for sustainable management. Though sustainability is often spoken almost at all levels, the field actions of putting that in real world situation is yet to be experienced.

Focal Area V Protect traditional knowledge, innovations and practices

Goal 9. Maintain socio-cultural diversity of indigenous and local communities

Target 9.1: Protect traditional knowledge, innovations and practices

Target 9.2: Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing

Bangladesh situation

Government of Bangladesh is very careful towards the rights and privileges of the indigenous people. The Peace Treaty signed by the Government in connection with Chittagong Hill Tracts is an official acceptance of the rights and privileges of the indigenous people. The Government has been tolerant with respect of the claim of the indigenous people of Modhupur even on reserved forest land. Some of the NGOs are working on the 'traditional knowledge' with donor funding, while the Ministry of Cultural Affairs is active on this issue. The real progress on the collection and collation of the indigenous knowledge is reasonable. The achievement under this given focal point is reasonable.

Focal Area VI Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Target 10.1: All transfers of genetic resources are in line with the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements.

Target 10.2: Benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources

Bangladesh situation

This aspect comes under the purview of Biosafety. Government of Bangladesh under a project has just finalized National Biosafety Framework (2006). Prior to that Government of Bangladesh has prepared the Biosafety Guidelines. These are awaiting approval of the relevant authority (Cabinet Division). Until and unless the Biosafety Rules are framed, nothing effective will surface on this issue.

Focal Area VII Ensure provision of adequate resources

Goal 11. Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention 76.

Target 11.1: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.

Target 11.2: Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.

Bangladesh situation

The financial assistance received on these issues of CBD from developing countries is very inconspicuous. The same is the position on technology transfer issue. Under that given situation the achievement under this given focal area is very poor.

Indicators

Setting of these goals as stated above will let the parties get a clear picture to evaluate the activities with respect to implementation of CBD. For the purpose of evaluation setting up of indicators is essential. The Conference of the Parties decided to develop a framework for the evaluation of achievements and/or progress in the implementation of CBD in achieving the 2010 Biodiversity Targets. This framework includes the focal areas discussed above.

In case of Forests and Forestry the indicators may be both, absolute area of each forest type or its contribution as resource. Protection status of different forest types may be PA area under different forest types, be used as indicator.

Newton and Kapos (2003) suggested the following as indicators for sustainable forest management.

- Forest area by type and successional stage relative to land area.
- Protected forest area by type and successional stage and protection category relative to total forest area.
- Degree of fragmentation of forest types.
- Rate of conversion of forest cover by forest type to other uses.
- Area and percentage of forest affected by anthropogenic and natural disturbances.
- Complexity and heterogeneity of forest structure.
- Number of forest dependent species.
- Conservation status of forest dependent species.

The parties are required to identify indicators for the evaluating the achievements of the country. The indicators are supposed to be identified using the following.

The indicators should be identified or developed in such as way so that:

1. The same indicators may be used at the global, regional, national and local levels as tools for the implementation of the Convention and of national biodiversity strategies and action plans, where so desired by Parties;
2. The indicators relate to one or more of the various Programs of Work of the Convention;
3. The indicators should take into consideration relevant Millennium Development Goals and indicators developed by other relevant international processes; and
4. Existing data sets are used.

The annexure I of the decision VII/30 has suggested the following in connection with the indicators.

Status and trends of the components of biological diversity in selected biomes; ecosystems and habitats; the abundance and distribution of selected species; change in status of threatened species; trends in genetic diversity of domesticated animals, cultivated plants, and major fish species, protected areas, sustainable use area of forest, agricultural and aquaculture ecosystems under sustainable management, proportion of products derived from sustainable sources are the targets to be evaluated through the indicators. The following aspects may also be borne in mind while identifying the indicators.

1. Threats to biodiversity
2. Nitrogen deposition
3. Numbers and cost of alien invasions
4. Ecosystem integrity and ecosystem goods and services
5. Marine trophic index Application to freshwater and possibly other ecosystems
6. Connectivity/fragmentation of ecosystems
7. Incidence of human-induced ecosystem failure
8. Health and well-being of people living in biodiversity-based-resource dependent communities
9. Water quality in aquatic ecosystems
10. Biodiversity used in food and medicine
11. Status of traditional knowledge, innovations and Practices
12. Status and trends of linguistic diversity and numbers of speakers of indigenous languages
13. Status of access and benefit-sharing Indicator to be identified by WG-ABS
14. Status of resource transfers Official development assistance provided in support of the Convention (OECD-DAC-Statistics Committee) Indicator for technology transfer

Indicators are required to be identified for each of the focal areas.

Bangladesh situation

Nothing has been done as yet in setting indicators as required.

Protected Areas

COP 07 has also given a program of work on protected areas. The detailed of these is given in **Annexure 09**. Some of the salient features of this are as under.

It has 4 program elements as under.

1. Direct actions for planning, selecting, establishing, strengthening, and managing, protected area systems and sites. It has five goals.
2. Governance, participation, equity and benefit sharing. It has two goals.
3. Enabling activities. It has five goals.
4. Standards, assessment, and monitoring. It has four goals.

List of on-going projects and programme under CBD relating to CBD 2010 target

The following projects and programmes undertaken by MoEF are expected to mitigate the biodiversity loss. These are ongoing projects.

- Biodiversity Conservation and Development of Natural Environment
- Establishment of Eco-park at Modhutila
- Bio-diversity Conservation in the Sundarbans Reserved Forests
- Afforestation in the Denuded Hill Areas of Ramgarh-Shitakunda (1st Phase)
- Establishment of Botanical Garden & Eco-park at Shitakunda, Chittagong
- Development of Dulahazra Safari Park and Cox's Bazar
- Natural Environment/Biodiversity Conservation & Development at Bashkhali, Chittagong (2nd Phase)
- Nishorgo Support Project
- Kuakata Eco Park at Kolapara Upazila at Patuakhali
- Coastal Char Afforestation
- Coastal and Wetland Biodiversity Management at Cox's Bazar and Hakaluki Haor

In addition to the above, a project on Encyclopedia of Flora and Fauna is currently being implemented by the Asiatic Society of Bangladesh.

CBD and NBSAP

As per article 6 of the CBD, the Ministry of Environment and Forests has successfully implemented a project and developed the National Biodiversity Strategy and Action Plan (NBSAP) in July 2005, with the financial support from GEF/UNDP. The NBSAP is the overriding national document to set the trend for future biodiversity related activities. This has been prepared through extensive consultations with the stakeholder following both 'top-down' and 'bottom-up' approaches. The bottom-up approach was used at six Regional Workshops arranged in six administrative divisions of the country. Following the 'top-down' approach, five thematic areas were identified that include: species conservation; ecosystem management; legal, regulatory and policy issues; education, training and awareness building; linkage and institutional issues. Under this auspicious document, 16 strategies have been identified to conserve the biological diversity in Bangladesh. The Government has approved this document but is yet to publish and implement it.

Activities under the CBD:

- Ecologically Critical Areas (ECAs) : The following were declared as ECAs: Tanguar Haor (Ramsar Site), the Sundarbans (Global Heritage site), Maheshkhal (coastal island) and other areas in Sylhet (hills, sanctuaries, national parks).
- Under Article 10, conservation and use of biodiversity in national decision-making is envisaged.
- National conservation efforts: Conservation of species through a number of sectoral policies like Forest Policy, Environmental Policy, Livestock Policy, Fisheries Policy. For example, the Fourth Fishery Project for fish resources management and conservation is underway.
- Article 12 focuses on scientific education and training. Article 13 refers to education and public awareness including formal and non-formal education and media propagation. Several workshops for training and awareness building with GO-NGO collaboration have been organized. Environmental issues in academic curricula have come only in limited manner.
- Article 14(b) refers to policy of minimizing adverse impact on biodiversity. Policy debate continues in the country regarding shrimp farming in saline waters which threaten mangrove forestry;
- Articles 15(4-5) refer to access to genetic resources by mutual consent. Activities under this article include benefit sharing arrangements (policy and law) among the poor stakeholders in fishery and social forestry in Bangladesh;

3.3 Priority Environmental Issues

Major challenges to biodiversity conservation in Bangladesh

Some of the major challenges to implementing the Convention on Biological Diversity and promoting sustainable development in Bangladesh include:

- Meeting the increasing demand for biological resources caused by population growth and increased consumption, while considering the long-term consequences of our actions.
- Increasing our capacity to document and understand biodiversity, its value, and threats to it.
- Building adequate expertise and experience in biodiversity conservation planning.
- Improving policies, legislation, guidelines, and fiscal measures for regulating the use of biodiversity.
- Adopting incentives to promote more sustainable forms of biodiversity use.
- Promoting trade rules and practices that foster sustainable use of biodiversity.
- Strengthening coordination within government departments, and line Ministries dealing with issues of CBD.
- Securing adequate financial resources for conservation and sustainable use, from both national and international sources.
- Making better use of technology.
- Building political support for the changes necessary to ensure biodiversity conservation and sustainable use.
- Improving education and public awareness about the value of biodiversity.

3.3.1 Bioprospecting and ABS issues

- The formulation of regulation of access to biological resources including regulation of transgenics and Genetically Modified Organisms (GMO's)/ Living Modified Organisms (LMO's).
- The development of Material Transfer Agreement (MTA). A prior informed consent and mutually agreed terms to be clearly defined in the MTA.
- Development of modes and mechanism of benefit sharing from commercial use of bioresources.
- Facilities for post entry quarantine of transgenics along with review of quarantine Act to harmonize with biosafety policy/Act/guidelines/rules etc.
- Institutional capacity building and human resource development.
- Transparency and equity: Formulation of Plant Variety Protection and Farmers Rights Act and Biodiversity and Community Knowledge Protection Act.
- Financial support and mechanism:
- Biosafety, sanitary and phytosanitary issues: (a) Development of biosafety framework taking into account the Cartagena protocol on biosafety, national policy, regulatory regime, risk assessment management and risk communication, mechanism of public participation, awareness education and mass communication and monitoring and enforcement.

Major constraints in managing biodiversity in Bangladesh under CBD:

- Focused approach on conservation of biodiversity and its utilization are lacking.
- Need to strengthen long-term storage facilities and facilities for field genebank (botanic garden, conservation of recalcitrant seeds and vegetatively propagated plants).
- Inadequate incentive to farmers.
- Inadequate trained manpower.
- Livelihood and conservation are not linked in the programme of activities.
- Livelihood supporting species has not been identified with special care and their conservation activities are not promoted.
- Inadequate fund to initiate comprehensive work programme.
- Lack of policy and regulatory regime (MTA, benefit sharing mechanism, funding mechanism).
- Delay in formalizing draft acts related to PGRFA.
- Unplanned conversion of agricultural land to non-agricultural uses.
- Lack of support for strengthening and for widening survey and inventory work.
- Concerted efforts need to be initiated to preserve traditional knowledge related to PGR with special reference to crop wild relative.
- Lack of regional approach in *in situ* conservation of genetic resources.
- No formal market for local varieties and diversity rich product.
- Problem in seed production and distribution of local varieties and diversity rich products.
- Monitoring activities are inadequate.
- Promotion and commercialization activities of under utilized crops are yet to develop.
- No multi stakeholder strong national programme.
- Land slide is a priority environmental issues that need to be addressed.
- Livelihood and poverty need to be addressed together while promoting biodiversity activities.
- Need central coordination.

Assess the achievement and reorganize the gaps and constraints in order to develop strategy for conservation and sustainable utilization of PGR:

- Larger participation and involvement of institutions, organizations, people NGO, women organization and farming communities and active stakeholders in national endeavours.

Formulate and development of comprehensive and effective programme and national action plan.

- Funding source need to be identified.

FAO report on the state of world's plant genetic resources has been considered the first comprehensive assessment of the state of plant genetic resources conservation and use.

Major issues that require further attention at national level may be identified as follows:

- Inventorization and proper documentation; patenting of indigenous knowledge, process and techniques.
- Further exploration and collection of plant genetic resources from different Agro-ecological Zones (AEZs).
- The value addition of germplasm enhancement work (traditional breeding and biotechnology).
- Need to evaluate, regenerate and conserve most of the agro-biodiverse resources under on-farm condition.
- Inter institutional cooperation need to be strengthened and coordinated.
- Traditional breeding, farmers' participatory breeding and bioprospecting through biotechnology need to be strengthened.
- Expanding and improving education and training.

The *ex situ* measures for access benefit sharing include reaching a broad agreement/accord; signing of Memorandum of Understanding (MOU), obtaining prior informed consent, defining the mutually agreed terms, signing of MTA and benefit sharing agreement. The post facto steps would be to establish the ownership over genetic material used, to establish that a benefit is considered from commercial use of the product/derivatives using the participants' genetic resources and seek for consent for sharing the benefit or alternatively the justice.

3.3.2 Biosafety

With a view to reducing the threats arising from the application of modern biotechnology in agriculture (such as, crops, fisheries, animal and livestock), food, medical, and industrial sector, Bangladesh is lagging behind to meet the challenges of Biosafety. The following are the priority issues in Biosafety:

- Information gap (spatial and diversity context) on genetic resources available in Bangladesh. Assessment has to be furnished on plant and animal biodiversity including the wild relatives, ecotypes and landraces in various agro-ecological zones.
- Conservation of the indigenous, local and elite crop and animal varieties
- Conservation of non-target insects, animals and plants, wild and weedy relatives
- Environmental impacts of GMOs/LMOs needed vigorous studies on the basis of food, agricultural and medicinal products
- Evolution of resistance of pest towards *Bt* insecticidal protein
- Containment facilities and maintenance of standard specification in containment or glass houses
- Train up and/or sensitizing biotechnology people with the issues of biosafety concerns (biosafety concerns may arise from various uses of GMOs and genetic modifications).
- Understanding the clarity of risks already studied/assessed outside the country with the newly imported GMOs, gene-constructs and their applications.
- Public health concerns: Study on the impact of GMOs on public health well before GMOs are placed into the market.
- Bangladesh needed to be more cautious about the trading of GMOs, which might start before development of infrastructures
- Information on GMOs should be provided properly e.g. the ingredients of a GMO product should be given in detail on the labels of the finished product so that customers could understand it's adversity
- Biotechnological hazards are difficult to identify and hence there should be expertise knowledge to handle the issues
- Inadequate understanding concerning the objectives of CP.

- Inadequate research, development and commercialization of GMOs resulting in insufficient understanding of importance of the protocol.
- Insufficient trained manpower to implement the CP. This protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health and specifically focusing on transboundary movements.

3.3.3 CBD 2010 Countdown

- Every sector is important in a country. But there are priority sectors in Bangladesh (Agriculture, fisheries, livestock, etc.). Such sectors contribute greatly to the livelihood of majority people. These sectors need to be specifically addressed in the NCSA.
- Inadequate knowledge in the general people about the importance of biodiversity.
- Academic curricula in our country are not comprehensive. But separate chapters on biodiversity in the curricula of different disciplines are inadequate. It is important to develop human and institutional capacity to make effective and sustainable use of agricultural biodiversity.
- Inadequate analyzing policies and fostering an environment to support the use of biodiversity.
- Inadequate skills in negotiations and implementation. Sometimes skilled persons are not selected to negotiate. Proper pre-negotiation discussion is not held with experienced personnel.
- Biodiversity related protocols/agreements/issues are not well circulated to all stakeholders thus keeping them unaware of the biodiversity issues.
- Efforts from the end of govt./NGOs are inadequate to make awareness building throughout the country. A separate well-structured program involving all stakeholders to this effect is of paramount importance. Local leaders (social / political / religious, etc.) should be equipped with biodiversity knowledge to perform the job.
- Inadequate local / foreign fund.
- Tremendous communication gap between knowledge generators (scientists / academic) and users (general public).
- Inadequate coordination among different institutions / organizations / offices.
- Insufficient trained manpower including taxonomists.

3.4 IDENTIFYING CAPACITY NEEDS

3.4.1 Bioprospecting and ABS

Individual level:

- Skill development for the negotiation team particularly for MOEF, MOA, FD, DAE, MFA need to be developed;
- Sensitize civil society and community people for Bioprospecting;
- System to be evolved to retain individual knowledge and capacity building;
- Awareness creation amongst teachers of schools, colleges etc;
- Indigenous knowledge may be protected for future Bioprospecting;

Institutional level:

- A special cell or unit under the MOEF or Forest Department may be set up to carry out the programme of biodiversity and for regular monitoring (not a separate department);
- Sensitize concerned ministries and agencies, especially the ones within NARS;
- Biodiversity hotspot may be preserved for Bioprospecting;
- Institutional capacity for protecting and regulating biopiracy;

Systemic level:

- “National Biodiversity Act” is needed to be enacted without further delay;
- Review of Quarantine Act to harmonize with biosafety and biotechnology;
- Modes and mechanisms for benefit sharing with foreign agencies may be explored;
- Blending of science and law to create a standard format for Material Transfer Agreement (MTA);
- Development of a perspective plan such as Vision 2025 for bioprospecting;
- Mass and general awareness and dispersion of knowledge, as opposed to knowledge monopoly within the scientific community;
- Focus on wetland forests as reservoirs of biodiversity;
- Instead of a thorough inventory, go for a listing of endemic plants. But others suggested inventory and documentation and demarcation of agro-ecological zones;
- Coastal biodiversity, especially Sundarbans as freshwater mangroves should also be a priority;
- Regional efforts are needed for *in-situ* conservation of biodiversity like the Sundarbans;
- Relevant patenting laws have to be visited and reformulated according to the needs of Bioprospecting;
- Create forward linkages i.e. linkages with the market for harvesting the output of Bioprospecting;
- Regulations for transgenic and GMOs.

3.4.2 Biosafety Need Assessment:

Individual:

- We need more trained but dedicated researchers and personnel to look into the Biodiversity and Biosafety issues. To understand how to assess and apply *risk-benefit* and *cost-benefit* analysis is another concern to be addressed by the professionals who are working with modern biotechnology.
- Customs, Police officials needed training to handle LMOs/GMOs;
- Training/capacity building should be there for farmers so that they can identify harmful pesticides;
- Advocacy programs should be arranged for policy makers so that they do not ignore biotechnology issues;
- Business houses needed to be encouraged and involved in the awareness raising campaign;
- Sensitize the DAE block supervisors at the border areas and equip them to identify harmful GMOs from the neighbor countries;

Institutional:

Institutes do not have clear mission, vision and objectives, as of now, regarding biodiversity, biosafety and GMO issues; also they suffer from logistic and required infrastructural supports on assessing and managing risks of new technology like genetic engineering and modern biotechnology. To this end the following activities are suggested to be taken up as efforts towards capacity building.

- Institutional capacity of DOE/MOEF and all other Ministries and Institutes which will be working to manage Biosafety activities should be strengthened;
- BPATC, NAEM etc cadre training centers should include separate module on Biosafety;
- Priority may be given on development of the institutional capacity of agro-biotechnology, FAO initiatives should be taken into consideration to interact with global networks ;
- Research organizations should be careful about the fabricated and/ or manipulated data and information about the GMOs and there should have some ways of monitoring about this issues;
- Institutional Capacity of Ministry of Commerce, Ministry of Agriculture, Chief Controller of Imports & Exports (CCI &E) and BSTI officials need to be developed in terms of risk identification and management of GMO products.

Systemic:

- Impracticable legislations or absence of legislations; No Biosafety law in place yet; Public education, awareness and information level has to go a long way regarding the importance of biodiversity and biosafety. Public participation mechanism in decision-making process on GMOs is still not in practice.
- Cartagena Protocol on Biosafety needed to be incorporated into national laws and regulations of Bangladesh

3.4.3 CBD 2010 Countdown Capacity Needs

Individual level

- Training for individuals to impart proper understanding on the importance of conservations, sustainable use of biodiversity and equal sharing of products out of local resources.
- Taxonomic capacity building including molecular taxonomy on all groups of plants, animals including insects, microorganisms, etc. This will help identify the organisms at genus/species level. This is very important for scientific documentation of organisms.
- Preservation of paratypes at individual level and to handover a set to the nearest institution level.
- The trained individuals should act as trainers to train the people around them. Thus the training benefits will be multiplied.

Institution level

- Institutional development to ensure Human Resource Development through the trickle-down effect.
- Computer based stocktaking of existing strengths.
- Renewed training on biodiversity to the permanent staff locally and internationally.
- Establishment of inter-institutional linkage at national, regional and international levels.
- Well-managed national species/data repository with access to all relevant stakeholders.
- Creating paratypes at the national and regional levels through training the permanent staff.

Systemic level

- To do something at national level, capacity at policy level is important. Therefore, policy makers should have orientation in the areas of CBD/CP.
- Inadequate coordination among stakeholders spoils a good strategy. Clear understanding of inter-ministerial and inter-departmental coordination is necessary.
- Coordination / assistance with NGOs is important as they have linkage at the grassroots level.
- Updating of websites and circulation of the same widely.
- NBSAP implementation process as early as possible.
- Timely preparation of national reports and wide circulation of reports.
- The National Biodiversity Act could be implemented.
- Involving or strengthening the linkages of local administration with projects, especially for those being implemented within the ECAs.
- Village level biodiversity register to be created by the local Government Institution. To create societies/association (*Samiti*) to carry out biodiversity assessments and inventorying of species.
- Delegation of authority to the really deserving and knowledge people.
- Conservation measures have to be accompanied by alternative livelihood packages.
- To evaluate the intangible benefits of projects through given accounting techniques.
- To identify indigenous / endemic species and make inventory for creating patent rights.
- Campaigns for increasing awareness and enhancing understanding among mass.

3.5 CAPACITY DEVELOPMENT ACTION PLAN (CDAP)

3.5.1 CD on Bioprospecting and ABS

Bioprospecting and Access and Benefit Sharing (ABS)

One of the first steps towards a successful national biodiversity strategy is to conduct surveys to find out what biodiversity exists, its value and importance, and what is endangered. On the basis of these survey results, Government of Bangladesh can set measurable targets for conservation and sustainable use. National strategies and programmes need to be developed or adapted to meet these targets. A set of (Bonn) guidelines was developed for effective implementation of ABS regime globally.

Sustainable use

Promoting the sustainable use of biodiversity in Bangladesh is a growing importance for maintaining biodiversity in the years and decades to come. Under the Convention, the "ecosystem approach to the conservation and sustainable use of biodiversity" is being used as a framework for action, in which all the goods and services provided by the biodiversity in ecosystems are considered. The Convention is promoting activities to ensure that everyone benefits from such goods and services in an equitable way. However, there are gaps in knowledge and information as far as sustainable use of the biological resources in Bangladesh is concerned.

Traditional knowledge & sharing the benefits of genetic resources

The CBD recognizes the close and traditional dependence of indigenous and local communities on biological resources and the need to ensure that these communities share in the benefits arising from the use of their traditional knowledge and practices relating to the conservation and sustainable use of biodiversity. An important part of the biodiversity debate involves access to and sharing of the benefits arising out of the commercial and other utilization of genetic material, such as pharmaceutical products. Most of the world's biodiversity is found in developing countries, which consider it a resource for fueling their economic and social development. Historically, plant genetic resources were collected for commercial use outside their region of origin or as inputs in plant breeding. Foreign bioprospectors have searched for natural substances to develop new commercial products, such drugs. Often, the products would be sold and protected by patents or other intellectual property rights, without fair benefits to the source countries. This issue is also of concern to the people and Government of Bangladesh.

National Capacity Development on Bioprospecting

- An assessment of genetic diversity, the rate and extent of Plant Genetic Resources (PGR) erosion and prioritization of PGR activities, based on the information gathered from such studies – (Top Priority).
- Establishment of a National Genebank for conservation, use and enhancement of biodiversity with appropriate infrastructure for conservation of orthodox and recalcitrant seeds, vegetatively propagated materials, including facilities for a Cryo bank and a DNA bank (Top Priority).
- The national policy framework/legislation need to be developed in pursuance of the principles of the Convention of Biological Diversity. The national framework will provide guidelines for (i) a *sui generis* system, (ii) access to and exchange of plant genetic resources, (iv) recognition of farming communities, their conservation and use of PGR, and their indigenous knowledge (Farmers' Rights) and benefit sharing, (v) adopting means to curb biopiracy, (vi) arrest genetic erosion and threat to conservation of biodiversity, (vii) protection of habitats rich in native diversity, (viii) biosafety regulation, and (ix) seed policies and other such concerns.
- A strong coordination among different stakeholders involving research, the public and the private sector, NGOs, farmers organizations, etc. would be necessary for achieving the above goals. BARC should strengthen its monitoring and coordination role on the PGR activities.

- The overall strengthening of the national programmes demands:
 - (i) Human resources development and capacity building in PGR in various fields that needs to be prioritized both for professional staff and technicians.
 - (ii) A national plan: a) to priorities PGR activities in germplasm collection, characterization, evaluation, documentation and conservation, (b) to prepare inventories of such resources for their better utilization; and (c) to plan a national database.
 - (iii) Strengthening and integration of national PGR network including field genebanks.
 - (ii) Strengthening of national varietal improvement programmes and an integration of such programmes with PGR activities.
 - (iii) To promote dissemination of information and national concern on biodiversity conservation through increased public awareness (including introduction of course curricula in PGR/biodiversity in educational institutions at different levels), with participation of farming communities, NGOs and other partners.
 - (vii) Development of a well structured national plant quarantine system/policy for import and export of materials (seeds, plant propagules, *in vitro* cultures, genetic finger-printing, strengthening of short-and medium-term storage facilities at existing genebanks at other institutes will be required.

Tentative outline of activities for capacity development on Bioprospecting and ABS issues (Both in public and private sector)

- Development perspective plan: vision 2025
- Biochemical and molecular characterization of germplasm and its facility development.
- Drafting of policy and legal document (eg. MTA, policy on PGR, Biodiversity Act, Plant Variety and Farmers Right Protection act, Development of conceptual paper etc.).
- *In situ* and *ex situ* conservation including long term seed bank, invitro bank, field repositories for tree species, root and rhizome crops, National Herbarium for cultivated plants.
- Cryo preservation of germplasm.
- Documentation of germplasm.
- Geographical information system.
- Methodologies of *in situ* conservation and on farm management.
- Regeneration of species conserved *ex situ*.
- Developing monitoring and early warning system for PGRFA.
- Marker aided characterization.
- Information Technology system (data base management) with special reference to information sharing on conservation and sustainable utilization of PGR.
- Management of gene bank.
- Negotiating skill development.
- Back-up research on conservation regime and protocols.
- Eco-tourism activities to be promoted.
- Institutional capacity of Forest Department and human capacity of forest officials may be developed;
- Capacity development also needed for custom officials in respect to market opportunities e.g. export / import procedures of Bioprospecting products;
- Capacity building and technical assistance for synergistic effects of Bioprospecting;
- Project activities identified in NBSAP may be implemented.
- Establishment of Biodiversity office to develop a new strategy for biodiversity conservation. Initial activities should be focused on the development and distribution of information on Bangladesh's biodiversity.
- Up-front compensation, royalties on any new products to be shared with government/private sector to establish a laboratory.
- Creation of trust fund / gene fund/biodiversity fund.
- Donation from the government/donor/private sector/eco-tourism, botanical garden/royalty/benefit from the commercialization of product by the bio-prospector of Biological diversity.

- Encourage private sector access to venture capital funding and facilitate technology transfer arrangement to promote the development of value added products from biodiversity and sharing of benefit for the promotion of biodiversity conservation, utilization and capacity development activities.

3.5.2 CD on Biosafety

Proposed Capacity Development Action Plan for biosafety at individual, institutional and systemic level:

Bangladesh has to build capacity at individual, institutional and policy levels for implementation of biosafety ensuring activities in the country. Capacity survey on biosafety and biotechnology status in the country under the 'DNBF' project revealed that capacity on biosafety at individual and institutional level are limited in terms of risk assessment, management and other aspects of modern biotechnology. UNEP-GEF, private entrepreneurs, GoB etc. sources may be the probable sources of funding in implementing Biosafety related emerging activities.

Proposed capacity development activities has been outlined below:

A. Capacity Development at Individual Level				
	Proposed activity	Outline of the activities	Timeframe/ Action Plan	Probable source of funding
1	Training/ Advocacy/ Mainstreaming program for policy-makers and regulators	<ul style="list-style-type: none"> • Enhancement of understanding of GoB officials on linkage among various international treaties with biosafety protocol; negotiation skill development on bilateral, regional and international agreements related to biosafety; 	Short Term (0-3 yrs.)	GoB and/or bilateral funding from UNEP-GEF or other development partners.
2	Training for scientists /researchers/ NCB members /technical members of other biosafety committees/ officers and staffs of implementing agency(s)	<ul style="list-style-type: none"> • Higher studies and research on biosafety and biosafety related courses (e.g. biosafety, food safety, food regulation, EIA, Risk assessment, Risk management, safe use of Genetic Engineering Techniques (gene isolation, gene-construct development, gene sequencing and insertion etc.); • Development of Scientific methods and protocols relevant to risk assessment and management (e.g. extent and effects of gene flow, Substantial Equivalence etc.); monitoring and enforcement; safety operation of laboratory equipments; good laboratory practices; handling of GMOs and their safe disposal systems, standard documentation and auditing and accreditation procedures etc.; • Develop competency of concerned agencies for detection, testing and quantitative analysis of GMOs, food safety analysis and levelling aspects. 	Long Term (0-10) Short Term (0-3 yrs.) Medium Term (0-5 yrs.)	GoB and/or bilateral funding from UNEP-GEF or other development partners
3	Public information and education system	<ul style="list-style-type: none"> • Publication of awareness and education materials (preferably in Bangla); capacity development for public notification and participation 		

B. Capacity Development at Institutional Level				
	Proposed activity	Outline of the activities	Timeframe/ Action Plan	Probable source of funding
1	Strengthening Institutional entities for handling biosafety issues	<ul style="list-style-type: none"> • Establishment of a secretariat/cell for biosafety activities with, full functional NCB, BCC, IBCs and FBC. • Capacity building to implement/adopt the NBF, relevant guidelines and manuals etc at the institutional level. • Strengthening of existing Biotechnology and Genetic Engineering departments/ laboratories and Government Institutions (e.g. DoE, BSTI, IFST etc.) in terms of modern equipment set-up and infrastructure development with full facility for contained use of GMOs and for their safety assessments. • Strengthening relevant government agencies such as border control (customs), quarantine and inspection facilities, and set-up data collection, management and storage facilities. • Development of reference/accredited laboratories for wide range of safety analysis such as detection, testing and quantitative analysis of GMOs, analysis of food derived and/or processed from GMOs, Substantial Equivalence and Toxicological tests etc. and biosafety research. • Establishment of Inter-institutional networks for risk analysis, reporting, communication and management. • Enhancement of regional and international cooperation activities. • Funding and resource management: fund raising skills, including proposal writing, project implementation training; 	<p>Long Term (0-10 yrs.)</p> <p>Medium Term (0-5 yrs.)</p> <p>Medium Term (0-5 yrs.)</p> <p>Medium Term (0-5 yrs.)</p> <p>Medium Term (0-5 yrs.)</p> <p>Short Term (0-3 yrs.)</p>	GoB and/or bilateral funding from UNEP-GEF or other development partners
C. Capacity Development at Systemic Level				
1	Development of decision making system and administrative and regulatory procedures	<ul style="list-style-type: none"> • Implementation of the NBF and Biosafety Guidelines. • Drafting, promulgation and enforcement of Biosafety Rules/Act. • Formulation of required/prescribed formats and manuals etc. 	Short term (0-3 yrs.)	GoB and/or bilateral funding from UNEP-GEF or other development partners
2	Information management system	<ul style="list-style-type: none"> • Development of Bangladesh Biosafety Clearing House (BBCH), network development for information on international collaboration and funding for risk assessment, management and harmonisation etc. 		

		<ul style="list-style-type: none"> • Harmonisation of biosafety related sectoral laws/policies; standardised formats and procedures for information exchange; • Review mechanisms of biosafety decisions, regulatory training (legal, policy, enforcement, inspection etc.); • Multidisciplinary strategic planning; analysis of risk assessment and management and integration of socio-economic considerations; • Enabling policies and mechanism for technology transfer and; • Analysis of Biosafety Guidelines, NBF and other relevant documents for effective coordination and implementation of biosafety activities. 		
--	--	---	--	--

3.5.3 CD on CBD 2010 Countdown

Tentative outline of activities for capacity development in public and private sector on CBD 2010 target

- Training of Govt. officials on negotiation techniques at international platforms.
- ToT for upazila level officials and agriculture officials / resource persons / science teacher and teaching taxonomy to them and knowledge transmission at the local level through training for primary stakeholders.
- To include a chapter (at least three lectures) on conservation in the training manual of LGD being developed under Local Government Support Programme funded by World Bank.
- To utilize the expertise of national training institutes, such as PATC, MAEM, BARD, RDA, BIAM, CERDI, etc. for capacity building exercises.
- Creation of an apex body in the public sector
 - Awareness creation in the policy makers.
 - Awareness development in the district & upazila level officials coordinated by the apex body.
 - Upazila officials will eventually create awareness among general public on the benefits of biodiversity.
 - Apex body will make reports and make them available to the people through website, folktheatre and other non-formal communication means.
- Creation of an apex body in the private sector
 - Awareness creation in the policy makers.
 - Awareness creation in the district and upazila levels officials of private sectors coordinated by the apex body. They will eventually create awareness among the people predominantly linked with them.
 - The apex body will make reports and make them available to the people through website, folktheatre and other non-formal communication means.

Capacity Development Action Plan

The most serious hurdle in the implementation of CBD in Bangladesh is the extreme shortage of taxonomists. This can somehow be met by training some of the existing officials of various government departments working with flora and fauna. The capacity development action plan under the above discussed scenario is proposed as under.

Step 01

The Government needs to take the following decisions.

- That the Government sincerely desires to implement the CBD.
- That the Government constitutes a CBD-Group and creates the required facilities for its proper functioning. The “CBD group” of experts is to be constituted from several fields of biological sciences. Primarily experts on taxonomy (flora & fauna), agriculture, forestry, fisheries, wildlife, livestock and biotechnology need to be included in this group. These personnel while having their basic expertise on the said branches of science are required to be well conversant of the CBD and Cartagena Protocol. This group may have a maximum of 100 personnel from all related subjects, so that the expertise sustain within the group and does not wither away with departure of a couple of persons. They must be well-appraised of COPs and need to develop their capabilities to keep track of all the progresses and trends on any of the issues tabled during the COPs. They must keep themselves updated continuously. Besides these they need to develop their negotiating capabilities at international level.
- That the Government ensures that all its officer at ‘Joint Secretary’ level or above are trained on a program “Natural Resource and Environment” and have passed the test.

Step 02

Constitute CBD-Group and their training.

- Formulate a Capacity Development Programs to meet the need of each of the 26 Ministry Officials (described above). The broad name of the course may be “Natural Resource and Environment”. Eventually all the administration cadre personnel need to be trained on this subject. For the personnel of a given ministry there should be specialized section so that they are given specialized training on those items. The formulation of the program for training need be well thought and comprehensive so that immediate revisions are not required. However, since this is a growing and expanding field of science, continuous updating will be necessary and the program may need to be revised after a few years.
- A CBD-Group is to be identified from various concerned ministries. Their number may be about 100. The personnel of the CBD group may be given a short training (may be two week) at home and abroad. These members of CBD-Group will perform the job of trainers later.

Step 03

Impart Training

For imparting training two programs are to be developed. One as “**Natural Resources and Environment**” and the other as “**CBD Implementation Backup**”. The ‘Natural Resources and Environment’ will be a continuous program at PATC for all the officers of Government. The other program shall be for the sectoral personnel and institutions so that they are well equipped towards the implementation of CBD.

First Priority:

As a matter of priority training on taxonomy has to be imparted first to develop the capacity of identification to know the extant of biological resources that exist in the country. In this case personnel may be given the training. This training has to be divided into two, one for flora and the other for fauna.

For the flora part personnel may be taken from National Herbarium, Forest Department, Botanical Gardens, Agriculture, Botany Department of Public Universities, Environment Department of Private Universities, Agricultural Universities, Agricultural Colleges, Research Institutes, Forestry Colleges, Forestry Schools, NGOs, etc.

For the fauna part personnel may be taken from Livestock Department, Fisheries Department, Zoos, Agricultural University, Zoology Department of Public Universities, Marine Aquaculture, Wildlife section of Forest Department, Research institutes, NGOs, etc.

Next Priority

Under this priority all the sectoral trainings are to be under taken. The Ministry of Environment and Forest will be the lead agency. This ministry will arrange all these trainings. The “Authority Responsible” will depute their personnel for taking the training. Besides the specific training suggested for various sectors The Ministry of Environment and Forest will continue to arrange a training at the PATC on a regular basis on “Natural Resource and Environment” to appraise the officials of the Ministry about the environmental subjects. It will be mandatory to qualify the test on this subject before the officer is promoted to the rank of Joint Secretary.

The layout of the sectoral training programs may be as under:

Sector: Forestry and Environment

Level at which the Capacity Development is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individual	Personnel from the Forest Directorate with priority on personnel employed in Park Management	Ministry of Environment and Forest	High
Individual	Personnel from the National Herbarium	Ministry of Environment and Forest	High
Individual	Personnel from BFRI	Ministry of Environment and Forest	High
Individual	Personnel from the Forest Directorate other than Park Management officials	Ministry of Environment and Forest	Medium
Individual	Personnel from the Directorate of Environment (with involvement on CBD and Cartagena Protocol) excluding those from administrative cadre.	Ministry of Environment and Forest	High
Institutional	<ul style="list-style-type: none"> Ministry of Environment and Forest. A CBD cell should be created in the Ministry of Environment and Forest. The trained personnel from various departments under the Ministry of Environment and Forest should be included in the CBD cell (CBD-Group). The senior most member of the cell should be in charge with the executive power and authority of the Secretary Ministry of Environment and Forest on issues related to CBD. A small number of the personnel of the CBD cell (key personnel) may have their full time office in the Ministry. 	Ministry of Environment and Forest	High
Systemic	Some changes in the administrative hierarchy will be necessary to accommodate the smooth working of the CBD cell. The CBD cells of the Ministry of Environment and Forest need to function in close harmony with the CBD cell of other Ministries and the CBD-Group.	Ministry of Environment and Forest & Ministry of Establishment.	High

Sector: Agriculture

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individuals	<ul style="list-style-type: none"> Personnel from BIRI, BARI, BARC, Jute Research, Sugarcane Research, Horticultural Research, Other Agricultural Research Related organizations 	Ministry of Agriculture	Medium
Individual	<ul style="list-style-type: none"> Personnel of all the directorates of Agriculture and Horticulture including that on Plant Protection 	Ministry of Agriculture	High
Institutional	<ul style="list-style-type: none"> Ministry of Agriculture. A CBD cell should be created in the Ministry of Agriculture. The trained personnel from various departments under the Ministry of Agriculture should be included in the CBD cell. The senior most member of the cell should be in charge with the executive power and authority of the Secretary Ministry of Agriculture on issues related to CBD. A small number of the personnel of the CBD cell (key personnel) may have their full time office in the Ministry. 	Ministry of Agriculture	High
Systemic	Some changes in the administrative hierarchy will be necessary to accommodate the smooth working of the CBD cell. The CBD cell of the Ministry of Agriculture need to function in close harmony with the CBD cell of the Ministry of Environment & Forest, CBD cells of other ministries and the CBD-Group.	Ministry of Establishment	High

Sector: Fisheries

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individual	<ul style="list-style-type: none"> Personnel of the directorates of Fisheries 	Ministry of Fisheries & Livestock.	High
Individual	<ul style="list-style-type: none"> Personnel from all the Fisheries Research Institutions in Bangladesh 	Ministry of Fisheries & Livestock.	Medium
Institutional	<ul style="list-style-type: none"> Ministry of Fisheries. A CBD cell should be created in the Ministry of Fisheries. The trained personnel from various departments under the Ministry of Fisheries should be included in the CBD cell. The senior most member of the cell should be in charge with the executive power and authority of the Secretary Ministry of Fisheries on issues related to CBD. A small number of the personnel of the CBD cell (key personnel) may have their full time office in the Ministry. 	Ministry of Fisheries & Livestock.	High

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Systemic	Some changes in the administrative hierarchy will be necessary to accommodate the smooth working of the CBD cell. The CBD cell of the Ministry of Fisheries need to function in close harmony with the CBD cell of the Ministry of Environment & Forest and the CBD-Group.	Ministry of Establishment & Ministry of Fisheries & Livestock.	High

Sector: Livestock

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individual	Personnel from Livestock Directorate	Ministry of Livestock	Medium
Institutional	<ul style="list-style-type: none"> Ministry of Livestock. A CBD cell should be created in the Ministry of Livestock. The trained personnel from various Departments under the Ministry of Livestock should be included in the CBD cell. The senior most member of the cell should be in charge with the executive power and authority of the Secretary Ministry of Livestock on issues related to CBD. A small number of the personnel of the CBD cell (key personnel) may have their full time office in the Ministry. 	Ministry of Livestock	High
Systemic	Some changes in the administrative hierarchy will be necessary to accommodate the smooth working of the CBD cell. The CBD cell of the Ministry of Livestock need to function in close harmony with the CBD cell of the Ministry of Environment and Forest and the CBD-Group.	Ministry of Livestock	High

Sector: Education

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individual	Teachers from Public Universities with interest on ICTPs	Ministry of Education and University Grant Commission	Medium

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individual	Teachers from Environment Departments of Private Universities with interest on ICTPs.	Ministry of Education and University Grant Commission	Medium
Institutional	Ministry of Education is required <ul style="list-style-type: none"> To constitute a CBD cell with eminent biologists from various universities To coordinate with the CBD cell of the Ministry of Environment and Forest and establish linkage between the two. Coordinate with CBD-Group 	Ministry of Education	High
Systemic	Some administrative adjustments will be required for the smooth functioning of the CBD cell constituted under the Ministry of Education	Ministry of Education and Ministry of Establishment	High

Sector: Other Ministries

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individual	Personnel from the Ministry of Foreign Affairs. (Specially to assist in International negotiations)	Ministry of Foreign Affairs	High
Individual	Personnel from The Ministry of Land	Ministry of Land	Medium
Individual	Personnel from the Ministry of LGRD	Ministry of LGRD	Medium
Individual	Personnel from the Ministry of Energy and Mineral Resources	Ministry of Energy and Mineral Resources	Medium
Individual	Personnel from other ministries.	Concerned Ministries	Low
Institutional	Concerned Ministries are required <ul style="list-style-type: none"> To constitute a CBD cell To coordinate with the CBD cell of the Ministry of Environment and Forest and establish linkage between the two. Coordinate with CBD-Group 	Concerned Ministries	High
Systemic	Some administrative adjustments will be required for the smooth functioning of the CBD cell constituted under the Ministry.	Concerned Ministry and Ministry of Establishment	High

Sector: NGOs

Level at which the Capacity Building is to be Aimed at	Involvement Required	Authority Responsible	Priority or Time Frame
Individual	Permanent employees with specializations or interest on biological science from NGOs working on Environment and Nature	Ministry of Social welfare and Ministry of NGO Affairs.	Medium
Institutional	NGOs having Biologists especially <ul style="list-style-type: none">• Foresters,• Botanists,• Wildlife Specialists and• Zoologists in their permanent employment roll may be identified and these NGOs and may be provided with some sort of institutional capacity building support, in the form of <ul style="list-style-type: none">• training at home and abroad,• supply of books and journals,• easy access to government documents, etc.	Ministry of Social welfare and Ministry of NGO Affairs.	Medium

The personnel of the above said CBD group are to be properly trained. Such training may be held at home and abroad. A basic training may be imparted initially so that the expected expertise continue to build gradually with the passage of time. Very good 'Resource Persons' from home and abroad may be engaged, to impart the said training. Some of the selected personnel from this group may be trained abroad, to perform at the desired level with the required skill and consistency.

Chapter 4

Chapter 4

LAND DEGRADATION

SN	Particulars of Contents	Page No
4.0	Introduction 4.0.1 Significance of Land 4.0.2 History of UNCCD 4.0.3 Objectives of UNCCD 4.0.4 Definition of desertification and land degradation	82 82 82 82 83
4.1	Obligation under UNCCD 4.1.1 Obligation 4.1.2 Major Decisions 4.1.3 Status of implementation	83 83 85 86
4.2	Current situation and Stocktaking 4.2.1. Current Situation 4.2.2. Status / trend of land degradation 4.2.3. Stocktaking on Sustainable Land Management 4.2.3.1 Community Development Programme 4.2.3.2 Income Generation Programme 4.2.3.3 Capacity Building Programme 4.2.3.4 Afforestation Programmes 4.2.3.5 Others Projects / Programme	87 87 90 91 91 91 91 92 93
4.3	Priority Environmental Issues 4.3.1 Population pressure and land use change 4.3.2 Soil Salinity 4.3.3 River bank erosion 4.3.4 Topsoil loss and landslide 4.3.5 Brick field 4.3.6 Waterlogged soil and drainage congestion 4.3.7 Intensive cultivation 4.3.8 Agrochemicals 4.3.9 Soil compaction 4.3.10 Drought 4.3.11 Acidification and decline of Organic Matter 4.3.12 Transboundary issues	94 94 98 99 100 101 102 102 103 104 104 104 105
4.4	Identifying Capacity needs 4.4.1 Identification of Stakeholders 4.4.2 Identifying Capacity Development Needs 4.4.3 Capacity Needs identified by the Thematic Group	106 106 106 109
4.5	Capacity Development Action Plan 4.5.1 Tentative Outline of Activities for capacity building	110

Chapter 4

LAND DEGRADATION

4.0. INTRODUCTION

4.0.1 Significance of Land

The mankind cannot survive in the sky or on water. They exist on land. "Land" represents the terrestrial bio-productive system that comprises soil, vegetation, other ecological and hydrological processes that operate within the system. Land is very significant element for human beings to obtain food, fiber, fuel and other materials for livelihood. But land – all over the world – is degraded due to huge population pressure and human intervention. According to the Global Assessment of Human-Induced Soil Degradation (GLASOD), there are 1.9 billion hectares affected by soil degradation world-wide, 850 million hectares of which are within the Asia-Pacific region, accounting for about 24 per cent of the total regional land area. Thirteen per cent of arable land in the region is severely degraded, 41 per cent is moderately degraded and 46 per cent is lightly degraded (WRI/UNEP/UNDP/World Bank, 1996). In Bangladesh land degradation is also a serious concern to the people. About 6.0 million hectares or 43.0 percent of the total geographical area of Bangladesh is affected in varying degrees due to land degradation. The physical manifestation of this degradation is observed as loss of soil fertility, loss of organic matters in the soil, soil erosion due to surface runoff, soil acidification, river bank erosion, salinization of the soil, deforestation and removal of vegetation cover, habitat destruction and lowering of the ground water table. Most of Bangladesh is less than ten meters above mean sea level. Impacts due to climate changes on land quality perspective are therefore multidimensional. It extended from declining productivity to loss of biodiversity and land mass as a whole.

4.0.2 History of United Nations Convention to Combat Desertification (UNCCD)

Desertification has been a subject of global concern since long. It is estimated that over 250 million peoples are affected directly due to land degradation and over one billion people are at a risk. Desertification is a result of complex interactions among physical, chemical, biological, socio-economic and political problems that were local, national, regional and global in nature. Realizing this phenomenon, the international community recognized it as a major economic, social and environmental problem. The formal expression of global concern on desertification starts in late seventies. Initially in 1977, a United Nations Conference on Desertification (UNCOD) was convened in Nairobi, Kenya, which came up with the United Nations Plan of Action to Combat Desertification (PACD). However, the implementation of PACD was far from satisfactory. Assessments made in 1984, 1987 and 1989 by UNEP indicated that desertification continued to spread. Also, the UN Commission for Sustainable Development Report 1988 observed that desertification had become one of the most serious environmental and socio-economic problems of the world. The World Atlas of Desertification indicates that over the preceding 20 years, the problem of land degradation had continued to worsen (UNEP 1992 b). The UN Conference on Environment and Development (UNCED) also highlighted the problem of desertification and recommended that the United Nations General Assembly should establish an Intergovernmental Negotiating Committee (INCD) to prepare a Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa.

4.0.3 United Nations Convention to Combat Desertification (UNCCD)

In order to combat desertification, the United Nations Convention to Combat Desertification (UNCCD) was adopted in Paris on 17 June 1994 and opened for signature there on 14-15 October 1994. It entered into force on 26 December 1996. Bangladesh signed the Convention in 1994 and ratified the same on 26 January, 1996. The objectives of this convention is to combat desertification and mitigate the effects of drought in countries experiencing serious

drought and / or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21. Achieving this objective will involve long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. The Conference of the Parties (COP) is the supreme governing body of the Convention. Over 191 countries were Parties as on September 2004.

4.0.4 Definition of Desertification and Land Degradation

Though desertification is not an acute problem in Bangladesh, yet land degradation is a serious concern to the policy makers as well as environmentalists. There is always confusion about the terms “desertification” and “land degradation” among the non-practitioners of land management. As per Article 1(a) of the United Nations Convention to Combat Desertification (UNCCD), “desertification” means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic variations and human activities. As per Article 1(f) of the convention, “land degradation” means reduction or loss, in arid, semi-arid and dry sub-humid areas of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as

- (i) Soil erosion caused by wind and/or water;
- (ii) Deterioration of the physical, chemical and biological or economic properties of soil;
and
- (iii) Long-term loss of natural vegetation;

Hence, there is no contradiction between these two terms. Rather it can be said that land degradation is the primary stage of desertification.

4.1 OBLIGATIONS UNDER UNCCD

4.1.1 Obligations and Commitments

The UNCCD is the only legally binding dedicated instrument to address the problems of land degradation in dryland areas. Implementation of the Convention is an obligation to all the country Parties, although some provisions such as the provisions on financing and technology transfer make distinction between the developing and developed country Parties. The affected developing country Parties are to develop their national action programmes (NAPs) and follow through their implementation as per provisions of the Convention and periodically report to the Conference of the Parties (COP) on the progress on their implementation of UNCCD including the NAPs.

The developed country Parties are also obligated to report on fulfilling their obligations periodically to the COP as needed. The reporting of the organizations of the United Nations, inter-governmental organizations, multilateral financial institutions, international NGOs are not obligatory but they are encouraged to report on their activities. The regional and sub-regional level organizations are asked to provide support to the development and implementation of joint or co-operative programmes relating to the membership of those organizations and report to COP on those activities.

National Action Programmes (Section 1, Articles 9 & 10)

- All affected country parties shall prepare a National Action Programme, utilizing and building to the extent possible, on existing relevant plans and programmes and sub-regional and regional action programmes

National Action Programme Article 4 of the Annex II, Regional Implementation Annex for Asia

1. In preparing and implementing national action programmes, the affected country Parties of the region, consistent with their respective circumstances and policies, may, inter alia, as appropriate:
 - (a) Designate appropriate bodies responsible for the preparation, coordination and implementation of their action programmes;
 - (b) Involve affected populations, including local communities, in the elaboration, coordination and implementation of their action programmes through locally driven consultative process, with the cooperation of local authorities and relevant national and non- governmental organizations;
 - (c) Survey the state of the environment in affected areas to assess the causes and consequences of desertification and to determine priority areas for action;
 - (d) Evaluate, with the participation of affected populations, past and current programmes for combating desertification and mitigating the effects of drought, in order to design a strategy and elaborate activities in their action programmes;
 - (e) Prepare technical and financial programmes based on the information derived from the activities in subparagraphs (a) to (d);
 - (f) Develop and utilize procedures and benchmarks for evaluating implementation of their action programmes;
 - (g) Promote the integrated management of drainage basins, the conservation of soil resources, and the enhancement and efficient use of water resources;
 - (h) Strengthen and/or establish information, evaluation and follow up and early warning systems in regions prone to desertification and drought, taking account of climatological, meteorological, hydrological, biological and other relevant factors; and
 - (i) Formulate in a spirit of partnership, where international cooperation, including financial and technical resources, is involved, appropriate arrangements supporting their action programmes.

2. Consistent with article 10 of the Convention, the overall strategy of national action programmes shall emphasize integrated local development programmes for affected areas, based on participatory mechanisms and on the integration of strategies for poverty eradication into efforts to combat desertification and mitigate the effects of drought. Sectoral measures in the action programmes shall be grouped in priority fields which take account of the broad diversity of affected areas in the region referred to in article 2 (a).

Four principal categories of obligation

There are four principal categories of obligation under the terms of the UNCCD and its regional implementation annexes:

- The common obligation of all Parties, including those unaffected by desertification, are spelled out mainly in Articles 3, 4, 12, 14, 16, 17, 18, 19 and 20. They relate principally to international cooperation in implementing the CCD at all levels, particularly in the areas of the collection, analysis and exchange of information, research, technology transfer, capacity building and awareness building, the promotion of an integrated approach in developing national strategies to combat desertification, and assistance in ensuring that adequate financial resources are available for programmes to combat desertification and mitigate the effects of drought.
- Country Parties affected by desertification in Africa, Asia, Latin America and the Caribbean, and the Northern Mediterranean undertake to prepare national action programmes and to cooperate at the regional and sub-regional levels.
- Other affected country Parties have the option of preparing action programmes following Convention guidelines, or more generally of establishing strategies and priorities for combating desertification.

- Developed country Parties have, under Article 6, Article 20 and other articles, specific obligations to support affected countries (particularly but not exclusively affected developing countries) by providing financial resources and by facilitating access to appropriate technology, knowledge and know-how.
- Parties are obligated (article 26) to report on measures they have taken to implement the Convention. Parties which have prepared National Action Programmes are obliged under article 10 to provide regular progress reports on their implementation.

Obligations of the Affected Developing Country Parties

(Article 5 of the UNCCD):

- Give due priority to combating desertification and mitigating the effects of drought
- Establish strategies and priorities within the framework of sustainable development
- Address underlying causes of desertification and particularly to the socio-economic factors contributing to the desertification process
- Promote awareness and facilitate the participation of local populations, particularly the women and youth, non-governmental organizations, in efforts to combat desertification and mitigate the effect of drought
- Provide an enabling environment by strengthening the relevant existing legislation, enacting new laws, where they do not exist, and establish long term policies and action programmes

Capacity building, education and public awareness (Article 19 of the convention)

Article 19 of the convention ("Capacity building, education and public awareness") specifically recognizes the significance of sound national planning and capacity building through, *inter alia*: institution building, training and development of relevant local and national capacities.

4.1.2 Major Decisions undertaken by UNCCD

UNCED in 1992 recommended an integrated approach to promote sustainable development at community level to address the problems of land degradation in arid, semi-arid and dry sub-humid areas. In following this recommendation, the United Nations General Assembly adopted the resolution 47/188 which called for establishment of the Intergovernmental Negotiating Committee to prepare by June 1994, a Convention to Combat Desertification, particularly in Africa. After five negotiating sessions, the Committee completed its task and the Convention was adopted in Paris in June 1994. The first session of the Conference of the Parties (COP) was held in Rome, Italy in October 1997. Thereafter, the COPs were held annually in Dakar, Senegal; Recife, Brazil; Bonn, Germany; and Geneva, Switzerland in 1998, 1999, 2000 and 2001 respectively. In line with decision of the fourth COP, the COP sessions were held every two years on 2003 in Havana, Cuba; and in 2005 in Nairobi, Kenya.

The first session of the COP was convened by the Interim Secretariat which established the Permanent Secretariat to conduct activities of the Convention following the decisions of the COP. A Committee on Science and Technology (CST) was established as a subsidiary body of COP to provide it with information and advice on scientific and technological matters. As per provision of the Convention, the CST met in conjunction with the COP sessions. There was no financial mechanism in the Convention and it was decided to have the Global Mechanism as a flexible approach through voluntary contributions by donors to support the funding needs besides the annual contributions of the member countries as per agreed assessment. The fourth session of the COP in Geneva in 2001 established the "Committee for the Review of the Implementation of the Convention (CRIC)" as subsidiary body to consider reports from country Parties and observers, as well as information and advice from the CST and the Global Mechanism, and to report to the COP. The CRIC is to meet every year during and between the ordinary sessions of the COP. The first session of the CRIC was held in 2002 in Rome, the second session was held in Havana in conjunction with the COP 5 in 2003, the third session was held in Bonn in May 2005, the fourth session was held in Nairobi in October 2005 during COP 6, and the fifth session of CRIC held in Buenos Aires, Argentina, from 12 to 21 March 2007. Following the terms of reference of CRIC adopted at COP 4, the first session of the CRIC reviewed implementation of the Convention by all the affected country Parties, the third session reviewed the implementation by the African Parties, and the fifth session will review the implementation by the rest of the affected country Parties.

The mandate and functions of the CRIC, as well as its schedule of meetings, are subject to renewal at COP 7. The review process leading to the CRIC included inputs at sub-regional and regional levels to draw conclusions and to propose to the COP concrete recommendations on further steps in the implementation of the Convention.

Decision of the COP 4,

The country review of UNCCD implementation was conducted along the following thematic lines as per decision of the COP 4, with due regard to geographic dimensions:

- (i) Participatory processes involving civil society, nongovernmental organizations and community-based organizations;
- (ii) Legislative and institutional frameworks or arrangements;
- (iii) Resource mobilization and coordination, both domestic and international, including conclusions of partnership agreements;
- (iv) Linkages and synergies with other environmental conventions and, as appropriate, with national development strategies;
- (v) Measures for the rehabilitation of degraded land and for early warning systems for mitigating the effects of drought;
- (vi) Drought and desertification monitoring and assessment;
- (vii) Access by affected country Parties, particularly affected developing country Parties, to appropriate technology, knowledge and know-how.

4.1.3 Status of Implementation of UNCCD

On the basis of the obligations to the UNCCD guidelines and arrangements were provided for the effective implementation of the Convention in the affected country Parties of the Asian region in the light of its particular conditions. As a signatory to the UNCCD Bangladesh is also obliged to consider the following particular conditions in carrying out their obligations under the Convention:

According to the Article 2, of the UNCCD, identification and prioritization of the relevant issues is very crucial for successful implementation of the convention, such as, the high proportion of areas in their territories affected by, or vulnerable to, desertification and drought and the broad diversity of these areas with regard to climate, topography, land use and socio-economic systems; the heavy pressure on natural resources for livelihoods; the existence of production systems, directly related to widespread poverty, leading to land degradation and to pressure on scarce water resources; their expanding, but still insufficient, capacity and institutional frameworks to deal with national desertification and drought problems; and their need for international cooperation to pursue sustainable development objectives relating to combating desertification and mitigating the effects of drought.

In accordance with the article 10 of the UNCCD, The purpose of national action programmes is to identify the factors contributing to desertification and practical measures necessary to combat desertification and mitigate the effects of drought.

National Action Programme

Consistent with article 10 of the Convention, Bangladesh has already developed National Action Programme for Combating Desertification in association with the Department of Environment, MoEF, and The World Conservation Union (IUCN), Bangladesh Country Office in August 2005. The overall strategy of national action programmes emphasized integrated and coordinated bottom-up approach to combat desertification and mitigate the effects of drought also identified the factors contributing to the process of desertification in Bangladesh and suggests measures and strategy as well.

A comprehensive, however, study at the country level on land degradation/ desertification, covering all its aspects ranging from the physical to economic, is required. It is clear that the quality of land has deteriorated, and its impacts are visible. Over the last decade, crop yield has declined due to deterioration of physical and chemical properties of land and soil. It would be prudent to establish a baseline survey on which future monitoring and assessment or further deterioration or improvement could be based.

National Reports on UNCCD

Bangladesh has already submitted comprehensive reports for the two consecutive years 2001 and 2002, titled "National Report on Implementation of United Nations Convention to Combat Desertification" and the "Second National Report on Implementation of United Nations Convention to Combat desertification". Bangladesh has also submitted Third National Report on the "Implementation of the UNCCD" in July 2006.

4.2 CURRENT SITUATION AND STOCKTAKING

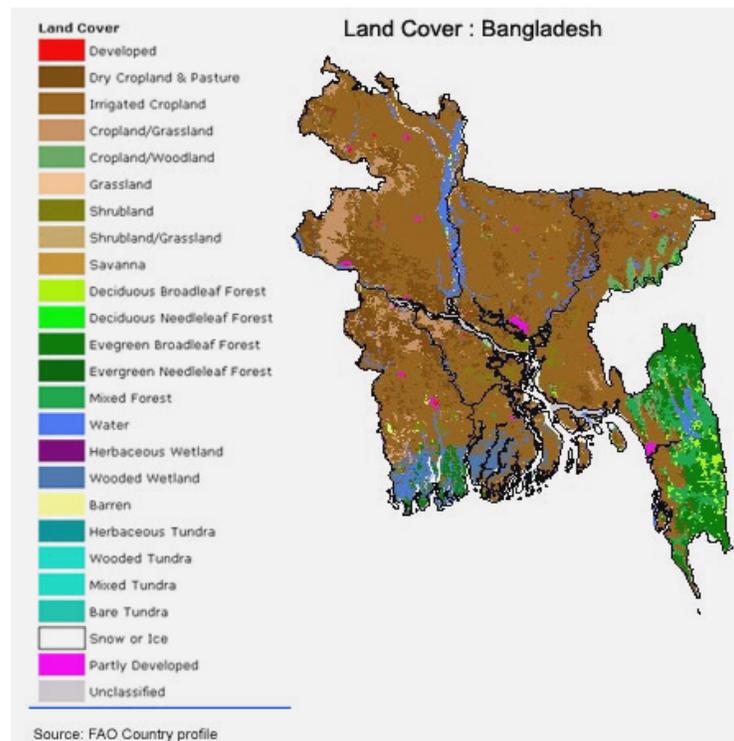
4.2.1 Current Situation

Land means the terrestrial bio – productive system that comprises soil, vegetation, other biota, ecological and hydrological processes that operate within that system. Land is an important resource of Bangladesh, predominantly a flat delta stretching from the Himalayan foothills to the Bay of Bengal in the south. The landform of Bangladesh is grouped into three classes, viz Floodplains (extends 80%), Hills (extends 12%) and Terraces (extends 8%) and variations in land use are spectacular in these landforms. The annual cropping is the major land use pattern in floodplains, whereas mixed evergreen and deciduous forest are dominant in the hills. The following table explains the area and proportion of each land type on the basis of data recorded during Reconnaissance Soil Survey (RSS) conducted by SRDI.

Table 3.1: Area and extents of major land types in Bangladesh

Land types	Area (Km ²)	Proportion
Highland	4,200	29
Medium Highland	5,040	35
Medium Lowland	1,771	12
Lowland	1,102	8
Very Lowland	193	1
Total	12,306	85

Source: Land Resource Appraisal of Bangladesh for Agricultural Development, 1998



Land use is a dynamic process and changes in the usage patterns are driven by agricultural and water demands, development of rural infrastructure, migration, urbanization and industrialization, to name a few. In terms of usage of lands, 17% of the total lands are forests, 52% are cropped land, 24% are rivers, wetlands and urban areas, 3% are fallow lands and remaining 4% are waste lands. A number of national estimates also show that 2.5% of the total land area in Bangladesh is used for industrial purposes. In terms of the broad categories of land use, the table below shows the status as reported for 1991-1992.

Table 3.2: Present land use

Type of land use Area	(km ²)	%
Forest	18,992	12.8
Cultivated - net (NCA)	81,740	55.1
-single cropped	32,942	40.3*
-double cropped	38,988	47.7*
-triple cropped	9,810	12.0*
Fallow	9,628	6.5
Urban	32,205	21.7
Waste	5,836	3.9
TOTAL	148,401	100.0

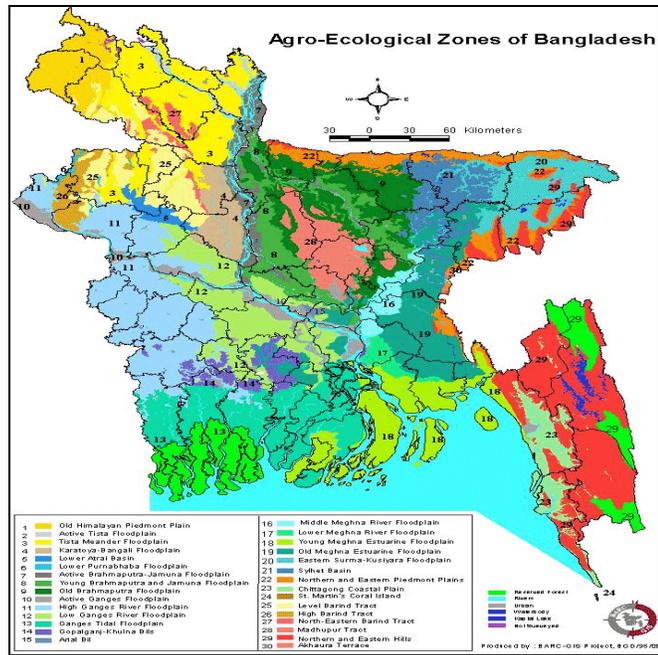
Note: * indicates percentage of Net Cultivated Area (NCA)

Source: http://www.fao.org/ag/AGL/swlwpnr/reports/y_sa/z_bd/bd.htm#use

Land use is often determined by a number of climatic factors, along with socio-economic determinants such as tenure – ship and environmental elements like riverbank erosion and accretion and salinity intrusion. Under the climate change scenario, the hydrological regimes are predicted to become erratic, causing water shortages or surpluses and accelerating the pace of land erosion and salinization. Land utilization consequently could be altered, spurring mass migrations of human beings and other species to suitable zones or contrarily compelling them to adapt to the adverse and changed circumstances.

It is projected that by the year 2020, populations will boom to 170 million, with a density of 1118 per sq. km. And per capita land allocations as high as 20 persons per ha, with possible loss of cultivable land to alternative uses like housing and urbanization. The pressure of the rising number of people on finite amounts of land, water and other natural resources may become irreversible within the next few decades, compounded by the effects of rising salinity, water logging, declining water tables, loss in soil fertility and high levels of erosion.

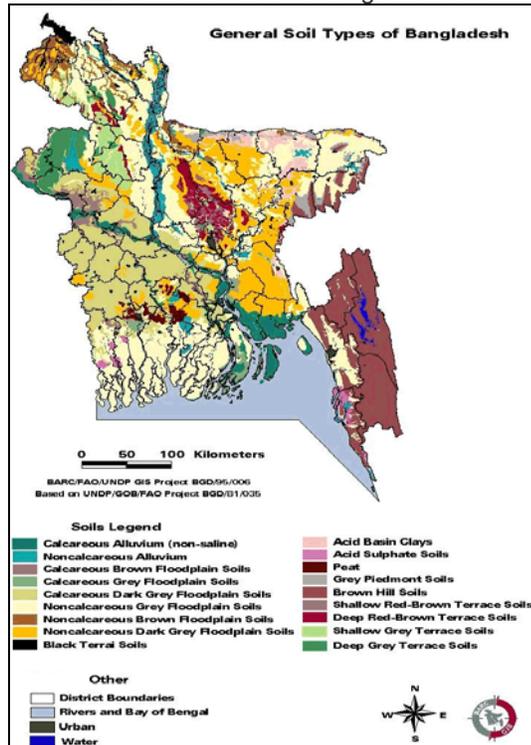
An Agro-ecological Zone is a land resource mapping unit, defined in terms of climate, landform and soils, and/or land cover, and having a specific range of potentials and constraints for land use (FAO Soils Bulletin 1996). In Bangladesh, 30 agro-ecological zones have been defined. These zones can however be grouped into 20 major physiographic units, as shown in Table 3.1 each of the zones has specific characteristics which are related mainly to topography and soil type.



Source: http://www.fao.org/ag/AGL/swlwpnr/reports/y_sa/z_bd/bdmp221.htm

The soil resource of Bangladesh could be divided into three major groups: floodplain, hill and terrace soils. The soils of the two terraces covering 8% of the total area are diverse, ranging from deep, reddish brown friable well drained clay loams to grey, poorly drained silty top soils over clay on level highlands. There are numerous attributes which influence the suitability of a given soil for growing crops: texture, soil depth, presence of a plough pan, available soil moisture holding capacity, permeability, drainage, consistence and chemical characteristics.

The main soil types in each AEZ are described in the figure below:



Source: http://www.fao.org/ag/AGL/swlwpnr/reports/y_sa/z_bd/bdmp221.htm

4.2.2 Status / trend of Land Degradation in Bangladesh

Bangladesh has a total land surface of 12.31 million hectares, of which presently 7.85 million hectares are under agriculture (BARC 2001). It accommodates more than 130 million people. This amounts to an average of 27 percentile of land and 17 percentile of cultivable land per head. Moreover, due to population growth, this share of land per capita is shrinking every year making the resource base for agriculture, forest and wetlands more vulnerable and marginalized. For example, in 1983-84, there was 20.0 million ha of total cultivable land, which dropped to 17.5 million ha in 1997. On average Bangladesh is losing nearly 82,000 ha of land each year. This is mainly due to conversion of land into urban, peri-urban, industrial uses, and construction of roads, embankment. Competition between forest and agriculture, fisheries and agriculture are also responsible for some conversions (e.g., Chokoria Sundarban of Cox's Bazar district and its adjacent areas).

Table 3.3: Different types of land degradation and their extent in Bangladesh

Extent of Land Degradation in Bangladesh		
Types of land degradation	Total area (M ha)	Dry region (M ha)
Water erosion	1.7	0.10
Bank Erosion	1.7	0.10
Soil Fertility Decline	8.0	1.84
P deficient (for HYV rice)	8.5	5.89
P deficient (for upland crops)	5.6	0.95
K deficient (for HYV rice)	7.4	4.82
K deficient (for upland crops)	7.5	0.95
S deficient (for HYV rice)	7.7	2.86
S deficient (for upland crops)	8.7	
Soil organic matter depletion	7.5	2.9
Water logging	0.7	
Salinization	3.05	
Pan formation	0.06	
Acidification	0.6	
Deforestation	1.5	0.10

Source: BARC, 1999

http://www.sdnpsd.org/sdi/international_days/wed/2006/bangladesh/land_degradation.htm

According to the criteria set by the UNCCD or defining a dry region (the ratio of annual rainfall to potential evapotranspiration (ET_p) may be a maximum of 0.65), no region within Bangladesh can be termed as dry region. However, Bangladesh does experience long spells of dry weather and moderate to severe droughts are spread over a region of 5.46 million ha. Based on annual rainfall, dry season net evapotranspiration and excess evapotranspiration (ET_p-R), and dry season R/ ET_p ratio value, a dry region is delineated.

Table 3.4: Extent of Dry Zones of Bangladesh

Dry Zones	No. of Upazila Occupied	Area covered (M ha)	Percent of total land
Moderate	64	2.015	14.37
Slight	163	4.427	31.56
Non-dry	263	7.585	54.07

There are many driving forces compelling people in Bangladesh to over-exploit natural resources like land. The main ones are the poverty with rapid population growth, improper land use, absence of a land use policy, and ineffective implementation of existing laws and guidelines. Unplanned agricultural practices, and encroachment on forest areas for agriculture and settlements, also put pressure on scarce land resources. Unplanned or inadequate rural infrastructure development and the growing demands of increasing urbanization are also devouring productive land. The level of land degradation and its extent vary seasonally and yearly, by region, as well as the pressures on land are not always the same either.

4.2.3 Stocktaking on Sustainable land Management

To combat land degradation and to attain sustainable land management and development, Government has declared Land Use Policy in 2001. Government also approved a comprehensive Poverty Reduction Strategy Paper entitled “National Strategy for Accelerated Poverty Reduction : Unlocking the potential” in October 2005 to address the poverty with other cross-cutting issues. The country has engaged a number of programmes and projects that can significantly contribute to the fight against land degradation. These programmes and projects are sub-divided into four categories viz. Community development programme, Income generation programme, Capacity building programme, and Afforestation programmes.

4.2.3.1 Community Development Programme

The policy of empowerment of village communities and their involvement in developmental activities including natural resource management has been strengthened through the national perspective plan. A host of subjects such as agriculture, land improvement, implementation of land reforms, land consolidation and soil conservation, water management and watershed development, animal husbandry, firewood and fodder, social forestry has been included. The UNDP supported Community Empowerment program (CEPs) supports, through several projects, the Government of Bangladesh’s poverty alleviation efforts. The different CEP projects are pursued as pilot schemes with an underlying long-term objective of replicating a successful model at the national level. Strategic linkages will be developed with other service providers that are institutionally appropriately placed to provide sustainable support to the target clients in meeting their social, economic and infrastructure needs.

4.2.3.2 Income Generation Programme

Under the SEMP components, there are alternative income generation activities, which have been carried out by the local community people. Homestead nursery, poultry, cattle rearing, medicinal plants cultivation, fishing, pisciculture, horticulture, solar paneling and handicraft production are some of the major income generating activities under SEMP.

4.2.3.3 Capacity Building Programme

- ***Water Sector Improvement Project (WSIP)***
The project is aimed to improve the performance of the water management systems in Bangladesh and ensure their sustainability through improved operation and maintenance, and appropriate institutional reforms.
- ***Follow-up on River Bank Protection Project (RBPP)***
This project aims to reduce vulnerability of the poor by more extensive implementation of river training techniques developed under RBPP to mitigate against further river bank erosion which leads to disastrous loss of land, crops and property every year (World Bank, 2000 c)
- ***Follow-up on Jamuna Bridge Multipurpose Project (JBMP)***
The project is expected to make a positive contribution to the reduction of economic damages caused by erosion in the project areas by preventing the loss of about 7,800 ha of riparian land, including about 1,500 ha of urban area in Sirajganj and protect about 1,000 people from loss of livelihood, displacement and impoverishment. By preventing, perennial flow into the Bangali River from the Brahmaputra River, the project would prevent potential incremental flood damage to crops, property and infrastructure over an area of nearly 300,000 ha populated by more than two million people (World Bank, 2000 c).

- **Sustainable Environment Management Programme (SEMP)**
SEMP addresses the major environmental priorities identified by people through NEMAP. It is the first program approach initiative of the Government of Bangladesh, consisting of 26 components being executed by the MoEF and 17 was implemented by 21 government/nongovernmental agencies throughout Bangladesh. Focus areas relating to the environment are Policy and Institutions; Participatory Eco-System Management; Community-based Environmental Sanitation; Advocacy and Awareness; and Training and Education. SEMP will support community capacities for sustainable management of environmental resources and strengthen the capacity of the public sector to develop new framework for policy development in support of enhanced community participation, protection of the environment, and sustainable management of the country's environment and natural resources. SEMP will benefit grassroots level people, particularly women, in eco-specific intervention areas (Jilani, 1998).

4.2.3.4 Afforestation Programmes

The GoB has approved the Forestry Sector Master Plan (1995-2015) and promulgated the National Forest Policy 1994. Both the documents have emphasized the afforestation program in the country with a 20% coverage of Bangladesh targeted in the Master Plan by 2015. To achieve this target, the FD is undertaking a plantation program under the ADP. With regards to the number of FD projects to be implemented, the MoEF approves the afforestation and social forestry programs proposed by the FD. The GoB has imposed a moratorium on tree felling in 1989 to encourage forest conservation. This moratorium is extended to 2005. Further activities include attempts by the GoB to increase by 10% the amount of protected areas in reserved forest lands by 2015 Under the Forestry Sector Project (FSP) plantation of 40,000 ha of Sal Forest were planned during 1997- 2003.

- **Forest Resource Management Project (FRMP)**
Under FRMP, the following could be achieved in the next three years: Forestry Management Information System (MIS) to additional four Forest Divisions established; additional 200 ha participatory forestry development program with landless poor and destitute women completed; about 60,000 ha forest resources expansion and mangrove plantation programs established; forest management and conservation plans finalized; mangrove research and professional forestry education for technology generation and human resources development operating effectively (ADB-UNDP-GOB, 1996).
- The Barind Integrated Area Development Project (BIADP) (later renamed as **Barind Multipurpose Development Authority (BMDA)**) started in 1985 covering Rajshahi, Naogaon and Nawabganj districts, was implemented to mitigate the processes of land degradation of the Barind region

Barind Multipurpose Development Authority (BMDA)

To retain the environmental balance and to check the desertification of the Barind region, the government in 1985 had taken the Barind Integrated Area Development Project (BIADP) later renamed as Barind Multipurpose Development Authority (BMDA) in Rajshahi, Naogaon and Nawabganj districts. Before the project activities started in the region, Barind Tract was the most unfavorable agricultural section of the country with rain fed local T. Aman as the dominant crop. The ensured supply of DTW irrigation has fundamentally changed the agricultural scenario in the Barind. In place of single crop, now multiple crops are grown with higher agro-economic productivity. This transformation to multiple cropping has resulted in productive cropping patterns and increased cropping intensities. Construction of cross-dams, water control structures, re-excavation of canals and ponds have contributed to improve surface water augmentation. This is reflected in satisfactory command area development, ecological balance and pisciculture. Due to the lack of good road network, the slow moving bullock cart was the main transport used for carrying goods and passengers. Construction of feeder and rural roads has changed the status of rural livelihood through uplift of rural economy by BMDA.

- **Forestry Sector Project (FSP)**
Forest Department of Bangladesh is implementing the Forestry sector project (FSP) that cover district of Bangladesh. The project period is from 1997-98 to 2005-2006. The primary objective of the project was to increase overall tree resource base of the country; to arrest depletion of forest resources; to enhance conservation of forests in selected protected areas and attain sustainable management of forest resources through local community participation.
- **Coastal Green Belt Project**
FD in Bangladesh has completed the Coastal Green Belt Project. Under this project, afforestation activities have been conducted in the coastal regions of Bangladesh. The FD successfully implemented the project. Under this project, over 1300 km of embankment plantations, 7500 km of strip plantations, 665 ha of foreshore plantations and 28.9 million seedlings for sales and distribution were a part of the project activities.

4.2.3.5 Others Projects / Programme

- **Coastal and Wetland Biodiversity Management at Cox's Bazar and Hakaluki Haor**
Funded by GEF. The threats of excessive cutting of mangrove, fuel wood, beach compaction by vehicles used in tourism, will be addressed through land protection measures, village conservation and sustainable use, and integrated management plans.
- **Linkage of Land Degradation to Energy**
The Energy Perspective Plan has established a linkage between the process of land degradation and energy consumption pattern, particularly the biomass fuel. This plan emphasizes the need for switching over the use of biomass fuel to clean energy, which is likely to contribute to increase the green cover and minimize the loss of nutrient rich soil.
- **Bangladesh Arsenic Mitigation and Water Supply Project (BAMWSP)**
Bangladesh Arsenic Mitigation and Water Supply Project (BAMWSP) aims at alleviating the adverse impacts of arsenic contamination of drinking water. The components of BAMWSP include on-site mitigation by the installation of deep tube wells and improved understanding of the arsenic problem through study of detailed hydrology characterization in the affected areas.
- **Measures Taken to Mitigate the Effects of Drought**
In the event of drought the Government undertake relief measures by providing drinking water, food grains fodder, food subsidies to special groups and employment through food-for-work- program. The Disaster Management Bureau coordinates drought relief works with local governments. The activities of the Bureau also comprise human resource development, research case studies, database and information services, and documentation on disaster management. Rural Works program of the GOB provides employment to the population affected by drought and helps to mitigate the severity of the drought wherever it may occur.
- **Drought Assessment framework (DRAS)**
CEGIS has developed DRAS for quick assessment of water scarcity and irrigation management in any part of the country. At present, DRAS model validation work is going on in the research field of BRRI and BARI.

Many projects or approaches were undertaken for different time lengths. But in true sense Land degradation, its aspects and sustainable land management were addressed with sectarian approach. All components and issues were not taken care with adequate balance as they deserved. Out of the following projects could be listed.

List of Ongoing Projects:

- Ministry of Land is implementing Coastal Land Use Zoning Project (CLUZ);
- Project on Capacity Building and Resource Mobilization for Sustainable Land Management in Bangladesh
- Bangladesh Environmental Management Project-CIDA
- UNDP's Sustainable Environmental Management Program, Particularly Component 1.2 on " Ecosystem Management in the Barind Area" and Component 2.4 on "Capacity Building for Environmental Legislation and Policy Analysis in MoEF"
- National Water Management Plan, 2001
- Integrated Coastal Zone Management Project (ICZMP)
- Coastal Development Strategy
- Water Management Improvement Project (WMIP)(Under process)
- Small Scale Water Resource Development Sector project, phase-II (Ditiyo Khodrakar Pani Sampad Unayan sector prakalpa).
- Afforestation programme on denuded fringed lands and marginal lands.
- The River Erosion Project, Bangladesh Water Development Board (Part of Practical Action Bangladesh's Reducing Vulnerability programme).
 - Jamuna-Meghna River Erosion Mitigation Project
 - Meghna-Dhonagoda Irrigation Project (MDIP).
 - Pabna Irrigation and Rural Development Project (PIRDP)

4.3 PRIORITY ENVIRONMENTAL ISSUES

In Bangladesh enormous pressure on limited but vital land and soil resources exerted which strictly limit the resilience of these resources. The landscape of Bangladesh could be broadly divided into three levels based on landscape viz hilly, terrace and floodplain developed in three major watersheds, viz the Ganges, the Brahmaputra and the Meghna and minor watersheds like the Karnaphuli, Shangu and Matamuhuri. These landscapes come across different types of land degradation depending on their use, position, occurrence, extent, composition or physical make up etc. The major priority environmental issues concerning land degradation are as follows:

4.3.1 Population pressure and land use change

Bangladesh is one the highest populous countries with growth rate 1.48%. In 1980-81 net cultivable area was 9.38, which shrinks to 8.48 m hectares in 2001-02 and per capita land at present is about 0.06 ha. There are many driving forces compelling people in Bangladesh to over-exploit natural resources like land. The main ones are the poverty with rapid population growth, improper land use and ineffective implementation of existing land use policy. To meet

the food demand average cropping intensity increases from 153.74 million MT in 1980-81 to 176.98 million MT and irrigation coverage increases about 33 and 52 percent of cultivable land in 1991 and 2001 respectively (MMIS, MoA.2004) besides conversion of agricultural land to non-agricultural use is about 82,000 ha/year (BARC. 2004). SRDI (2004) estimated 0.1 percent of arable land per year converted to other uses like settlements, roads, industries, brickfields, borrow pits etc based on interpretation of aerial photo of different years. Fig-1 is one of the examples of engulfment of industries into productive agricultural land. Industrial effluents have adverse influence on the soil health due to concentration of heavy metals like Chromium (Cr), Lead (Pb), Cadmium (Cd), Nickel ((Ni) etc and these metal will go to the food chain. Fig- 2 depicted the scenario of industrial effluents flowing across the cropped land. Comprehensive data or information



Fig-1: Engulfing productive land for industry
Fig-2: Industrial effluents within crop field.

regarding the area covered by these sectors is lacking. But impact of these sectors on land and its quality is spectacular. Industries are occupying the productive lands and also polluting the surroundings by their effluents. Dispersed industrial growth and uncontrolled discharges of their untreated effluent in the nearby rivers deteriorate the quality of land, soil and water. Bangladesh has highest density of road network 7.6 km/100sq km, as compared to India (1 km), China (2.7km), and Pakistan 4.8 km). But paved road is estimated about 29 km/1000sq km less than half of Asia and one tenth of India. Establishment of road net work and inadequate compliance of landscape geography and structure resulted waterlogging of water either permanently or temporarily and changes micro ecosystem. The changed scenario has bearing on choice of crop, cropping pattern, soil (health) and land qualities. In that case either farming systems have to be changed due nutrient supply, deficiency of micro nutrients or even soil physical properties that support plant growth.

Land fragmentation due to crumbling of farm families is another issue which resulted form population increase and it is estimated that the lands are fragmented in to about 12 million plots in 1990's and obviously this figure will be more in present situation. Pressure on limited land resources stem out multifaceted issues relevant to land degradation.

Considerable changes in land use occurred in last few decades. Fig-3: explains the changes in cropping intensity in last three decades (1983-2003). Most of the single cropped land was transformed to either double or triple cropped land within this period depending on the land type, water availability for irrigation (both surface and ground water). Fig-4 explains the sources of irrigation or paddy. STW for abstraction of GW is intensively used and it increased from 1.0 to 2.4 m ha within ten years (1990 and 2000). That cause shallow GW depletion for which users have to set STW at deeper level. Fig-5 is an example of installation of intensive STW in Ganges floodplain. About 86 % of water is used for agriculture. World Bank study revealed that after nearly thirty years of 'successful' and intensive tapping of groundwater nearly 35 million people in Bangladesh are now facing deadly threat from Arsenic poisoning ([http:// www.countercurrent.org](http://www.countercurrent.org)). Land use maps of the year 1963-75 (depending on Reconnaissance Soil Survey, SRDI), 1997 and 2005 depending on data acquired during Upazila Nirdeshika (Semi-Detail survey) depict that most of the land under Aus or jute followed by rabi cropped land

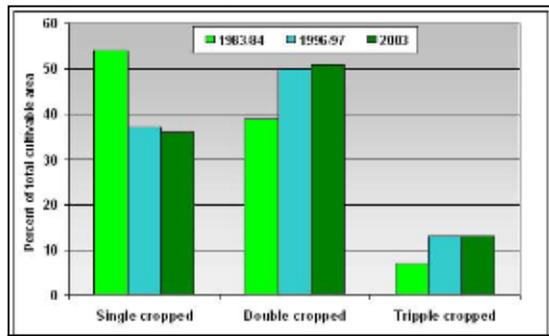


Fig-3: Changes in cropping pattern over time

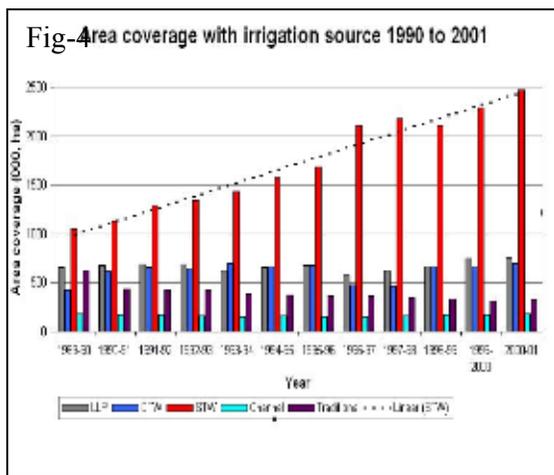


Fig-4: Area coverage with irrigation source 1990 to 2001

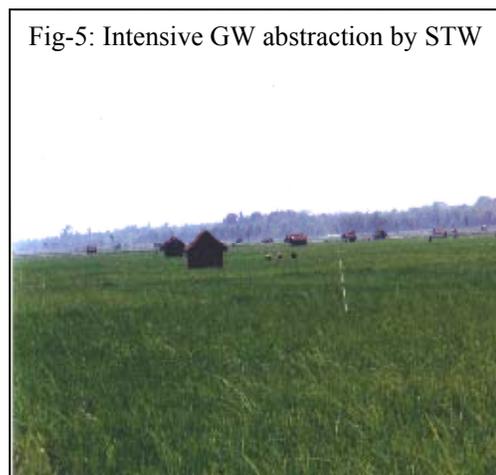


Fig-5: Intensive GW abstraction by STW

changes to Boro –Fallow-Transplanted Aman cropping pattern. Boro is cultivated by using ground water in general (Fig-6,7 & 8). A comparative statement of land use changes in 1970's and 2000 is given in Table-1.

Table-1: A comparative statement of major cropping pattern in 70's and 2000's

Major cropping pattern in 70's	Major cropping pattern in 2000's
F-Aus/Jute-T-Aman	Rabi crops (Wheat/Chickpea/Mustard) -B.Aus -T.Aman Boro-F-T.Aman Rabi and Kharif vegetable
Rabi crops-Mixed Aus and Broadcast Aman	Boro-F-T.Aman
Rabi crops- Broadcast aman	F-Boro Rabi crops- Boro
F-F-T.Aman	Boro-F-T.Aman F-Shrimp-T.aman; F-Sesame-T.aman Shrimp Salt bed
F-Mixed Aus and Broadcast Aman	Boro-F-T.Aman
F- Broadcast aman	Boro- Broadcast aman Boro-F-F

Source: Upazila Nirdeshika (1985-2000), Soil Resource development Institute.

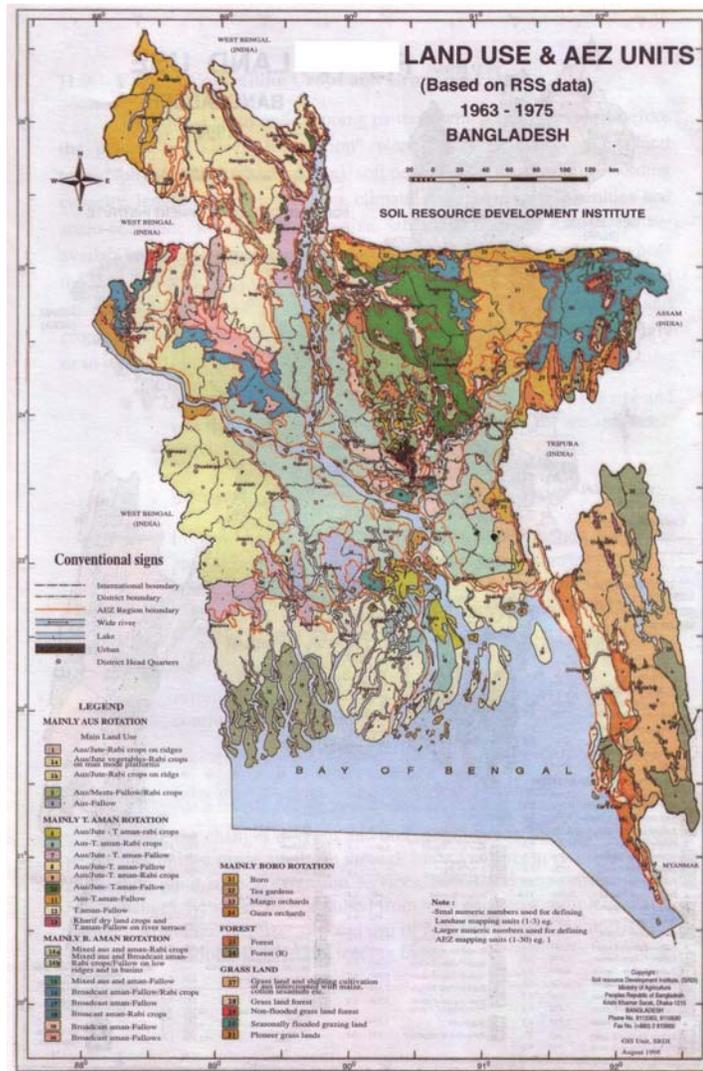
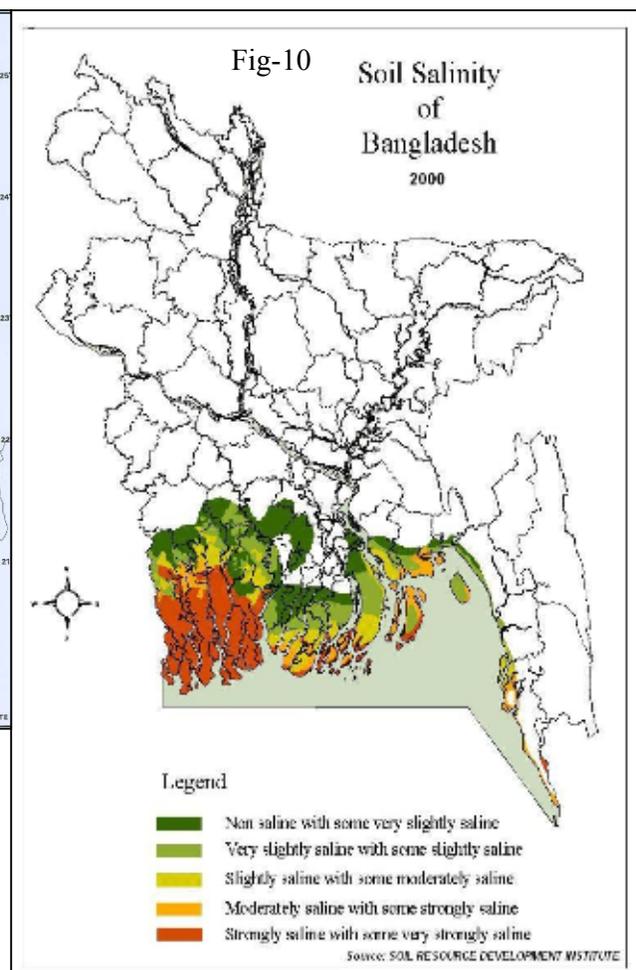
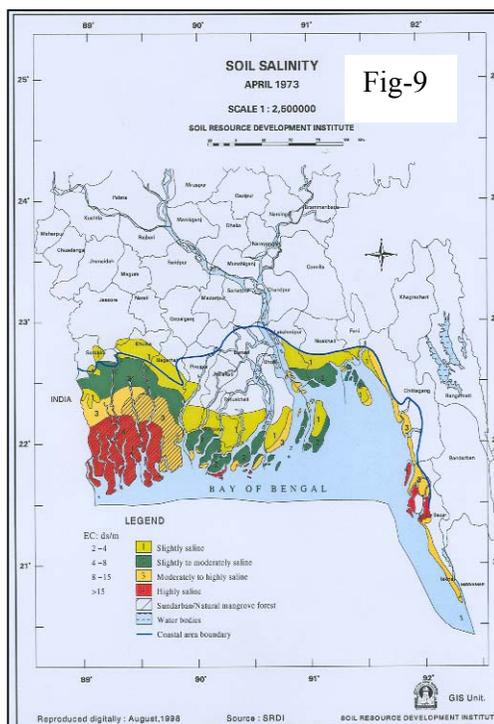


Fig-6 : Land use and AEZ Units

4.3.2 Soil Salinity

Coastal saline soils occur in the river deltas in a strip of land of few kilometers to 180 km width along the sea coast. Reduction of fresh water flow from upper riparian areas of the coast, silting up of the Feeder Rivers enhances soil water salinity in the coastal zone in addition to various anthropogenic activities like shrimp culture, extension of salt bed etc. During 1983 extension of saline area was 0.83 million ha which at present estimated to 1.02 million ha (Staff, SRDI, 2000). A comparative status of total saline area and area under different degrees of salinity in 1973 and 2000 may be depicted from two maps (Fig-9, Fig-10) and their extent in Fig-11. During last three decades about 0.17 million hectares of land is newly affected by various degrees of salinity, where substantial increase was found in strongly (8.1-16.0 dS/m) and very strongly saline (>16 dS/m) classes. Salt bed and shrimp cultivation have bearing on coastal soil degradation and landscape. Production of salt become more profitable and that enhances transformation of agricultural land to salt bed which degrade the soil for future use of the land for crop production (Fig- 12). The situation is further aggravated due to tidal surge and cyclone.



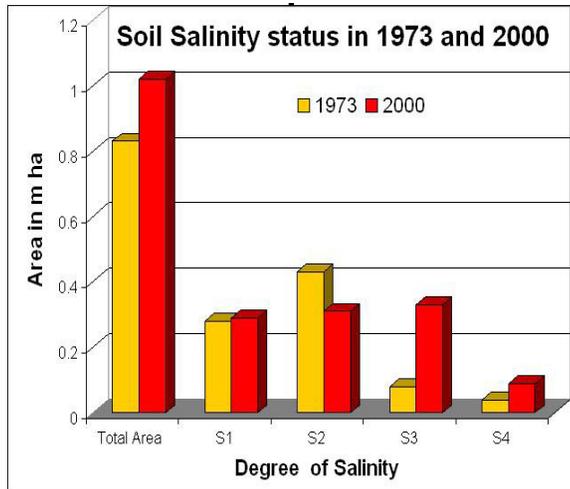


Fig-11: Degree of Salinity

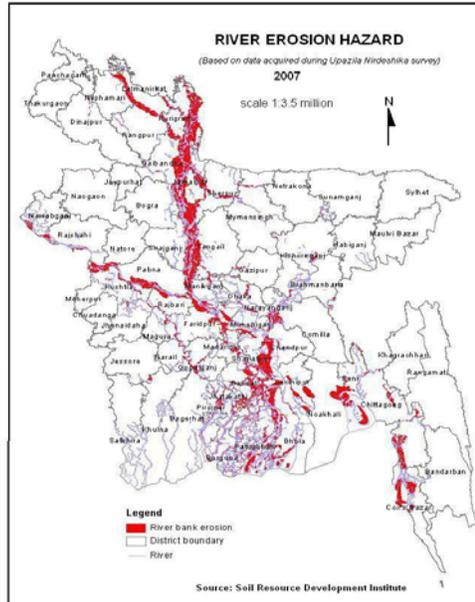


Fig-12 Salt bed engulfing paddy field

4.3.3 River bank erosion

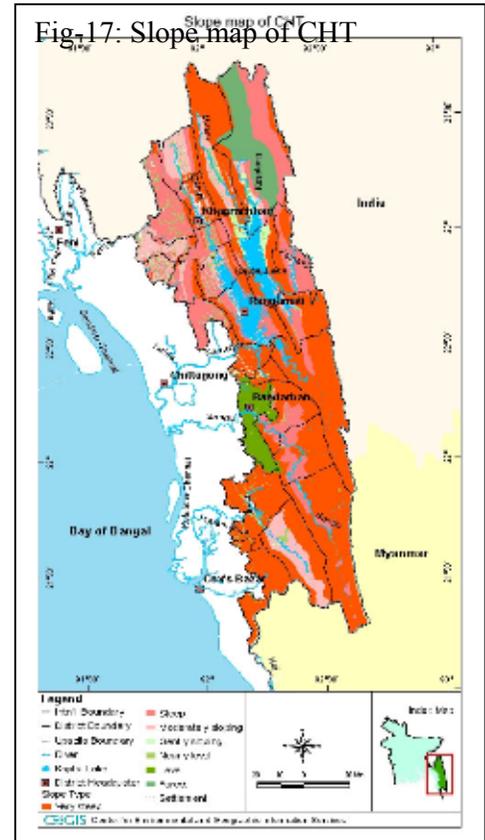
River network in Bangladesh is one of the unique situations of deltaic area and extensive water system of the country 62.8 km/ 1000 sq km land area of three major river system. 700 rivers with total length of 221,555 km, has constraint as result of silting of river beds, enhance flood and river bank erosion, restrict navigation and water flow. The Jamuna-Brahmaputra is 292 kilometers long and extends from northern Bangladesh to its confluence with the Padma. The Padma-Ganges is 456 kilometers long and extends from the western border to where it joins the Meghna River at Chandpur. It is the central part of a deltaic river system with hundreds of rivers and streams--some 2,100 kilometers in length--flowing generally east or west into the Padma. The network of the Surma-Meghna system, which courses from the northeastern border with India to Chandpur, where it joins with the Padma. The Surma-Meghna, at 669 kilometers by itself the longest river in Bangladesh, is formed by the union of six lesser rivers.

Along these rivers bank erosion is spectacular as a result more than 100,000 people displaces annually where poverty is highly concentrated resulting in devastating social impacts along the major rivers. Women and children trafficking, imbalance in social fabrics, unwanted famine in addition to productive land loss and enormous sediment yield are the major consequences of these river erosion. Riverbank erosion is very likely to undercut the existing flood embankments as well, leading to devastating flood damage that could affect millions people along the river and even within the protected area. Fig-13: Breached embankment of Haimchar area. Fig-14 derived from Upazila Nirdeshika data base shows river bank erosion hazard area (about 7835 sq km) of the country (Staff, SRDI,2005). Bangladesh Water Development Board (BWDB) estimated about 1200 km river bank has been actively eroded and more than 500 km has facing severe problems of river erosion. Between 1982 and 1992 about 1063 and 193.0 sq km have been lost and accreted respectively as reported by Ahsan (2006). On the other hand time gaps between two massive floods have been narrowing with increasing projects on flood: 1954 to 1974: 20 years, 1974 to 1987 and 1988: 13-14 years, 1988 to 1998: 10 years, and 1998 to 2004: 6 years (<http://www.countercurrent.org>). Major causes of flood are siltation of river (Fig-16) and interruption of natural drainage ways. Siltation in the floodplains also contributes towards degradation of land due to flashflood and sediments accumulated from riverbank erosion.



4.3.4 Topsoil loss and landslide

Spectacular top soil loss and land slide occurred in the hilly region of Bangladesh. This region occupies about 12% geographical area of the country. Hilly region is concentrate in Chittagong Hill Tracts (CHT) and that occupy 76% very steep to steep sloping areas (Fig-17). Sloping areas of this region are not used with adequate conservation measures. Improper cultivation in Hill Slopes, Terrace Land and Piedmont Plains enhances topsoil loss. Shifting cultivation on the hills, locally known as “Jhum”, is a common practice among the tribal communities in the greater Chittagong Hill Tracts. Traditionally Jhum cultivation is a slash-and-burn process where a certain area is cleared and cultivated for 1-2 years, and then abandoned for 5-12 years until the natural fertility of the soil is regained to a useful economic level. In the recent years this traditional agricultural practice is considered as the most inefficient way of using the rich forest lands. Due to increase in the number of population in the CHT region there is a demand on agricultural production, which is putting pressure on cultivable land. As a result, the traditional regeneration time is not being allowed, and the soil is losing its fertility. SRDI measured soil loss from different slope classes in CHT under Jhum cultivation, which ranges from 36 to 45 t/ha/yr. Study on Jhum restoration revealed that Organic Matter (%), available Phosphorous and Potassium content increased both in top and subsoil by the sixth year, where N content increased by ninth year (Shoaib, 1999). Cultivation root crops like arum, turmeric, ginger etc. by spading the slope and with out appropriate mulching and cultivating pineapple along the slope further worsen the soil loss situation (Fig-18). Establishment of hedgerow along the contour reduce soil loss substantially and it is with tolerance limit (Shoaib,2000). Haque and Osman (1990) estimated soil loss 2.7-



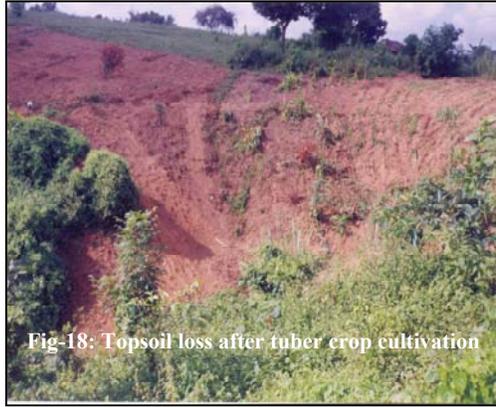


Fig-18: Topsoil loss after tuber crop cultivation

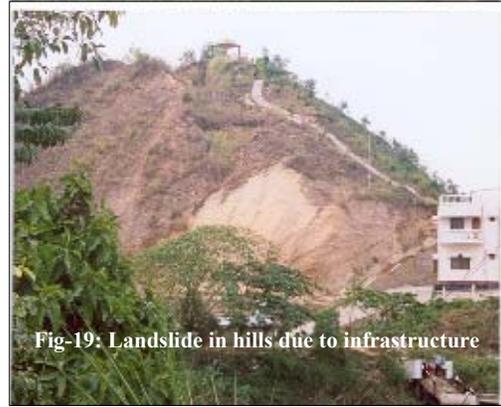


Fig-19: Landslide in hills due to infrastructure

7.2 t/ha/yr and 102 t/ha/yr from well stocked forest and clean fallow slope respectively. Borggard et.al.(2003) estimated 30 tones of soils and 19 tonnes of organic matter assuming 2.5% of CHT used for jhum per year. About \$2 million will require in purchasing fertilizer to replenishing equivalent nutrient. CHARM (2007) analyzed rainfall pattern of CHT over 1981-2003 and revealed that rainfall decreased 90% of the CHT. Deforestation and/or land cover changes are the main causes for natural resource degradation in CHT. Landslides are also spectacular in CHT and those are mainly due to road and other infrastructure construction (Fig-19).

4.3.5 Brick field

Peoples are likely to be in safe housing condition that can protect from cyclone, flood, fire and other natural or man induced disaster. There is a trend observed that peoples are converting their houses from bamboo mat to brick wall. By this time a remarkable changes in the infrastructural sector occurred to meet the development aspects. Bricks are one of the components. In 2005 it was estimated that there are about 5000 brick fields in the country (Personal communication with DoE). SRDI made an inventory on 53 brick fields throughout the country on size, capacity, impact on surrounding soils and agricultural/ horticultural crops. Result revealed that average size of the field is about 3.4 ha producing average 1.4 per year. Brick field causes loss of huge amount fertile top soils per year. It was estimated that 1 ha top soil of agricultural land up to 15 cm is used to manufacture 0.7 million bricks. It cost about Tk.2.6 million in terms of nutrient (N,P,K,S,Zn) loss and Tk.0.06 million in terms of production loss per year from to 10,000 ha agricultural land (Fig-20a,b,c). Observation also made from where top soil was removed for brick making. Table- 2 includes the detail of the findings related to land loss.

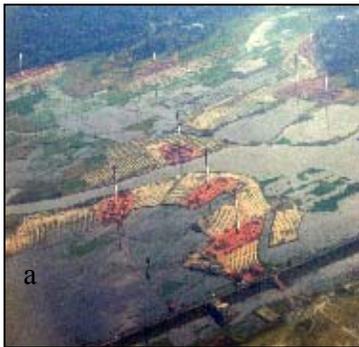


Fig-20(a) : Aerial view of Bick field



Fig-20(b): Brick field in Crop land



Fig-20(c):Brick field and crop land

Table-2 Loss of Fertile topsoil, nutrient and production due to brick field per year.

Area Under 53 brick fields (ha)	Total Capacity (Million bricks/year)	Top soil loss (ha)	Nutrient loss		Production loss			
			Ton	Taka in million	Boro (HYV)		T.Aman (HYV)	
					Ton	Taka in million	Ton	Taka in million
182	105	864	N-2,418	90.0	3,886	31.0	3,022	24.0
			P-25,904	1,709.0				
			K-6,314	133.0				
			S-23,314	388.0				
			Zn-1,943	243.0				
Total				2563.0	Tk. (31.0+24.0)=55.0 million			

Source :SRDI, 2005

4.3.6 Waterlogged soil and drainage congestion

Waterlogging and drainage congestions degraded the land qualities in addition to other socio-economic problems. In waterlogged soil, diffusion of gases through soil pores is so strongly inhibited by their water content that it fails to match the needs of growing roots. A slowing of oxygen influx is the principal cause of injury to roots, and the shoots they support (Vartapetian and Jackson, 1997). In prolonged wet soil redox potential is decreased. Facultative anaerobes first chemically reduce nitrate, converting it to nitrite, nitrous oxide and nitrogen gas (denitrification) rendering nitrate unavailable to roots. As the reducing intensity of the soil increases further obligate anaerobes chemically reduce oxides of Mn^{4+} , and Fe^{3+} to form highly soluble Mn^{2+} and Fe^{2+} (Laanbroek, 1990) that may enter roots and interfere with enzyme activities and damage membranes. Ferrous ion toxicity can be a particular problem for rice farming on acidic soils. If flooding is prolonged, further, anaerobic bacteria may then convert SO_4^{2-} to H_2S , a poison of respiratory enzymes and non-respiratory oxidases. Acidic soils that are low in iron are especially likely to contain free and undissociated H_2S (Ponnamperuma, 1972).

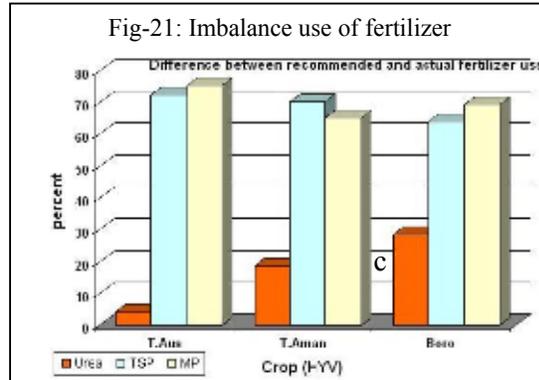
Waterlogged area become serious issue after construction of embankments though water projects. Drainage become impeded and water logging become permanent. Few of them are Atrai-Hurasagar, Beel Dakatia, where the areas are waterlogged for more than twenty years and Chlan beel, one of the richest wetland is now in stake ([http:// www.countercurrent.org](http://www.countercurrent.org)). Seasonal or temporary waterlogged area restricts cropping on time resulting decline in production.

4.3.7 Intensive cultivation

Vertical expansion of cropping induces modern cultivar and options of irrigation. It was observed that to increase per unit production a great potential for using ground water for agricultural needs besides domestic purposes and ground and surface water extraction was intensified. Number of water projects, such as, Brahmaputra right bank embankment project, Pabna project, Dakatia and Halda project, Barisal project, Ganges-Kobadak Kushtia project, Chenchuri and the Barnal, Salinpur-Bashukhali projects in the Khulna area, Surma-Baulai Haor and the Knowai River projects in Northeast region, River training, Chandpur riverbed stabilization project, Chilmari project, Kurigram project came into being to facilitate irrigation in agricultural sector ([http:// www.countercurrent.org](http://www.countercurrent.org)). The scenario induces monoculture that is growing paddy throughout the year As a result reduced residual moisture in the dry season, especially on higher ground, hence reducing cropping options; deterioration of soil physical properties in waterlogged areas; reduced availability of soil nutrients and thus increased dependence on chemical fertilizer inputs; increased dependence on pesticides; trend to high yield variety (HYV) monoculture, reducing agricultural diversity; reductions in agro system

resilience; as a result of above, the possibility of decreasing yields; loss of formerly flooded habitats for major capture fishery species; changes in hydrological regimes of remaining habitats; increased agrochemical runoff and contamination of surface waters. (<http://www.countercurrent.org>)

Paddy production either remain declined or did not increased as expected. Average yield of HYV Aus was 1.91, Transplanted Aman 2.07, Boro 2.65 t/ha in 1985-86, where in 2003-04 it is 1.25, 2.52 and 3.36 t/ha for aus, T.Aman and Boro respectively. Apparent per unit increase in yield of Boro are due to incorporation high yield cultivar in addition of better management and use of fertilizers. Fertilizer use gap between recommended dose and actual application are different in different



season. It was observed that use gap is highest for MOP in Aus and Boro 74.5 and 69.4% respectively, TSP in Aus season is 72.3% (Fig:- 21). On the other hand consumption of fertilizer is about 160kg/ha and approximate nutrient depletion (Kg/ha/yr) was estimated highest Boro-T.Aus-T.aman (333 kg/ha/yr) and lowest in Wheat-M.Bean-T.Aman (112 kg/ha/yr) cropping pattern. Soil fertility loss due to crop intensification was observed highest in Madhupur Tract (AEZ-28) and Barind Tract (AEZ-26), where lowest in Chittagong Coastal Plain (AEZ-23), generally in highlands (MMIS,MoA,2004). In general total Nitrogen depletion ranges from 20-50%, available Calcium 60 to 71%, available Magnesium upto 30%, total Organic Matter (OM) 18-30% and pH decreased 10-30% observed from database of Upazila Nirdeshika time series data acquired during 1985 to 2000. Maps developed using Upazila Nirdeshika data on nutrient like total Nitrogen, Boron, Phosphorus, Potassium, Zinc, Sulpher and Problem soils are attached in Appendix-1.

4.3.8 Agrochemicals

A large amount of pesticides, fungicides, weedicides etc are imported to keep crop production sustainable (Table-3). Data reveals that import of pesticides etc increases upto 40% over 30 years and among them pesticides occupy about 63%. The scenario indicates that there is spectacular use of agrochemicals in agricultural production system and that make hazard to human health, fisheries, soil health, livestock, etc (which not adequately addressed till to date). Fig-22 gives a picture of irrigated area, and use of pesticides and chemical fertilizer. On the other hand it was also reported that agrochemicals found in the market are either of low quality or not at per specification or level of the container. As a result farmers are cheated in one hand, misuse of foreign exchange on other in addition to environmental degradation. Loss of fisheries in the low lying areas, basins, ditches etc. was also reported, which reflected from drastic reduction of open fisheries and disappearance of many local species.

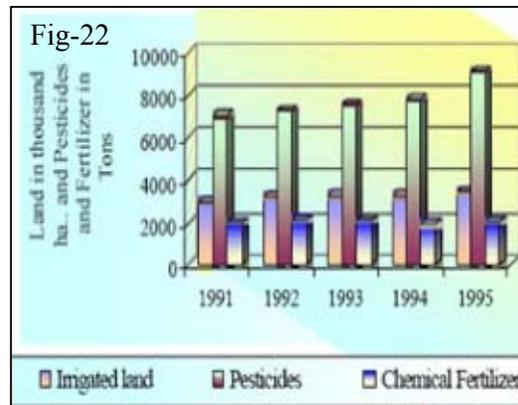


Table-3 Import of pesticides during last three decades

Year	Tons	Value (million Taka)
1980-81	2274.04	202.29
1990-91	5122.00	642.67
2000-01	5655.00	1207.76

Source: Handbook of Agricultural statistics,2004 (MMIS, MoA)

4.3.9 Soil compaction

Soil compaction observed in floodplain soils rich in silt and clay fractions. Practicing two transplanted rice by paddling the soil enhances pan formation below plough layer. In most cases this layer is highly reduce and hinder root penetration. Soil compaction changes pore space size, distribution, and soil strength. One way to quantify the change is by measuring the bulk density. As the pore space is decreased within a soil, the bulk density is increased. It occurs when soil particles are pressed together, reducing pore space between them. Heavily compacted soils contain few large pores that are the most effective in moving water through the soil when it is saturated and have a reduced rate of both water infiltration and drainage from the compacted layer. In addition, the exchange of gases slows down in compacted soils, causing an increase in the likelihood of aeration-related problems. Finally, while soil compaction increases soil strength-the ability of soil to resist being moved by an applied force-a compacted soil also means that roots must exert greater force to penetrate the compacted layer.

Excessive soil compaction impedes root growth and therefore limits the amount of soil explored by roots. This, in turn, can decrease the plant's ability to take up nutrients and water. Generally a medium-textured soil, having a bulk density (Bd) of 1.2 gm per cubic centimeter (74 pounds per cubic foot), is generally favorable for root growth but if Bd increased crop production decreased. Soil compaction in the surface layer can increase runoff, thus increasing soil and water losses as well. On soils with relatively stable structure, greater surface roughness can increase infiltration, reduce runoff, and reduce erosion up to the point that runoff begins

4.3.10 Drought

The total precipitation in drier areas for example west and northwestern parts of Bangladesh is low with sudden heavy downpours and evapotranspiration exceeds the amount of rainfall by a factor of 2.0 in dry season. Bangladesh experienced 19 severe droughts between 1960 and 1991 extended over a region of 5.46 million ha. Huq et al.(1996) suggested that area affected by severe drought will be an increase of 4000 to 12000 sq km under severe climatic change scenario. That leads more water consumption either from surface or ground water abstraction. Drought Map on kharif and Rabi growing period are given in Appendix-2.

4.3.11 Acidification and decline of Organic Matter

Time series data as acquired during Upazila Nirdeshika survey (1985-2000) and fertility monitoring revealed that trends of changes in pH and decline organic matter (OM) content in top soil are significant. Average decrease in pH value ranges from 0.6-1.8 unit, where it is 18-34% for OM. Various reasons have bearing on this issue and among them nutrient mining, intensive cropping, imbalance use of fertilizer particularly Urea, mono cropping etc. Fig-23 is one of the examples of depleted organic matter and acidic topsoil.



Fig-23: Organic matter depleted soil in Meghna Flood plain.

4.3.12 Transboundary issues

Withdrawal of fresh water in the upper riparian areas of the Ganges, the Brahmaputra and the Meghna watersheds in addition to erratic climatic (rainfall) condition has a synergic relation with the land use, cropping pattern, ground water availability, flood frequency, salinity ingress etc. in Bangladesh. Among the rivers flowing across the country 53 are originated beyond the territory of Bangladesh.

Bangladesh has responded to reversing the trend of land degradation through incorporating many activities as integral components of the national development strategies and national environment planning. To combat land degradation and to attain sustainable land management and development, current government programmes have focused on field oriented activities in conjunction with the institutional capacity building. Through these processes Bangladesh has been able to identify Priority Environmental Issues (PEIs) related to land and degradation as well.

The NCSA process also includes an exercise under two Thematic Group Meetings where experts of all walks of relevant ministries, Gov. agencies, divisions and departments and eventually identified many other PEIs exclusively related to land degradation.

Main PEIs related to land degradation in Bangladesh includes:

- *Salinity intrusions*: Salinity intrusion has created a major problem in Khulna and Satkhira area. In a study in the year 2000 revealed that 1.1 million ha of land are losing fertility because of salinity intrusion every year;
- *Arsenic contamination*. Arsenic contamination in the ground water aquifer should be included as a priority environmental issue as well;
- *Topsoil erosion* is a major problem in the hilly areas. 8, 700 ha of area are being eroded annually. Cutting of hills is responsible for this problems. Hill areas or upper riparian areas are sensitive, any anthropogenic disturbances will create erosion, flooding and sedimentation in the lower regions;
- *Brick fields*: Approximately 5, 000 brick fields require topsoil and almost 1,000 ha of topsoil are lost every year for this purpose– it takes 100 years to replenish. Cumulative effects of topsoil loss are billions of taka/year;
- *Water logging*: Water logging is another PEI which has been created due to unplanned dam, embankments. Water logging in Bhabadhaha Beel, Beel Dakatia/Dumuria is happening because of unplanned structures. Farmers have become fishermen in these areas and health hazards are there;
- *Riverbank erosion*: In Kurigram, *riverbank erosion* is another priority issue which causes migration / displacement and ultimately leads to multi-dimensional social effects like poverty, women and child trafficking etc;
- *Groundwater depletion*: planting shallow and deep tube wells is another issue,
- *Transboundary issues*: Organic load coming towards Bangladesh from upper riparian areas is causing underground biophysical changes
- To a huge extent, the intangible effects or ex-situ effects of chemical fertilizers falls on fisheries in waterlogged areas;
- Irresponsible mining of sand, gravels, coal etc from forest and agricultural lands;
- Conversion of agricultural lands and natural forest into other unsustainable economic uses ;
- Rapid urbanization and industrialization without considering the land use priority;
- Discharge of untreated industrial effluents ;
- Access and imbalance use of insecticides;
- Inadequate scientific and institutional capacities in land management;
- Bangladesh has lost its micro nutrients as more fertilizers are being used to keep up the production level, in this case researches to be conducted to introduce new variety of species which will be able supplement the use of chemical fertilizer;
- Temperature variation will effect the production of grains in near future, measures to be taken to reduce vulnerability of crop production;

- Decrease in average / annual rainfall was identified as one of the major issues related to desertification in Bangladesh;
- Industrial boom is another cause of land degradation;
- Unplanned housing in urban and rural areas also causing the land degradation;
- Unplanned and over-exploitation of underground water for irrigation purpose;
- Categorization of the river depending upon the pollution is a major issues for land degradation;

4.4. IDENTIFYING CAPACITY DEVELOPMENT NEEDS

4.4.1 Identification Of Stakeholders

Key stakeholders for sustainable land management include government organizations as service providers, as those responsible for administration and management of lands and as land owners. From this perspective the key stakeholders are the Ministry of Land-DLRS, Ministry of Agriculture – DAE, BARC, SRDI and BMDA, the Ministry of Water Resources – WARPO, the Ministry of Planning and Finance – Planning Commission, the Ministry of Environment and Forest – DOE and FD, the BWDB, the Ministry of Fisheries and Livestock – DoF, DLS, BLRI, Ministry of Local Government and Rural Development – LGED, BRDB, and the Ministry of Defense – SPARRSO, GSB, BMD.

Most of the above organizations have field offices, and in some cases such as for DLRS and DAE, some functions are administered through the local administration at the division, district and Upazilla levels. It is imperative that the field level officers like Divisional Commissioner, Deputy Commissioner, UNO and other local administration have important role to play in sustainable land management

Much of the current knowledge of best practice in sustainable land and ecosystem management lies within the NGO community, particularly those active at the local level. Relevant NGOs include IUCN, the Arannyak Foundation, and UBINIG . All have ongoing activities and practical knowledge relevant to this project which will be utilized. Additionally, research institutions such as SRDI, BIDS and the Soil, Water and Environment Department of Dhaka University may be invited to advise government stakeholders in management and implementation of the project.

The target group for capacity building will be policy makers, technical experts, field level officials and relevant NGOs. Wherever possible, the project will build on the existing capacity of stakeholders – often those institutions and individuals whose capacity is already raised through previous development interventions. The selection of the NGOs for participation in project implementation will be based on criteria to be decided at the initiation of the project. For awareness raising, and to promote actions at the individual level, the project will focus on small landholders, including landless women and ethnic minorities.

Another group of important stakeholders are the beneficiaries, the individual farmers, and the community groups who are dependant on the land for their livelihood. These beneficiary groups are to be targeted for capacity development.

4.4.2 Identifying Capacity Development Needs

A positive development in Bangladesh like many other countries in Asia is that with increasing awareness on the environment, the environmental awareness has increased to some extent, though very little compared to the needs. But the institutional and policy shortcomings continue to be the major causes of overall failure in the achievement of sustainable development. Among them is the poor environmental governance, weak vertical and horizontal coordination among different decision making bodies and agencies of the governments, and inadequate and improper enforcement of the policies that can help promoting sustainable development. In the case of UNCCD implementation, the awareness process and institutional development are beginning to take place.

The lead organization responsible for implementation of UNCCD in Bangladesh is the MoEF. But its overall clout in the management of land is limited to the management of sensitive ecosystem and forest. The decision makers are yet to recognize that land degradation is a significant barrier to sustained economic growth. Sustainable land management (SLM) objectives do not feature prominently in the policy and regulatory structure of the country, no government institution is taking a lead in promoting SLM, and there is no coordinating body or mechanism to mainstream SLM practices into the Government's multi-year or annual development program. Government agencies whose activities have an influence on land management practices do not consider SLM as part of their responsibility.

The organizations directly involved in the decision-making process of land related issues are in the Ministries of land, MoEF, Agriculture, water resources, livestock and fisheries, and rural development. The other organizations who provide support activities are SPARRSO, BMD, CEGIS, etc. Human resources with adequate training are not always available or rightly placed. The programmes are not broad based enough for human resources development and to perform the mandated tasks. As a result programme development is handicapped and resources that are highly competitive can not be secured, and the programmes would be short in delivery. This vicious cycle would continue till the capacities for programme development and implementation are properly developed.

Policy regarding SLM is also piecemeal and enforcement is weak. Policies related to agriculture, forestry, water resources, and rural development at times are contradictory with regard to SLM. While there is no dedicated initiative to promote an enabling environment for legislative and policy harmonization, the National Land Use Policy, under the auspices of the Ministry of Land, has been identified as a possible vehicle. However, the policy came into effect in 2001 and has yet to be implemented. The government is currently planning to carry out a review and redraft of the policy which this proposed project will support. An effective review would require (a) development of a plan of implementation and associated mobilization of resources, (b) development of necessary skills and procedures amongst government staff to enforce the policy, (c) development of a monitoring and knowledge management system, and (d) coordination between relevant government agencies to enforce the policy together with providing appropriate legal status for the policy.

Capacity building is also needed to conduct environmental impact assessments (EIA) which are mandatory for all development projects in Bangladesh. The MoEF has the responsibility for EIA clearance. The EIA regulation needs revision together with development of operational capacity in the DoE and Ministry of Land.

Technical skills are needed at all levels across every aspect of SLM. There is a particular need for training in the application of market based instruments, environmental/natural resource economics for analysis of existing land use practice, identification of economically and financially viable land management alternatives, and GIS. Civil society and local government bodies require particular training on eco-system-based approaches that integrate local and global environmental concerns as well as approaches to community-based natural resource management. There is also a need for enhancement of experience in field research and ability to apply the results of research through extension.

There is also a need to promote a more general appreciation for the role of SLM in poverty reduction among decision makers and the public at large so that what appear to be technical issues can be effectively mainstreamed and effectively translated into broad-based policy decisions.

The capacity needs for UNCCD implementation in the country are in the categories of mainstreaming of the Convention, enhancement of knowledge on the issues of land degradation and desertification, advocacy and awareness raising, introduction of enhanced skill at institutional and individual level, and functional support for improving the performance of the individuals and the institutions. In the case of UNCCD implementation in Bangladesh, these needs identified in the following matrix:

Table: Capacity Needs at Various Levels

Capacity Needs	Systemic level	Institutional level	Individual level	Grass-roots level	Capacity type
1. Levels of awareness and knowledge of land degradation issues or understanding of root causes, interactions.			limit the ability for discussion, decision-making and action		Knowledge
2. Know-how and guides for effective decision-making.		strategic environmental assessments; land capability/suitability criteria, strategic-integrated land use planning.			Knowledge
3. Information, information management, monitoring and observations.	hampers policy and decision-making	– soil, catchment and landscape information are often not available to address Land Degradation, are disjointed, or there are no means to bring information together.			Knowledge
4. Coordination of national policy, legal and regulatory frameworks.	confusion between sectors and between national and local levels.				Mainstream
5. Integrated environment and development tools;	Profusion of laws, policies and plans, with little vertical and horizontal coordination				Mainstream
6. Incentive systems and market instruments	This is not adequately developed and internalized by the experts, institutions and in the decision-making system				Mainstream
7. Institutional coordination	Institutional mandates either overlap or have gaps, key institutions are not involved, and interactions between institutions are not always effective.				Mainstream
8. Science and technology for decision-making		Science and technology are ineffectively mobilized in support of policy and decision-making.			Mainstream
9. International negotiations and agreements.		Development of strategy and skill for participation and reporting back.			Mainstream
10. Capacity development at community level.				Capacity building initiatives not delivered within the capacity of communities	Skill
11. Linking up with global and regional level through established networks - Coordination, and processes for interaction with international community	Effective participation in the in convention process and the regional networks are to be developed				Mainstream

Capacity Needs	Systemic level	Institutional level	Individual level	Grass-roots level	Capacity type
12. Personnel management		Individuals tend to be ineffectively deployed, mobilized, motivated or given responsibility.			Functional
13. Organisational management		Institutional effectiveness is hampered by weak management			Functional
14. Financial resources and technology.		Need capacity development for to develop effective programmes and pilot technology implementation.			Mainstream
15. Policy development		Overall policy development capacity including translating promising technical findings into policies			Mainstream

4.4.3 Capacity Needs identified by the Thematic Group

Two separate Thematic Group meetings were held on 4 and 11 December 2006. The group members identified the following capacity development needs at different levels:

Individual capacity:

- Juniors and young professionals should be trained and adequate resources mobilized for their capacity building ;
- Focus group/ person needs to be identified to compliment the Rio conventions;
- Equal sharing of benefits and involvement of the beneficiaries at the local level to be emphasized;
- Personnel needed to be updated on the COPs decisions under UNCCD;
- Equal sharing of benefits and involvement of the beneficiaries at the local level to be emphasized;
- Personnel needed to be updated on the COPs decisions under UNCCD;
- Dedicated officers from different institutions may be enlisted to act as driving force.
- Success stories may be published in local language as fact sheets with photographs and drawings etc.
- Expertise service from in country and abroad.
- Dissemination of technology may be enhanced with provision of feed back from stakeholders.

Institutional Capacity:

- Physical deterioration of soil compaction needs to be studied;
- RRI, BWDB, WARPO etc should synchronize their efforts to address riverbank erosion;
- Hub, i.e. one stop service, is needed for capacity building on sustainable land management;
- The goal of polder projects was agricultural enhancement, but there is a need to rethink holistically and mainstream them into sustainable development efforts;
- Each institution should have database and memory and this should be transmitted to the 'young professionals' who will be working for the next 20-30 years;
- Education institutions and research bodies should have their own think tanks
- Database formats can be made user friendly and accessible

- Institutional memory could be built up keeping in mind that some jobs are transferable;
- Institutional capacity – identify the involved parties such as police, UP Chairman etc
- Awareness programmes should include schools, colleges, madrasa, media etc
 - While considering a development project, Planning Commission, IMED and ERD needed to develop a format with an inbuilt mechanism to evaluate the project based on economy, environment, ecosystem, land degradation concern whether it can facilitate the Rio conventions or not ;
 - Emphasis to be given on the community based projects while focusing community participation for implementation of the Afforestation project;
 - BPATC, Planning Academy (APD) , NAEM may be integrated with different mechanisms to strengthen the capacity of the personnel;
 - In case of development projects, special focus to be given on the migration /displacement issue of the ethnic/ local people of the locality;
 - Water management projects should consider the aspects of efficient and equitable use of surface water rather than ground water. Institution like BWDB need to develop it's capacity in this regard;
 - Development of infrastructure such as polder, embankments should consider the storage of surface water;
 - In the light of that, water used in irrigation can also be used for domestic purposes;

Systemic Capacity:

- Documentation of best practices and creation of 'data bank' of local knowledge e.g. practices of CHT. Format for documenting local knowledge can be found at: www.wocat.com ;
- Good governance should be there for ground water use because soil moisture is essential
- Regional level initiatives and basin management is necessary as 53 rivers are originated from India;
- Construction of high rise building both in urban and rural areas may be encourage in order to avoid land degradation;
- Amendment of the Land Use Policy is urgent to halt land degradation;
- Coordination among the national bodies regarding UNCCD is very crucial;
- Regional cooperation may be strengthened to ensure water supply of the international rivers;
- Traditional knowledge to be documented and practice to up hold the adversity of the Land degradation;
- Efforts from all the govt. agencies and institutions is crucial to review the existing policies ;

4.5 CAPACITY DEVELOPMENT ACTION PLAN (CDAP)

General frame work for capacity building and resource mobilization could be planned relating other MEA's approach. Institutions/organizations may be selected depending on their relevancy with Rio declaration on priority basis. Institutions mandate and organogram or organizational structures may also be reviewed; stock taking of resource of those institutes may be emphasized, strong stewardship for data/information house keeping and establishment of regular monitoring and evaluation system.

Capacity building and resource mobilization could be planed in three dimensional approaches essentially with regular update information exchange relevant to UN conventions. Firstly policy interventions could be done with strong approach for awareness building among the stakeholders through the sensitization of media. Existing policies may be reviewed in consultation with the stakeholders and updating the changes on regular basis. Published

government gazettes should be made available to all concerned and press and other media could be made main player for awareness building (Systemic). Policy decision in consultation with experts to share data/information is urgently required. Documentation of best practices and creation of 'data bank' of local, innovative knowledge should be given priority and format of World Overview of Conservation Approaches and Technologies (WOCAT) may be used as guide line and that could be found at: www.wocat.com. A short orientation may enhance its implementation.

Secondly mandate, institutional structures of all related institutes should be revisited for strengthening and building capacity to deal with the vision of the government. MoE may act as national hub and link with the institutions in action. One stop service (may be in MoE) for formulating planning, implementation, monitoring and evaluation of proposal from each institute may be established. Focal groups should be proactive in the spirit of good governance, knowledge share and think tank to retain institutional memory and effective compliance. Research on soil and land quality degradation should be enhanced through related institutions. Local government institutions and government training institutes must include regular program as regular events. Data acquired by an institute should make available to the relevant institutions. Any sectarian approach or individual ambition should not hinder the holistic approach and the notion should strictly avoid RRI, BWDB and WARPO may synchronize work plan to make polder effective and sustainable (Instructional Capacity).

Thirdly focal groups of each institute should be updated and work as think tank in respective field. Groups and individual members may be encouraged to share their knowledge, experiences on regular basis. Provision of orientation or refresher course could be organized within and among the institutes (Intra/inter institutional) that will update on the COP's decisions under UNCCD (Individual level).

4.5.1 Tentative Outline of Activities for capacity building

Capacity building for compliance of all MEA's should be treated in a holistic view with vision and proactive mode. Following steps may be considered.

- Step-1: Activate all level stakeholders (Policy level to local administration, viz: Chairman etc).
MoE can take the initiative.
- Step-2: Available stocks make available to all concern public and private institutions.
- Step-3: Institutions related to Natural Resource Management (NRM) to be assigned to form focal groups comprising all levels of contributors and database may be develop in MoE for effective traceability. Knowledge these institutions may be shared for effective interventions.
- Step-4: Hot spots areas to be given priority during formulation of workplan, such as River Bank erosion, Polder management, Soil and land quality decline, Fisheries, Livestock, Heavy metal contamination, Food security etc.
- Step-5: Database management relevant to NRM and link to upazila level for monitoring and feed back. Institutional and individual capacity building may be focused and watershed management working group may be formed.
- Step-6: Documentation of best practices related to climate change using common format. WOCAT tools may be tested and/or user friendly customized software may be developed for this purpose.
- Step-7: To address the situation revisit of SRDI database and other models (For example DRASS of CEGIS).
- Step-8: Strong and effective stewardship from MoE is essential to buildup capacity of concerned public and private institutions dealing with common three Rio conventions.
- Step-9: Establishment of Intra and Inter ministerial liaison for **mindset** and **knowledge management** in accordance with conventions.
- Step-10: Adequate funding for capacity building with scope of strong monitoring and evaluation.
- Step-11: River training, Ground Water situation, Surface water storage, Problem soils, Landscape management, etc. may be enlisted as priority setting.

The capacity development action programme need to address the constraints identified in this analysis which are – information and knowledge barriers, need for policy synergy, inadequate focus on land related policies, and most of all inadequate social consciousness. The capacity development action plan should also address the substantive content identified in section 3. The activities of the capacity development action plan as identified for systemic, institutional and individual levels are intended to achieve the targets for capacity development.

Focal Area: Land degradation

SN	Output	Activities	Nature of *CD	Timeframe **	Implementing Agency
	Soil conservation and afforestation	• Pilot programme will be established on soil health conservation through demonstration of organic manuring and compost preparation. In rural areas the farmers usually keep their manure yard open and thus the nutrient.			
	Excavation and re-excavation of Pond and Canal	Excavation and re-excavation of Govt <i>Khas</i> ponds will be undertaken in areas of extreme poor people Co-management of these ponds through community people			
	Water control structures	Low cost water control structures of appropriate design will be building across the re-excavated canals for conserving water so as to supplement the irrigation of rain fed paddy and for low water consuming crop cultivation. the water thus stored in the section of the canal may be leased out to groups/individuals having land on it's vicinity to cultivate fish duck and supplemental irrigation on early basis;			
	Construction of Mini Ditch/Pond	On farmlands having no source of irrigation, harvesting of rainwater will be done by excavation of mini ditch/pond and use the same for supplemental irrigation;			
	Demonstration of improved fuel use	Demonstration of improved fuel use for women in rural areas and introduction of renewable energy through constitution of biogas plants. In areas where LGED construct biogas plants the costs			

		to be paid by the farmers may be borne from this programme if necessary. Similarly pilot demonstration of solar based home lightening will be done in some selected village to be brought under eco-village concept;			
	Community Awareness:	community organizing for developing awareness among the poor preferably the women for checking environmental degradation. training programme will be organised in the selected Eco-villages to train the villagers particularly the women folk to aware them about the eco-system they live in;			
	Eco-village:	Eco-village concept will be implemented in some selected upazilas depending on the availability of fund. Factors affecting the ecosystem of the villages will be determined in consultation with the villagers. Program for the removal/upgrading the degrading factors will be solved on priority basis as per recommendation of the villagers. Activities such as supply of potable water, sanitation, horticulture, manure management, biogas plant installation, solar lightening, homestead gardening, afforestation activities etc will be implemented.			
	Legislative and institutional frameworks or arrangements	No separate legal measures have been initiated in Bangladesh to implement the provisions of the Convention. But legislations existing in the country support the strategies and policies aimed at conservation and management of natural resources and preservation and protection of the environment. Legislation facilitating community forestry activities exists in the country			

4.6 CAPACITY DEVELOPMENT ACTION PLAN

Issues and Outputs	Activities at Different Levels		
	Individual	Institutional	Systemic
1. Manpower trained and skilled	<ul style="list-style-type: none"> • Personnel/experts to be trained • Skills in negotiations and implementation to be enhanced. • Personnel needed to be updated on the COPs decisions under UNCCD 	<ul style="list-style-type: none"> • BPATC, Planning Academy (APD), NAEM may be integrated with different mechanisms to strengthen the capacity of the personnel 	
2. Enhanced inter-agency coordination	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Coordination among the national bodies regarding UNCCD • Intra-organizational coordination is also very important for preparation of Report • Inter-agency cooperation is inevitable for preparation of Report 	<ul style="list-style-type: none"> • While considering a development project, Planning Commission, IMED and ERD needed to develop a format with an inbuilt mechanism to evaluate the project based on economy, environment, ecosystem, land degradation concern whether it can facilitate the Rio conventions or not
3. Improved national policies		<ul style="list-style-type: none"> • Amendment of the Land Use Policy is urgent to halt land degradation 	<ul style="list-style-type: none"> • Efforts from all the govt. agencies and institutions is crucial to review the existing policies • Land zoning is very important for conservation of biodiversity and soil fertility. MoL is implementing Coastal Land Use Zoning Project (CLUZ) which also envisages to protect land degradation.
4. Enhanced Knowledge /adequate information	<ul style="list-style-type: none"> • Traditional knowledge to be documented and practice to uphold the adversity of 	<ul style="list-style-type: none"> • Continuation of institutional memory is very important. In this respect, introduction of a new administrative policy is important. 	<ul style="list-style-type: none"> •

Issues and Outputs	Activities at Different Levels		
	Individual	Institutional	Systemic
	the Land degradation	So that, each skilled person should be posted / retained in similar ministry at least for 4/5 years	
5. Increased participation		<ul style="list-style-type: none"> • Inadequate involvement of local community/ stakeholders (institutions, NGOs, etc.) in implementing projects concerning Rio Conventions through national endeavors 	<ul style="list-style-type: none"> • No multi stakeholder strong national programme.
6. Critical ecosystems are addressed		<ul style="list-style-type: none"> • Emphasis to be given on the community based projects while focusing community participation for implementation of the Afforestation project • In case of development projects, special focus to be given on the migration /displacement issue of the ethnic/ local people of the locality • Water management projects should consider the aspects of efficient and equitable use of surface water rather than ground water. • Water used in irrigation can also be used for domestic purposes • Integration of effluent and waste management aspects to be focused in river management projects • Bangladesh should have a database on various environmental parameters such as flood and rainfall for accurate prediction 	<ul style="list-style-type: none"> • BWDB need to develop it's capacity in this regard • Development of infrastructure such as polder, embankments should consider the storage of surface water • Regulatory measures to be taken to protect land degradation and Regulatory regime regarding land degradation need to be improved; • National Action plan on coastal and marine environment should include land based activity. According to that different measures can be taken to protect river through various river basin/ river management projects

Issues and Outputs	Activities at Different Levels		
	Individual	Institutional	Systemic
		and forecasting <ul style="list-style-type: none"> • Temperature variation will effect the production of grains in near future, measures to be taken to reduce vulnerability of crop production • Research initiative to be taken to introduce temperature tolerant crops • Regulatory measures to be introduce to restrict the implantation of tube wells for high rise buildings • Regulation to be introduced on establishment of brick fields to protect the top soil • There must be a thorough guideline for land use both in urban and rural areas • Strategic Environmental Assessment is very important to protect the land degradation 	

Legendry:

Ind – Individual Capacity, Ins – Institutional Capacity, Sys – Systemic Capacity
 L – Long Term, M – Medium Term, S – Short Term

4.7. Tentative Outline of Activities:

- Afforestation programme should be carried out in marginal lands, lessons learnt from BMDA’s activities;
- Concerted efforts for watershed based resource management;
- Database should be made available at the upazila level;
- Implementation of Large-scale participatory afforestation programme with indigenous drought resistant species;
- Evaluation and Rehabilitation of Drylands;
- Application of Seasonal Drylands Forecasting tools in drylands management;
- Technical analysis of land degradation issues;
- Identification of appropriate and existing institutional arrangements and lacking in sustainable land management;
- Identification of regional and global support that will be provided by global support unit of the Portfolio Project;
- Massive afforestation and conservation of existing forest;
- Maintaining of long term sustainable Ecosystem;

4.8. Preparation of Report and Communication:

- There must have a clear modality for the personnel who is involved with the Reporting process;
- Intra- organizational coordination is also very important for preparation of Report;
- Inter-agency cooperation is inevitable for preparation of Report;
- Continuation of institutional memory is very important. In this respect, introduction of a new administrative policy is important. So that, each skilled person should be posted / retained in similar ministry at least for 4/5 years;
- National level consultation is crucial prior to the participation in any negotiation process of any conventions;

4.9. Tentative Outline of Activities:

- Regulatory measures to be taken to protect land degradation and Regulatory regime regarding land degradation need to be improved;
- National Action plan on coastal and marine environment should include land based activity. According to that different measures can be taken to protect river through various river basin/ river management projects;
- In addition to that integration of effluent and waste management aspects to be focused in river management projects;
- Regulatory measures to be introduce to restrict the implantation of tube wells for high rise buildings;
- Regulation to be introduced on establishment of brick fields to protect the top soil;
- There must be a thorough guideline for land use both in urban and rural areas;
- Strategic Environmental Assessment is very important to protect the land degradation;
- Bangladesh should have a database on various environmental parameters such as flood and rainfall for accurate prediction and forecasting;
- Temperature variation will effect the production of grains in near future, measures to be taken to reduce vulnerability of crop production ;
- Research initiative to be taken to introduce temperature tolerant crops;

SECTION 3. Elements Of Capacity Development Action Plan

Substantive content for capacity development for land degradation in Bangladesh would be the following:

1. Education and public awareness on the issues of land degradation.
2. Transfer, acquisition, adaptation and development of environmentally sound and appropriate technology for sustainable land management.
3. Training and technology development and use of alternative, renewable energy sources (aimed particularly at reducing dependence on wood for fuel)
4. Promotion of alternative livelihoods, including training in new skills for conservation of ecosystem and sustainable land management.
5. Training of decision-makers, managers and personnel responsible for collection and analysis of data for disseminating and using early warning information on drought conditions, water resources and for food production
6. Monitoring and assessment: Information collection, and analysis (relevant short-term and long-term data and information; particularly to ensure systematic observation of land degradation in affected areas and to better understand and assess the processes and effects of land degradation as well as drought impact mitigation measures.)
7. Effective early warning and advance planning for periods of adverse climatic variation
8. Research and development
9. Development of database on sustainable land management

10. Technical and scientific co-operation in the fields of combating desertification and mitigating the effects of drought through appropriate national, sub-regional and international institutions

The activities related to capacity building are in the categories of institutional coordination and policy harmonisation, functional capacity development, implementation of national land use policy, use of sustainable development tools, including application of environmental impact assessment, the use of economic instruments, human resources development, policies and planning including their coordination development of strategies, legislation, and stakeholders' participation and partnership development, and information sharing.

Through the LDC/SIDS Global Project on Capacity Development for UNCCD Implementation, Bangladesh would be initiating a project for Resource Mobilisation and Capacity Development for Sustainable Land Management. This project was developed through a process of consultation with the stakeholders by organising three workshops and having consultations with the relevant institutions and experts. The activities identified in the project could be the elements of the action programme for capacity development for UNCCD implementation. The elements are elaborated in the following tables in the categories of (1) mainstreaming UNCCD implementation with institution and policy coordination, (2) implementation of national land use policy, (3) Knowledge enhancement on sustainable land management, (4) individual skill development and functional capacity building, and (5) Resource mobilization and NAP implementation:

Table- 3 (a). Mainstreaming UNCCD implementation with institution and policy coordination (Systemic and institutional capacity)

Capacity development target	Activities
Improved understanding in key ministries and institutions on SLM in land related legislation and policies.	<ol style="list-style-type: none"> 1. Prepare a consolidated report encompassing assessment from all ministries to identify synergies and inconsistencies between Government policies and the relevance of SLM with PRS/MDGs related actions, and conduct a series of seminars and workshops involving representatives from the abovementioned ministries and institutions to share findings and look at common capacity needs and synergy issues; 2. Develop a strategy for capacity development to follow up on UNCCD implementation and to integrate SLM into policies, legislation and plans within the related ministries.
Effective inter-agency coordination and networking mechanisms in place for UNCCD implementation and sustainable land management.	<ol style="list-style-type: none"> 1. Develop an effective institutional arrangement to coordinate the implementation of UNCCD and monitor the development for reporting by engaging the stakeholders local level institutions of technical departments, civil administration, civil society, and community groups; 2. Develop a network for communication with the nomination of a Focal Point from each concerned Ministry to act as communications coordinator on land management issues. Activities will include email circulars, regular meetings and circulation of minutes.
Integration of SLM into national development plans and policies, and the plans to deliver the MEAs	<ol style="list-style-type: none"> 1. Capacity development to include SLM related activities and the National Land Use Policy in the core implementation activities of the Poverty Reduction Strategy, and the Annual Development Programme to develop synergy with the objectives of poverty reduction and environmental sustainability; 2. Identify institutional barriers for successful implementation of national environmental policies and plans, such as NAPA, NBSAP;

Capacity development target	Activities
Enhanced awareness of UNCCD among policy makers and community leaders through an advocacy campaign	<ol style="list-style-type: none"> 1. Develop advocacy and awareness strategy - identify key target stakeholders that will include community leaders, and areas for campaign at different levels with development of campaign materials on existing knowledge and other studies; 2. Organize policy seminars with key policy makers, advisors and Members of Parliaments 3. Conduct national level media campaign with women participation.
Development and dissemination of new policy tools for land use decision-making	<ol style="list-style-type: none"> 1. review the mandates of the responsible organizations with adequate manpower and resources supported by necessary policies

Table 3(b): Implementation of national land use policy (Institutional)

Capacity development target	Activities
Institutional arrangements and action plan to facilitate implementation of National Land Use Policy;	<ol style="list-style-type: none"> 1. Develop an effective institutional framework with the designation of a coordination body or unit within the Ministry of Land to function as the secretariat of the two committees charged with the review and implementation of the Policy and to ensure cooperation and coordination among the relevant stakeholders; 2. Develop capacities of the participating organizations to carry out land related activities.
Development of mechanisms for monitoring the implementation of National Land-Use Policy.	<ol style="list-style-type: none"> 1. Develop GIS and remote sensing capacity in the related participating organization with adequate manpower and budgetary support. 2. Develop capacity for baseline survey for monitoring the Land Use Policy implementation 3. Conduct training of staff from relevant institutions to monitor implementation of National Land Use Policy;

Table -3 (c) Knowledge enhancement on sustainable land management (Institutional and individual)

Capacity development target	Activities
Needs assessment and capacity development for knowledge management of	<ol style="list-style-type: none"> 1. Identify few organizations with existing and potential for capacity development for knowledge management. 2. Provide adequate hardware and software in the above organizations with training for database management 3. Conduct system-wide training on data collection and database management

Capacity development target	Activities
SLM,	
Development of knowledge management systems for capacity enhancement.	1. Identify a lead institution to continuously update the knowledge management system and establishment of database, and conduct regular training

Table-3 (d): Individual skill development and functional capacity building

Capacity development target	Activities
Capacity development through training and demonstration of valuation of ecosystem services and use of economic instruments (such as reform of taxes, subsidies), strengthening EIA process, and progression from EIAs to Strategic Environmental Assessment (SEA).	<ol style="list-style-type: none"> 1. Develop training modules on EIA, SEA and valuation of natural resources with organization of training workshops on EIA and SEA for senior technical officials in DoE and other concerned organizations on the issues of SLM 2. Organize a training workshop on valuation of ecosystem services, natural resources and on the use of economic instruments in decision-making; 3. Illustrate the application of natural resource accounting tools in local land use planning and resource management as follow up to training by selected participants working in one area to implement a pilot project.
Dissemination of best practices and technologies on SLM.	<ol style="list-style-type: none"> 1. Develop training materials and conduct training of trainers program targeting the field staff, community leaders, women groups, and farmers on production of organic manures and conservation of biomass for soil productivity; on soil conservation and mitigation measures including agro-forestry at selected Upazila level, integrated ecosystem management and community based natural resource management. 2. Disseminate of best practice materials on SLM to farmers and community leaders by organizing media events and community workshops in selected locations, field visits to demonstration sites etc.
Capacity building for local level coordination between institutions and advocacy on SLM through pilot field demonstration projects.	<ol style="list-style-type: none"> 1. Organize pilot demonstration and training on SLM on technology innovation, innovative crop diversification in the Barind Tract with provision of adequate training in institutions of other Asian countries; 2. Organize pilot demonstration and training on enhanced soil conservation methods and technology innovation in selected Agro Ecological Zones (AEZ).

Chapters 5

Chapter 5

SYNERGY AMONG RIO CONVENTION AND OTHER MEAs

SN	Particulars of Contents	Page No
5.0	Significance 5.0.1 What are 'synergy' and 'cross-cutting issue'? 5.0.2 Why is 'synergy'?	123 123 123
5.1	Obligation for Bangladesh under three Rio Conventions 5.1.1 Obligations for Bangladesh under three Rio Conventions 5.1.2 MEAs other than three Rio Conventions	124 124 125
5.2	Current situation and Stocktaking 5.2.1 Stock taking of Bangladesh's efforts on Rio Conventions 5.2.2 Bangladesh's progress on other conventions 5.2.3 On-going common projects and programme 5.2.4 Synergies among RCs related policies In Bangladesh	127 127 128 128 129
5.3	Priority Environmental Issues 5.3.1 Common Issues 5.3.2 Crosscutting issues among the Action Plans	130 130 132
5.4	Identifying Capacity needs <ul style="list-style-type: none"> • Individual • Institutional • Systemic 	132
5.5	Capacity Development Action Plan 5.5.1 Institutional strengthening 5.5.2 Legal, policy and enabling frameworks 5.5.3 Public awareness and education 5.5.4 Sustainable land management 5.5.5 Data & information collection, dissemination & monitoring 5.5.6 Research and technology development 5.5.7 Technical and managerial capacity 5.5.8 Resource mobilisation	136 136 136 137 137 137 138 138 139

Chapters 5

SYNERGIES AMONG RCS AND OTHER MEAS

5.0 Significance

5.0.1 What are 'synergy' and 'cross-cutting issue'?

In NCSA process, the term 'synergy' denotes the mainstreaming of the basic principles, programs, activities and action plans undertaken by or within the three Rio Conventions. It also indicates the linking and interfacing the capacity needs for developing nations within/among different conventions under a single umbrella. Through synergies positive impacts are amplified by coordinating or linking the implementation of two or more MEAs. In other words, synergies give multiple benefits for more than one convention resulting from a single action or programme.

Cross-cutting issues are common to more than one convention; that is they "cut across" conventions. Capacity strengths, constraints, needs and opportunities are examples of some cross-cutting issues. Therefore, if a cross-cutting need were addressed through capacity development programmes, it would benefit more than one convention.

5.0.2 Why is 'synergy'?

Responding to global problems like climate change, loss of biodiversity and land degradation requires concerted efforts among various stakeholders and institutions. Moreover, close collaboration with other MEAs is also required. The increasing need for synergies between the conventions is felt at the national, regional and global levels where most Governments, particularly in developing countries like Bangladesh, have only one agency, MoEF, to deal with all the conventions. Issues such as capacity building, technology transfer and public education cut across not only the different sectors but also between the conventions. Hence, closer coordination of activities among the conventions will not only improve the effectiveness of implementation of obligations but also improve the efficiency of utilization of fund within the limited resources.

As part of the NCSA process involving multi-stakeholder participation, Bangladesh envisaged to identify capacity constraints while implementing the RCs are at different levels of implementation. These constraints and bottlenecks should be addressed in a synergistic manner, where capacities for individuals and institutions can be centered on more than one thematic area at a time. However, the key to this is to find the commonalities and connecting threads that have significant impact in implementing the Conventions either at individual level or as a group. The consultative meeting involving all stakeholders of NCSA during the proposal development phase has identified some of the capacity needs that need to be addressed synergistically with overall national development policies.

5.1 Obligations for Bangladesh under three Rio Conventions

5.1.1 Obligations for Bangladesh under three Rio Conventions

The detailed obligations for Bangladesh, under three Rio Conventions (RCs) i.e. UNFCCC, UNCBD and UNCCD have been described in the Chapter 2 - 4. Common Obligation and mandates for Bangladesh under three RCs are appended in the following table:

Table: Common Obligation for Bangladesh under three Rio Conventions

Common Issue	UNCCD	CBD	UNFCCC
Education, training and public awareness	Article 19: Promote awareness and facilitate participation of local community, the women and youth, NGOs to combat desertification and mitigate the effect of drought	Article 13: cooperate in developing educational and public awareness programmes with respect to conservation and sustainable use of biological diversity	Article (6): development and implementation of educational and public awareness programmes on climate change and its effects; Training of scientific, technical and managerial personnel
Risk assessment	Article 4: adopt an integrated approach addressing the physical, biological and socio-economic aspects of the processes of desertification and drought	Article 14: impact assessment and minimizing adverse impacts	Article 3(3): precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects Article 4: methods for impact assessments with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment
Sustainable development	Article 4: integrate strategies for poverty eradication into efforts to combat desertification and mitigate the effects of drought	Article 10: sustainable use of components of biological diversity	Article 3(4): Measures to protect the climate system against human induced change
Research and systematic observation	Article 19: strengthening training and research capacity at the national level in the field of desertification and drought	Article 12: promote and encourage research which contributes to the conservation and sustainable use of biological diversity	Article 5: research and systematic observation to strengthen national scientific and technical research capacities and capabilities
Technology transfer	Article 16: use and disseminate modern technology for data collection, transmission and assessment on land degradation	Article 16: access to and transfer of technology	Article 8: to meet the specific needs and concerns arising from the adverse effects of climate change and the impact of the implementation of response measures
Adaptation with the impacts	Article 18: adaptation and development of environmentally sound, economically viable and socially acceptable technologies relevant to combating desertification and mitigating the effect	Article 14: appropriate arrangements to ensure that the environmental consequences of its programmes and policies that are likely to have adverse impacts on biological diversity are duly taken into account	Article 4: develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture and for the protection and rehabilitation of areas
Exchange of information	Article 16: ensure the collection, analysis and exchange of information address the needs of local communities and	Article 17: include exchange of results of technical, scientific and socio-economic research as well as information	Article 6: public access to information on climate change and its effects and public participation in addressing and developing responses

Common Issue	UNCCD	CBD	UNFCCC
	those of decision makers with a view to resolving specific problems		
Regulatory framework	Article 10: incorporate long-term strategies to combat desertification and mitigate the effects of drought, emphasize implementation and be integrated with national policies for sustainable development	Article 8: regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use	Article 3(4): Adopting appropriate policies to integrate UNFCCC obligations with national development programmes Article 4: periodic national inventories of GHG emission; programme for the control of climate change; incorporate suitable policies for the control of climate change in national plans

Sourc90e: M.Q. Munir (2007)

5.1.2 MEAs other than three Rio Conventions

In addition to the three Rio conventions, Bangladesh has also signed several other MEAs that date back to early 1980s. These MEAs are:

- Ramsar Convention: Convention on Wetlands of International Importance especially Waterfowl Habitats, Ramsar (ratified in 1992)
- CITES: Convention on International Trade in Endangered Species of Wild Flora and Fauna (ratified in 1982)
- CMS: The Convention on Migratory Species of Wild Animals (ratified in)
- Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal (ratified / accessed in 1993)
- Montreal Protocol on the Substances that Deplete the Ozone Layer (signed in 1994)
- Stockholm Convention on Persistent Organic Pollutants (POPs) (signed in 2001)
- World Heritage Convention
- World Trade Organization
- Agenda 21

Ramsar Convention

The Ramsar Convention aims to stop the illegitimate encroachment on and loss of wetlands by recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value. This convention is very much related with the CBD relating to conservation of wetland biodiversity.

CITES

The objective of the Convention is to protect certain endangered species from over-exploitation by means of regulation of their import and export. It contains Appendix-I covering endangered species in which trade is to be rigorously controlled; Appendix-II covering species that may become endangered unless trade is regulated; Appendix-III concerning species that any party may wish to regulate and require international cooperation to control trade and Appendix-IV concerning model permits.

CMS

The CMS aims to conserve terrestrial, marine and avian migratory species throughout their range. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species. The Conference of the Parties (COP) is the decision-making organ of the Convention. It establishes and keeps under review the financial regulations of the Convention, adopts the budget for each financial period and reviews the implementation of the Convention. In particular, it may review and assess the conservation status of migratory species -- specially migratory water bird and marine turtle -- and the progress made towards their conservation; it provides guidance, receives reports and makes recommendations to the Parties. The COP

meets at intervals of not more than three years. So far, since the Convention entered into force in 1983, the COP has held seven meetings. The next CMS Conference of the Parties (COP9) will take place in 2008.

Basel Convention

The Convention aims to reduce transboundary movement of hazardous wastes to a minimum level and ensure environmentally sound and efficient management of such wastes as close as possible to the source of generation. Bangladesh has signed the Basel Convention and attended the follow-up meetings. But it is yet to take any concrete action to stop import of wastes into Bangladesh.

Vienna Convention on Ozone Layer, the Montreal Protocol and Subsequent Amendments

The central objective of the Vienna Convention is to protect human health and the environment against adverse effects resulting from human activities that deplete the ozone layer gradually. The Montreal Protocol provides for specific obligation, including limitations and reductions on the calculated levels of consumption and production of certain ozone depleting substances like carbon and halogen based substances. The subsequent amendment of 1990, recognising the development needs of the developing countries, made provisions for additional financial resources and access to relevant technologies.

Persistent Organic Pollutants (POP)

Bangladesh has signed the Stockholm Convention on Persistent Organic Pollutants on 23 May 2001, after actively taking part in the negotiation process leading to the final Convention. Bangladesh has cancelled the registration of all POPs pesticides; in fact all authorizations for chlorinated hydrocarbons for pesticide use have been withdrawn. In addition to this, the government has listed fifteen pesticides as being banned, namely: BHC, Chlordane, DDT, Dieldrin, Dicrotophos, Disulfoton, Endrin, Ethyl Parathion, Isobenzene, Methyl Parathion, Methyl Bromide, Mercury Compound, Methoxychlor, Posmet, Phospamidin, Monocrothos, Kalthane. The last POPs pesticide in use, Heptachlor, was banned in 1996. The production of DDT was discontinued in the 1991. It is believed that the stockpiles and any additional imports from this time have been consumed although there are some reports of illegal import and use of DDT in the northern border areas. Also the use of DDT as a dried fish preservative in Chittagong has been reported. There are indications that some DDT might have been used in public health (spraying of hospitals) until fairly recently. There is no data on possible stockpiles of POPs. No major stockpiles of the pesticide POPs are expected to be in the countryside, as the pesticide legislation requires importers, manufacturers and distributors to take back outdated pesticides. However stockpiles might exist among the farmers, industrial users (heptachlor in sugar mills) and dumps without clear ownership.

No assessment of the extent of PCB use has been conducted. PCBs are banned under the Pesticide Rules of 1985, which is the main legal instrument for restricting hazardous chemicals. The ban covers all uses of PCBs including electric transformers and other equipment. There is still a large quantity of transformers and capacitors containing PCBs oils in use. There are some oils stored in the maintenance facilities of power distributors waiting to be re-used. There are reports of contamination of cooking oil by PCBs oils. There exists no legislation on dioxins and furans in Bangladesh. The main legal vehicle, which would be relevant for releases of dioxins and furans, is The Environment Conservation Act of 1995 and its Amendment of 2000. This legislation gives a mandate to the overall quality of air and water, but does not explicitly mention dioxins and furans.

World Trade Organization (WTO)

Bangladesh is also a signatory to Marrakesh Agreement establishing **World Trade Organization (WTO)** in 1994. Agreement on Trade Related Aspects on Intellectual Property Rights (**TRIPs**) is an annex to WTO agreement. There are disagreements between some articles of CBD and TRIPs. While articles 8(j) and 15 of CBD granted access to genetic resources, Article 27.3(b) of TRIPs gave patent rights for protection of plant varieties. Bangladesh being a signatory to both these documents needs to strike a balance between the contentious issues.

Agenda 21

Chapter 15 of **Agenda 21** deals with the conservation of biological diversity. Agenda 21 has also made provisions for combating deforestation (chapter 11), combating desertification and drought (chapter 12), Sustainable Mountain Development (chapter 13), Sustainable Agriculture and Rural Development (chapter 14), Management of Biotechnology (chapter 16) etc. Bangladesh has not developed a National Agenda 21 *per se*. However, a number of plans and policies including NEMAP and NCS have elaborately dealt with Agenda 21.

5.2 Current Situation and Stocktaking

5.2.1 Stock taking of Bangladesh's efforts on Rio Conventions

Bangladesh, in the process of fulfilling the obligations of Rio Conventions, has already prepared a few reports such as Initial NatCom. 'National Biodiversity Strategy and Action Plan' has been finalized. Enhancement of national capacity to implement of NBSAP is very crucial. Hence the NBSAP has emphasized capacity building initiative as one of the priority area of intervention. During implementation of NCSA, it will definitely play a vital role to execute the capacity enhancement initiative under NBSAP as well as with other Rio Conventions. IUCN Bangladesh as an executing agency on behalf of Ministry of Environment and Forests has thorough knowledge and understanding of the process of NBSAP preparation and that experience will facilitate the opportunities of linking NCSA with NBSAP implementation.

One of the obligations of the signatories to the UNFCCC is formulation of National Adaptation Programme of Action (NAPA). The MoEF -- the focal ministry with respect to UNFCCC -- has already formulated NAPA, funded by GEF- UNDP, in August 2005 and identified 15 possible projects for an amount of US\$ 73.70 million to mitigate the adverse impacts of Climate Change.

Being actively involved in the process of NAPA, IUCN Bangladesh, the implementing partner of NCSA, is already in close liaison with other sectoral working groups of NAPA preparation. This will be a good opportunity for NCSA to incorporate priority area of actions under UNFCCC.

The National Action Programme (NAP) for combating desertification has also been finalised. IUCN-Bangladesh Country Office - was given the responsibility to prepare the NAP document. In the process of NAP development, IUCN has already identified and consulted all relevant stakeholders and priority areas of actions. NAP preparation will create opportunities of linking NCSA in the identified area of capacity building under NAP.

Since 1998 IPSU, MoEF is implementing SEMP component titled 'Capacity Building for Environmental Legislation and Policy Analysis' which is very much related to NCSA implementation. During the NCSA, a close liaison with IPSU will ensure utilization of previous experiences into NCSA.

www.sdnbd.org is a comprehensive website supported by SEMP which now works as unofficial clearinghouse of environmental information of Bangladesh. While collecting information and developing portal for NCSA, the experience of developing www.sdnbd.org will be fully utilized.

There are several other projects supported by different donors which are working in line with UN Conventions and contributing directly and indirectly to capacity building in the environmental management in Bangladesh. Through NCSA process, close liaison with the on-going environmental project will be maintained to bring in the experience of the project. Efforts will be extended from NCSA to acquire experience of the completed projects and experienced individuals to further smoothen and strengthen NCSA process.

NCSA process will be able to tap IUCNB's existing networking facilities and working experience on Rio Conventions. Through the networking and NCSA consultation, the capacity building needs for implementing Rio Conventions felt through these on-going processes by

other stakeholders will be easily known and taken into note of IUCN Bangladesh. Besides being involved in all the relevant on-going processes IUCN Bangladesh will be able to bring in the capacity assessment scenario of all these on-going activities. Thus the Bangladesh's capacity assessment for global environment management will be drawn upon from far wider consultation and interaction than in normal NCSA process.

5.2.2 Bangladesh's progress on other conventions

In this section, we described the actions taken so far under ICTPs other than Rio Conventions.

Ramsar Convention: Under this Convention, the Sundarbans and Tanguar Haor of Sunamganj have been declared as Ramsar sites in Bangladesh.

CITES: The MoEF is the designated management authority for CITES. The Wildlife Advisory Board under the Wildlife Protection Act acts presently as the Scientific Committee. But any significant action has not yet been taken under this Convention except organizing some training workshops and NGO activities.

CMS: Bangladesh accessed this convention in 2005.

Montreal Protocol: Bangladesh has already prepared an Inventory of Ozone Depleting Substances (ODS) and completed the country phase-out plan under the Montreal Protocol in 1994. The plan suggested three concrete actions, viz.

- ACI, the aerosol manufacturing plant is to phase out ODS as the propellant in the insecticide aerosol. This work is underway under an US grant.
- Establishment of an Ozone Cell in the DoE to monitor the phasing out plan and to develop the technical capability of the Government to undertake the follow-up actions. That cell is established and related activities are ongoing.
- Training for small ODS emission sources which is yet to be implemented.

Basel Convention: In Bangladesh, The Asian Development Bank (ADB) had financed a study project on 'Regulatory Framework on Import of Hazardous and Toxic Materials' and its report was published in 1997. In 1994, the DoE, with WHO funding, organised a training programme and workshop on 'Toxic Chemicals and Hazardous Wastes' and 'Risk Assessment and Management'. Before that, another WHO consultant had prepared a position paper on the use of toxic chemicals and disposal of toxic and hazardous waste in Bangladesh.

POPs: DoE has been implementing a project on PoPs.

5.2.3 On-going common projects and programme under three Rio Conventions

Project names and donors are given below.

- Sustainable Environmental Management Programme (UNDP)
- Bangladesh Rural Electrification and Renewable Energy Development (WB/GEF)
- Regional Climate Predictions for National Vulnerability assessments (DFID)
- Impact of Climate and Sea Level Change in part of the Indian Sub-continent (DFID)
- Dialogue on Water and Climate (the Netherlands Government, IUCN)
- Promotion of Renewable Energy, Energy Efficiency and Greenhouse Gas Abatement (ADB, BCAS)
- National Water Management Plan Project (GoB, GoN, WARPO)
- Integrated Coastal Zone Management Programme (GoN, DFID)
- Offshore Islands Renewable Energy Development (UNDP-GEF)
- Comprehensive Disaster Management Programme (DFID-UNDP)
- Reducing Vulnerability to Climate Change Project (Canada Climate Change Development Fund)

[Figure: Institutional framework for natural resource development and management]

5.2.4 SYNERGIES AMONG RCs RELATED POLICIES IN BANGLADESH

Table X summarizes some policy interventions as action plan, acts and policies with implications to synergize three Rio Conventions.

Table X: Examples of policy interventions of Bangladesh on the synergy among the three Rio Conventions.

Policies	UNCCD	CBD	UNFCC
National Environmental Management Action Plan, 1992	Identification and control of all types of activities related to pollution and degradation of environment	Promoting better management of scarce resources and reversing present trends of environmental degradation	Maintenance of the ecological balance and protection of the country against natural disasters
National Environment Policy, 1992	Prevention of land degradation, fertility conservation and increase	Enforcement of research, exchange of knowledge and experience and conservation of wild life and biodiversity	Removal of environmental adverse impact in the case of water resource and flood control
National Forest Policy, 1994	Increase forest cover to 20 percent of the total land area by 2015 to maintain the ecological balance and to attain self sufficiency in forest produce	Forest policy has clear mandate regarding the enhancement of biodiversity	Climate change and watershed management
National Water Policy, 1999	Ensuring water availability from all sources for meeting water demand during dry season and finding out deficient area based on land characteristics	Water resources development with conservation of fisheries, forests and other aquatic animals	Joint activities with associated countries for development, collection and distribution of water resources on international rivers for increasing water flow in dry season reducing flood intensity during rainy season
National Agriculture Policy, 1999	Build up irrigation facility for crop production and inspiring farmers for using supplementary irrigation and adopting appropriate measures during drought	Conservation of biodiversity of different crops	Build up necessary arrangements for natural disaster mitigation
Land Use Policy, 2001	Preventing environmental pollution through forestation in suitable and car area and ensuring preservation of present forest area	Conservation of tea, rubber and fruit trees, fish farming and increasing forest area and use of agricultural land	Forestation for natural balance
Arsenic Mitigation Policy, 2004	Arsenic contaminated aquifers have no regular pattern, varies both horizontally and vertically within short distance	Assessment of the level of arsenic in soil, agriculture and livestock Identification of arsenic affected patients and population at risk	Impact of arsenic on agricultural environment shall be assessed and addressed
Coastal Zone Policy, 2005	Reduction to vulnerability to natural disasters (e.g.	Steps to stop those activities which have	Institutional framework for monitoring climate

Policies	UNCCD	CBD	UNFCC
	drainage congestion, land erosion, drought) would be an integral aspect of the national strategies for poverty reduction	adverse effects on bio-diversity and mitigation measures to minimize those effects	change and adaptive measures to climate change for coastal zone and resources

Source: M.Q. Munir (2007)

5.3 Priority environmental issues

5.3.1 Common Issues

Bangladesh is frequently identified as a poverty-ridden, resource-scarce and overpopulated country that faces natural calamities continually. The major environmental disasters faced by the country are floods, cyclones and tidal surges, drought, water logging, deforestation, land erosion especially riverbank erosion, and water pollution, especially arsenic contamination.

Floods: Bangladesh is a land of perennial floods. About 20% of the country is annually flooded which is considered benign as it maintains soil fertility, floodplain fish propagation and biodiversity. However, the devastating floods, which inundate about 37% of the lands every 10 years or so, severely affect the marginal populations in coastal areas, depressions and other ecologically vulnerable zones. Floods assume particularly devastating character when the inflow of upstream waters and the monsoon rainfalls coincide, on the one hand, and peaks in the three major rivers – Ganges, Brahmaputra and Meghna – occur within short intervals, on the other. Among other natural disasters, cyclones and tidal surges have been responsible for huge number of human deaths and immediate devastation of houses, crops and cattle.

Droughts: Droughts are also commonly occurring phenomena that affect the north-western region at regular intervals. There has been a trend toward both intensification as well as narrower drought occurrence cycles. Apart from crop loss, a drought has other long-term implications. The soil dries up and the water level goes down drastically, making lands arid and unfit for cultivation. Shallow tube wells become inoperative and deep tube wells have to be sunk deeper and deeper as the water level falls. Another deadly impact of indiscriminate ground water extraction has been manifested in the countrywide arsenic contamination which has, to date, reportedly affected 59 out of the 64 districts of Bangladesh.

But more severe impact of chronic drought conditions is aridity and desertification as observed to be setting in the Barind Tract, that is, the south-western part of Rangpur, southern Dinajpur, north-western Bogra, and northern and south-western Rajshahi. Evidence of desertification is quite apparent in the dry and bare soil conditions in the above regions. With very little existent vegetation cover, the Barind Tract is an ecologically fragile zone, where organic content of the soil is very low. Soils, animals and human population alike suffer from nutritional deficiencies there.

Land degradation: Land degradation occurs in the form of loss of (i) soil quality through salinity intrusion, fertility decline, nutrient deficiency, and (ii) top soil through erosion. Estimated costs of land degradation in terms of productivity loss and nutrient loss would add up to nearly 7.7% of the GDP. Much of the land degradation is human induced through destruction of forest and vegetation cover and due to farm activities in sloping and undulated lands. However, other forms of land degradation, namely salinization and aridity also are observed due to climate change and withdrawal of water upstream from the Transboundary Rivers. Soil fertility, especially micro-nutrient deficiency also occurs because of unscrupulous use of chemical fertilizers for higher yields.

River bank erosion: River bank erosion is a major environmental hazard causing a net annual loss of 87,000 ha of valuable agricultural lands as well as homesteads, affecting about one million population, which again results in mass pauperization and rural-urban migration.

Degradation of forests and loss of forestland: Although claimed otherwise, the actual forest cover in the country may not exceed 6%. The annual deforestation rate is about 3.3 compared to 0.6% in South Asia. There has occurred massive deforestation in the country's reserve forests in the *sal* forests of Dhaka, Mymensingh, Tangail, Dinajpur and Rajshahi as well as in the reserve forests in the Chittagong Hill Tracts. While population pressure is conveniently cited as a major cause of deforestation, power, greed and profit seeking of the rich and influential are no less, if not more, responsible for over-exploitation of these natural resources in the reserve forests as well as in the Sundarbans. A new form of encroachment in the forests has also occurred through clearing mangrove forests in the coastal areas for shrimp culture. In the process, the Chakoria Sundarban has almost been totally destroyed with the help of skewed policy guidelines.

Loss of biodiversity: Loss of forestland entails loss of biodiversity. Bangladesh has lost about 10% of its mammalian fauna, 3% of avifauna and 4% of the reptiles in the last 100 years. The major causes behind the extinction of various species are loss or destruction of habitat, commercial exploitation, change in hydrological regime and increased aridity.

Loss of wetlands: The total wetlands e.g. haor, baor, beel and floodplain stood at a total of 6.3 million ha in the past. However, the area of the floodplains declined to 2.8 million ha in the year 2000. The major contributing factors have been flood control, drainage and irrigation (FCDI) and other infrastructure projects, expansion of human habitat, national policy of designating wetlands as wastelands and converting them into farmland to ensure more food grain production, over-felling of wetland trees, over-grazing and over-fishing, modern chemical-based farm practices etc.

Bangladesh and trans-boundary/global environmental issues

There are other factors beyond the borders of Bangladesh building into unavoidable conditions and threats, which eventually stand in the way of environmental safety and sustainable development. Prominent among them is global warming leading to possible sea level rise, possible ozone layer depletion and its consequences, extreme climate variability, and drastic decline in the flow of water in the trans-boundary rivers as a result of withdrawal of upstream waters resulting in the desertification of the northern districts of Bangladesh.

Coastal areas and sea level rise: Predictions have been made of a 9 cm rise in the sea level along the Bangladesh coasts by 2010 and a 45 cm rise by 2070. While the 9 cm rise may be absorbed by the people, the projected 45 cm rise will lead to submergence of 11% of lands and endangering at least 5% population. Several second round impacts are expected to follow, including out-migration of the coastal people exerting further pressure on urbanization, accentuated competition for agricultural lands and aggravation of biomass shortage in the coastal area, compounded with loss of biodiversity.

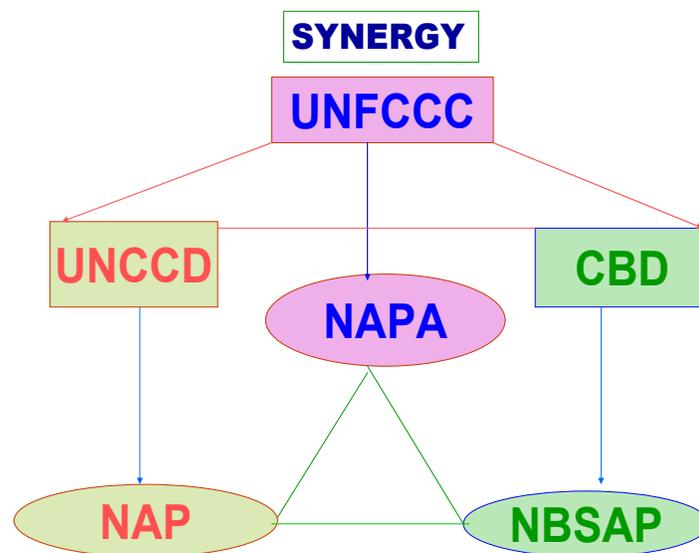
In addition to above, a number of crosscutting issues have been identified to respond to the global problems like climate change, loss of biodiversity and land degradation. The crosscutting issues among RCs (e.g. UNFCCC, CBD and UNCCD) are as follows:

- Capacity building
- Education, training and public awareness
- Technology transfer
- Inventories, monitoring and systematic observations
- Poverty eradication, sustainable development and environmental security
- Undertaking research and impact assessment
- Information, knowledge and data management
- Report and monitoring
- Planning, policy development and reform of legal frameworks
- Public participation
- International cooperation
- Utilization of fund within the limited resources

5.3.2 Crosscutting issues among the Action Plans under Rio Conventions

In response to RCs, Bangladesh has already formulated the three following document which has been discussed in the previous chapter.

- National Biodiversity Strategy and Action Plan (NBSAP): NBSAP has emphasized capacity building initiative as one of the priority area of intervention. During implementation of NCSA, it will definitely play a vital role to execute the capacity enhancement initiative under NBSAP as well as with other Rio Conventions.
- National Adaptation Programme of Action (NAPA): One of the obligations of the signatories to the UNFCCC is formulation of NAPA to mitigate the adverse impacts of Climate Change.
- National Action Programme (NAP): the National Action Programme for combating desertification has also been finalized. NAP preparation will create opportunities of linking NCSA in the identified area of capacity building under NAP.



The cross-cutting issues identified in these three documents are:

- Sustainable development
- Poverty eradication and environmental security
- Support afforestation and reforestation
- Land degradation and biodiversity conservation
- Natural disasters management
- Watershed management using basin wide approach
- Integrated approach of activities among the Conventions
- Improvement of the efficiency of utilization of fund

5. 4: Identifying capacity needs

Individual level: focus will be on education, training, awareness, gaining experience on the Rio Conventions and related issues.

Institutional level: focus will be on governance, management, technology and finance.

Systemic level: focus will be on setting up apex body, coordination mechanism, formulation and enactment of policies, acts, laws, and regulations.

Table: Major capacity needs or constraints at individual, institutional and systemic levels for synergizing three conventions.

Capacity needs/ Constrains	Levels		
	Individual	Institutional	Systemic
1. Lack of financial resources		<ul style="list-style-type: none"> • Lack of promotion and commercialization of under utilized crops • Fund constraints and resource management • Lack of support for strengthening and for widening survey and inventory work 	<ul style="list-style-type: none"> • Lack of adequate local / foreign fund • Funding source need to be identified. • Lack of incentive to farmers. • No monitoring activities are in place.
2. Lack of trained and skilled manpower	<ul style="list-style-type: none"> • Lack of trained personnel/experts/capacity building • Lack of skills in negotiations and implementation. • Insufficient trained manpower including taxonomists • Lack of proper understanding concerning the objectives of Cartagena Protocol (CP) • Lack of sufficient trained manpower to implement the CP. 	<ul style="list-style-type: none"> • Sometimes skilled persons are not selected to negotiate at COPs 	
3. Lack of inter-agency coordination		<ul style="list-style-type: none"> • Lack of coordination among the implementing agencies • Lack of coordination among different institutions / organizations / officers 	<ul style="list-style-type: none"> • Lack of central coordination at the government level.
4. Communication gap and low level of awareness	<ul style="list-style-type: none"> • Tremendous communication gap between knowledge generators (scientists/academic) and users (general public) 	<ul style="list-style-type: none"> • Biodiversity related protocols/agreements/ issues are not well circulated to all stakeholders thus keeping them unaware of the biodiversity issues • Apathy (lack of concern) to local knowledge base data documentation • Inadequate thrust on the linkage between environment and 	

Capacity needs/ Constrains	Levels		
	Individual	Institutional	Systemic
		<p>population (livelihood, poverty, food security) as an important aspect in development projects towards achieving sustainable development</p> <ul style="list-style-type: none"> • Efforts from the end of govt. / NGOs are inadequate to make awareness building throughout the country • Low level of awareness amongst the financial, private and public sector about CDM opportunities 	
5. Limitations in national policies			<ul style="list-style-type: none"> • Lack of policy and regulatory regime (MTA, benefit sharing mechanism, funding mechanism). • Lack of analyzing policies and fostering an environment to support the use of biodiversity • lack of synergizing national policies in view of priority environmental issues
6. Knowledge gap/ inadequate information	<ul style="list-style-type: none"> • Knowledge gap among the concerned officials is a problem to implement the Government policy, acts and rules due to frequent transfer; • Lack of adequate knowledge in the general people about the importance of Rio Conventions • Individuals not aware of priority environmental issues and 	<ul style="list-style-type: none"> • Lack of knowledge gap prioritization • Absence of designated/authorized institutions to generate knowledge base on micro climatic variation within the locality of different ecosystem; • Erosion of institutional knowledge • Need of initiative in carrying out research and studies on the impact of micro climatic variation over 	<ul style="list-style-type: none"> • Assess the achievement and reorganize the gaps and constraints in order to develop strategy for conservation and sustainable utilization of PGR

Capacity needs/ Constrains	Levels		
	Individual	Institutional	Systemic
	institutional memory/ continuation <ul style="list-style-type: none"> • Lack of much research, development and commercialization of crops (including GMOs) resulting in the lack of understanding of importance of relevant protocols • Updated database/data acquisition • Lack of information and data base/institution 	the change of biodiversity	
7. Limited participation		<ul style="list-style-type: none"> • Inadequate involvement of local community/ stakeholders (institutions, NGOs, etc.) in implementing projects concerning Rio Conventions through national endeavors 	<ul style="list-style-type: none"> • No multi stakeholder strong national programme.
8. Critical ecosystems not addressed		<ul style="list-style-type: none"> • Hill cutting in the Chittagong and Sylhet region creates destabilization in the ecosystem; • Water logging in south western part of Bangladesh may be addressed with due importance as a cross cutting issue; 	<ul style="list-style-type: none"> •
9. Policy intervention and implementation			<ul style="list-style-type: none"> • Implement the existing policies • Inadequate political support, commitments and will • Political instability

Source: Based on M.Q. Munir (2007)

[Figure: Thematic/sectoral correlation of climate change, biodiversity and desertification]

5.5 Capacity Development Action Plan (CDAP)

The approach used to develop the NCSA Capacity Development Action Plan involved analyzing the proposed capacity intervention areas identified by the thematic assessment reports. The interventions were divided into synergistic and convention specific capacity intervention areas. These capacity intervention areas were re-prioritized taking into account the existing opportunities, their relevance to Priority environmental issues, inability to be addressed, scale and level of concern of the problem they are addressing. Eight synergistic capacity building intervention areas and a number of convention-specific intervention areas were identified as priorities to be implemented in the short, medium and long term horizons (i.e. short term is 1-3 year, medium term is 3-5 years, and long term is 5-10 years). The following are the 8 synergistic CDAP areas identified:

1. Institutional strengthening;
2. Legal, policy and enabling frameworks;
3. Public awareness and education;
4. Sustainable land management;
5. Data and information collection, dissemination and monitoring;
6. Research and technology development;
7. Technical and managerial capacity; and
8. Resource mobilization.

5.5.1 Institutional strengthening

Lack of coherent and effective institutional coordination as well as limited trained manpower, physical infrastructure and facilities are the major capacity constraints limiting institutional performance in addressing cross cutting issues on MEAs. Strong coordination between institutions and adoption of an integrated approach are fundamental in ensuring synergistic implementation of the MEAs. This can be achieved by establishment and strengthening collaboration between institutions through formation of relevant committees and networks, development of guidelines for joint actions and mainstreaming of MEAs into planning processes. In addition, strengthening man power in the relevant fields of institutional development through recruitment and training, as well as improvement of the available physical infrastructure and facilities to facilitate coordination at national and district and lower administrative levels.

The above-mentioned interventions will result into establishment and strengthening of inter-institutional collaboration frameworks as well as strengthened executing institutions for the MEAs. Achieving this will require the active participation of key agencies, which include MoEF, DoE, FD, BMD, WARPO, SPARRSO, NGOs, private sector and tertiary training institutions. MoEF and DoE will provide the lead role in implementing the above interventions.

5.5.2 Legal, policy and enabling frameworks

Inadequate integration of MEAs issues in sectoral policies and plans as well as the weak implementation and enforcement of policies and laws for natural resource management are key constraints to sustainable utilization of these resources. The close linkages between MEAs and the national development objective (poverty eradication) provides a convergence for integration of MEAs into national development policies and plans. Furthermore, the relevancy of most natural resource management laws and policies to all the MEAs calls for a joint action in enhancing the implementation and enforcement of natural resource management laws as well as integration of MEAs into them. Accordingly, the action plan should focus on putting in place guidelines for integration of MEAs issues into national and district development plans and policies.

A review of existing laws and policies to give due emphasis and priority to integration of issues of MEAs and where necessary formulate new policies and laws e.g. on lands management, land use, biodiversity, climate, research, employment, energy, disaster preparedness and natural resource. Furthermore, actions to promote increased public

awareness of laws and policies on natural resource management should be enhanced. Measures should also be taken to promote participatory implementation and enforcement of laws and policies on natural resources through strengthening the role of local communities in monitoring natural resource management. It is expected that the above interventions will lead to stronger integration of MEAs issues into national and district legal, policy and regulatory frameworks. In addition, this will strengthen human and institutional capacity to implement and enforce laws and policies for natural resource management.

5.5.3 Public awareness and education

The complexity of information on MEAs, fewer media practitioners involved in ENR areas and inadequate integration of MEA issues into formal education curricula have contributed to the low public awareness of MEAs issues. The growing mass media presents an opportunity to raise public awareness on MEAs. A number of training institutions for the Government servants exist and could be used to enhance environmental education, training and awareness. The periodic review of teaching curricula for both primary, secondary and tertiary institutions would provide the opportunity to integrate MEAs issues into educational programs.

In order to strengthen public education and awareness of the MEAs, it necessitates simplification and translation of information and key documents on MEAs into the main local languages and sensitization workshops for key stakeholders, particularly the policy and decision makers. Capacity to effectively undertake public awareness on MEAs will require training programmes for mass media practitioners/ reporters as well as public education programs. Furthermore, strengthening public education on MEAs will require review of curriculum, production of education/ teaching materials and orientation of teachers towards MEAs issues. Implementation of the above-mentioned interventions will go a long way in creating public education and awareness of the MEAs as well as integrating these issues into educational programs of schools and tertiary institutions.

5.5.4 Sustainable land management

The land management in the country is promoted through number policies such as the agricultural policy, forest policy, land-use policy, water policy, coastal zone policy, environment policy and the fisheries policy. These policies in the case of individual owners are able to provide services through technical guidance and development projects. Maintenance of land records, survey for revenue collection, record of rights and settlement are the major functions of the Ministry of Land. The Ministry of Land is the custodian of government owned land. It has the overall responsibility for allocation of those lands for use by others. The ministry works through the Department of Land Record and Surveys (DLRS), headed by a Director General with the responsibility for survey and settlement operations. It has three directors to look after administration, land records and survey. The field establishment is under the Director of Land Records. The management of land and ancillary items is conducted through the local administration (District and Upazilla). The Land Use Policy of 2001 has provided guidelines for protection of agricultural land, water bodies, and optimal use of other land, land and zoning & formulation of zoning law, and to restrict or minimize the acquisition of land for non-productive use. There are 28 policy directives that should be followed by all concerned in the land management and administration. But the institutional structure to implement this policy and the needed cooperation arrangements are not functional as far as the policy implementation is concerned. The policy calls for the need for raising awareness on the issues of conservation of land, and for active participation of the ministries, departments and agencies of the Government in the implementation the Policy.

5.5.5 Data and information collection, dissemination and monitoring;

Weak policy on access to data and information exchange, low spread of ICT, inadequate and ill equipped monitoring stations and absence of clear monitoring indicators and improper packaging of information for policy and decision makers are constraints to effective collection, dissemination and monitoring of data and information related to MEAs. The existence of a conducive ICT policy that has waived taxes on equipment and technologies, existence of data collection centres and networks specifically on ENR as well as the supportive regional data

centres and networks such as the Drought Monitoring Centre, Information System should be taken advantage of to strengthen information exchange and dissemination.

In order to achieve the above, training programs in data management and ICT use is required. The capacity to network and facilitate electronic exchange of data among generators and users should be strengthened through frequent networking meetings to determine data and information needs and bridging technology gaps. In addition, capacity to package information on natural resource management should be improved to make it easily understood, interpreted and used by policy and decision makers. Monitoring of ENR will require establishing and strengthening monitoring stations and networks (for example on water, bushfires, land degradation and markets). Existing guidelines for monitoring ENR should be reviewed to integrate more strongly monitoring of MEAs implementation.

The above activities are expected to strengthen information collection, analysis and exchange, and put in place frameworks and protocols for exchange of information and monitoring of natural resources that integrate MEAs issues.

5.5.6 Research and technology development

Low priority given to environmental issues in the national research policy, absence of essential infrastructure and facilities, inadequate skilled manpower to undertake research, poor research-extension linkage, as well as weak mechanisms for dissemination of technologies are the main constraints affecting research and technology development relating to MEAs in Bangladesh.

In order to strengthen research related to MEAs and technology development/ transfer, a comprehensive assessment of the capacity needs of the research institutions and centers of excellence should be conducted. These institutions should be equipped with relevant facilities and trained manpower in required competences to enable them to conduct resource valuation and impact of environmental degradation studies. It is also essential to promote exchange of MEAs related research findings and technologies by establishing and strengthening research and technology networks and supporting their activities such as electronic information networks, workshops, conferences as well as journals and publications. Furthermore, actors involved in technology transfer such as NGOs, extension workers and the private sector should be equipped with skills to evaluate and market technologies. The bond between actor in technology dissemination and research and technology development centres should be strengthened by developing an efficient feedback mechanism involving regular forum, information system and incentives that promote feed back between the two. In promoting research related to MEAs and technology transfer, existing research organisation should take the lead with NGOs, the private sector, and centres of excellences such as universities.

5.5.7 Technical and managerial capacity

The most critical constraint affecting implementation of MEAs is the limited managerial and technical capacity of the human resources in the relevant areas of MEAs. The capacity of existing training institutions is limited and not adequately equipped to provide for the diverse skills required, given the broad nature of environmental issues. However, in the recent past, the number of Universities and other centres of excellence have increased. The increasing integration of environmental issues into training programs of schools and tertiary training institutions, as well as the increasing global appreciation of the linkage between natural resource degradation and poverty and the limited actions on MEAs provides an opportunity for the integration of MEAs into training programs.

While there are diverse fields and interventions required to build technical and managerial capacity, the action plan will focus on those that are relevant across the MEAs and facilitate a synergistic approach to implementation of MEAs. These include: review of institutional curricula to integrate MEAs issues; preparation of training materials on MEAs basing on identified needs; training key actors in implementation of MEAs in the following fields: negotiation skills, conflict resolution and management, gender responsive policy and law development and analysis, integrated planning and assessment, monitoring and evaluation,

SLM, biotechnology, ICT, ecosystem and data management, and designing incentives and entrepreneurship related to MEAs. In addition, training needs assessment of key actors in implementation of MEAs should be carried out to assess the training needs under each of the MEAs. The MoEF should work hand in hand with the concerned ministries and other relevant line agencies in supporting relevant skills development in the appropriate institutions and national and local government levels.

5.5.8 Resource mobilisation

The dismal global commitment to fund MEAs issues, the low priority accorded to MEAs issues at national and district levels, and limited capacity of institutions to prepare timely and acceptable proposals are serious constraints to resource mobilization for implementation of MEAs. This is further constrained by the stringent and very low GOB budget ceilings for the key sectors of environment, forest and agriculture. On the other hand, a number of opportunities for resource mobilization and mainstreaming of MEAs exist. These include the periodic review of national and sectoral development plans, the annual budgeting process, the decentralized finance flows for development programs, and the expanded GEF portfolio that includes land degradation and deforestation as focal areas.

In order to enhance national capacity for mobilizing resources, action should be taken to train actors in preparation of multidisciplinary proposals, and management and sharing of information on availability and means of accessing both domestic and external resources. Furthermore, specific measures should be taken to promote partnerships with a view to mobilize resources from various actors. Such measures should include training in negotiation skills, development of guidelines for mainstreaming MEAs in both national and district development and budgeting frameworks, organizing partnership forum, increased advocacy for MEA issues and sensitization of the private sector on their role in implementation of MEAs and the possible sources of funds (e.g. carbon funds). It is expected that these measures will enhance the integration of MEAs into national development plans and improve the capacity of key actors in mobilizing resources for programmes on MEAs.

Proposed CDAP for mainstreaming the biodiversity, climate change and land degradation at individual, institutional and systemic levels

A comprehensive capacity development action plan has been formulated for the Government of Bangladesh and its partners in the non-governmental sector after threadbare discussion with the probable multi-stakeholders. The immediate objective of this action plan will be to address the capacity building needs at the individual, institutional and systematic levels.

The approach/strategy to implement the CDAP would include:

- Policy and legal framework for sustainable development in different sectors
- Strengthening of information and monitoring systems in the areas of climate change, biodiversity and land degradation
- Implementation capacity of MoEF and DoE need to be enhanced to effectively function as focal point for the Rio Conventions
- Some dedicated officials from the concerned stakeholders need to act as driving forces
- Financial mechanism for environmental management need to be ensured
- The allocation of resources from GoB and contribution from donors would facilitate the process
- GoB need to seek expertise services from local and foreign arenas
- Environmental monitoring needed to be linked with the economic growth of the country
- The technology developed by different stakeholders should be used judiciously
- Internal advocacy and pro-activeness is necessary;
- Any strategy/action plan developed by the GoB needs implement as early as possible
- Integration of all development programmes based on PIEs

Table: Proposed capacity development action plan for mainstreaming the biodiversity, climate change and desertification at individual, institutional and systemic level

Output	Capacity Development Actions		
	Individual	Institutional	Systemic
1. Financial resources	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Develop a mechanism to raise and manage community-based funds to support local activities dealing with RC issues • Projects addressing synergies should get priority 	<ul style="list-style-type: none"> • Advocacy at the policy-level to established Government commitment on increased Government contributions (% of GDP) to the environment sector • Modify and improve existing financial mechanisms to facilitate flow of funds
2. trained and skilled manpower	<ul style="list-style-type: none"> • Organize training programmes on negotiation skills on MEAs of the concerned Government officials for the sake of national interest outside the countries. In this respect, the concept of 'climate diplomacy' may be introduced vis a vis 'economic diplomacy' • Build the negotiation skills of appropriate persons (GoB and NGOs) to negotiate at COPs • Training of biology teachers at Govt. colleges with honours/masters degree on inventorying of wildlife and plant resources 	<ul style="list-style-type: none"> • Convince BPATC to organize training programmes for Govt. officials on MEAs • NAEM may be involved in training college teachers • Convince Police Academy for training polices on MEAs for better implementation of environment related rules and regulations • Convince Customs Academy for training on MEAs for better implementation of rules and regulations related to trading of biodiversity 	
3. Coordination		<ul style="list-style-type: none"> • Establish and maintain a roster/ data base of the concerned officials - having environmental knowledge, individual experts and scientists within and outside of the Government (public-private sectors) • 	<ul style="list-style-type: none"> • An institutional framework or an apex body may be established to ensure the sustainability of the capacity building process under NCSA project. Established a Sustainable Development Commission (SDC) under the MoEF to address cross-cutting issues related to climate change,

Output	Capacity Development Actions		
	Individual	Institutional	Systemic
			biodiversity and desertification (land degradation) <ul style="list-style-type: none"> • Developed a matrix in terms of local, national and international implications focusing the Rio Conventions and other MEAs • Form a multidisciplinary team (field workers to policy-makers) and undertake interdisciplinary actions • Facilitate joint reporting to achieve synergies among the MEAs by developing synergistic reporting formats and contents • Facilitate joint calendar of events to achieve synergies among the MEAs • Ensure that synergies are reflected in the national MDG report preparation processes
4. Communication and awareness	<ul style="list-style-type: none"> • Publish news features in national printing media to celebrate environment related events • Encourage learned societies to organize workshops/ seminars to disseminate scientific findings to general public • Convince appropriate authorities such as, public and private universities and academics to incorporate the Rio Conventions in their academic curricula • Develop early warning systems for natural disasters and land degradation processes • The mass media 	•	•

Output	Capacity Development Actions		
	Individual	Institutional	Systemic
	<p>should be made active by initiating talk-shows on the leading public and private TV channels to generate awareness</p> <ul style="list-style-type: none"> Organize regular consultation between policy-makers and other stakeholders for decision-making in environmental sector and to share knowledge and skills 		
5. National policies	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Integrate EIAs, social impact assessments (SIAs) and Strategic Environmental Assessments (SEAs) into structural adaptation measures 	<ul style="list-style-type: none"> Facilitate the process of giving IPSU a permanent shape from the experience of IPSU Develop policy interventions to provide access to resources for bona fide users and to address users' needs Develop policies that support integrated watershed management, sustainable agricultural practices and reduce environmental degradation. Take initiative to resolve conflicts between land use, agriculture and fisheries policies Ensure that NatComs, NAPAs, NAPs and NBSAPs are complimentary to each other as well with PRSP and MDGs Revise existing rules, regulations and acts as per demand (obligations) of the Rio Conventions and their recent developments An appropriate committee should be given responsibility to synergize the action

Output	Capacity Development Actions		
	Individual	Institutional	Systemic
			<p>programs envisaged in NBSAP, NAPA and NAP to implement them in an integrated manner</p> <ul style="list-style-type: none"> • Bangladesh Meteorological Department (BMD) and SPARRSO may be shifted to the Ministry of Environment and Forest from the Ministry of Defense
6. Knowledge and information	<ul style="list-style-type: none"> • Sensitization of the policy-makers (MPs, ministers, political leaders, etc.) through briefing sessions. Orientation programmes for newly elected MPs should include concepts of MAEs • 	<ul style="list-style-type: none"> • Facilitate bioprospecting aimed at the development of new drugs and medicines • Documentation of traditional knowledge and databases on climate change (e.g. coastal areas), biodiversity (e.g. medicinal plants in the CHT) and land degradation (e.g. Barinds) need to be done • Data collection points/networks need to be increased in terms of fog, dust, rain, temperature and air quality for vigorous monitoring • Creation of living database on the inventory of all the existing projects and initiatives and biodiversity related information and regular up date is necessary • Establish a database including scientific parameters, tools, techniques, experiences and lessons learned and disseminate this knowledge and information through an appropriate body. BANSDOC may be reorganized for living 	<ul style="list-style-type: none"> • Project should focus rural energy problem • Establishment of network (bottom up approach) and policy, institutions and legal aspects to be linked with poverty, livelihood and food security

Output	Capacity Development Actions		
	Individual	Institutional	Systemic
		<ul style="list-style-type: none"> database • Thorough evaluation is needed to identify the specific responsibility of the ministries/ divisions/ departments for compliances of the RCs • MoEF may take necessary steps in providing / disseminating/ circulating documents on RCs related protocols/ agreements/ information to other ministries/divisions/ agencies/ institutions/ organization • BWDB collects data in 35 points. These points may be enhanced more to monitor the hydrological behavior and sea level rise • Develop and disseminate tools, tool kits and findings on assessment of adverse impacts of climate change and desertification on biodiversity • Develop suitable agro-silvi-pastoral technologies to deal with adaptation issues • Quantitative and qualitative research needs to be taken in terms of projects focusing on climate change, biodiversity and desertification 	
7. Participation	•	<ul style="list-style-type: none"> • Ensure involvement of local community groups in the capacity development process • Ministry of Land, Divisional Commissioner's office, Deputy Commissioner's office 	<ul style="list-style-type: none"> • Implementations of environmental management mandate at central, division, district and upazila levels

Output	Capacity Development Actions		
	Individual	Institutional	Systemic
		<p>and the office of the Upazila Nirbahi Officer may be entrusted with more responsibilities to look after the matter of land degradation and other environment related issues</p> <ul style="list-style-type: none"> • Private sector may also be involved with the process of renewable energy in the rural areas of Bangladesh • Involve the private sector in flourishing the opportunity of the Jatropha plantation and extraction of bio-diesel 	
8. Critical ecosystems Management	•	<ul style="list-style-type: none"> • Assess adverse impacts of climate change and desertification on biodiversity and effectively disseminate the findings • Develop biological indicators for pollution monitoring and assessment of ecosystem health • Projects should focus on the exotic species and various ecologically critical ecosystems • Establish ecological benchmarks, standards and baselines for monitoring vegetation changes, land degradation, and impacts of climate change on biodiversity and carbon stocks through appropriate research and development efforts, monitoring and evaluation • Establish systems of appropriate land-use practices including policy monitoring and 	•

Output	Capacity Development Actions		
	Individual	Institutional	Systemic
		zoning through proper characterization of land types	
9. Appropriate technologies	•	<ul style="list-style-type: none"> • Develop pollution treatment and abatement methods that ensure environmental sustainability, conservation and sustainable use • Initiate green accounting and valuation of ecosystem functions • Develop and/or facilitate carbon trading systems • Develop tools, techniques and management systems that address issues of forest fires (through appropriate actions and policies including through community participation) 	•

Cross-cutting area (biodiversity, desertification, agenda 21, etc.)

The challenge posed by the intricate relationships of climate, biological diversity, drought and desertification on the social, economic and environmental fronts in many countries has been exemplified in recent times. It has also been amply demonstrated that there is a clear convergence of objectives among the three Rio Conventions, the United Nations Convention to Combat Desertification (UNCCD), the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC).

Parties to these Conventions have repeatedly pointed out that there is need for a firmer convergence of the strategic approaches the various interested parties, particularly at the individual country level, have hitherto pursued. Moreover, the need is also recognized for Parties to focus more on a broader framework that includes a complex set of issues encompassing desertification and land management, biological diversity, climate change, socio-economic development, among others. In particular, in order to address more concretely the intertwined issues of poverty eradication, sustainable development and environmental security, the three Rio Conventions have expressed the need to join efforts in order not to address these issues separately.

Based on mandates agreed at COP 7 and SBSTA 17, two workshops were held on “Synergy and joint action with the other multilateral environmental conventions and agreements” and on “Enhancing cooperation between conventions” (Espoo, Finland, 2–4 July 2003), at which the following priorities were identified:

- (a) Integration of action programmes of environmental conventions – poverty reduction, science and education, agriculture, forestry, energy and water supply
- (b) Closer links between NAPs and NAPAs in arid, semi-arid and dry sub-humid areas
- (c) Liaison between focal points of the conventions and the GEF operational focal points to enhance integrated project development and programme management

- (d) Appropriate incentives at the country level to promote institutional arrangements for coordination and responsiveness by respective COPs and secretariats
- (e) Technical and financial strategic alliances
- (f) Increased number of national synergy workshops, which provide opportunities for synergy and cooperation between the conventions
- (g) Identification of the key prerequisites for synergy.

In addition, the UNCCD process launched a National Synergies Workshop Programme in 2000 with the following broad objectives:

- i. to strengthen current coordination at the local level, including the exchange of information, in order to achieve optimal use of domestically available resources;
- ii. to facilitate policy dialogue with the key stakeholders, in particular with the donor community, in order to attract financial resources in support of concrete actions for effectively addressing common objectives of the sustainable development conventions;
- iii. to catalyze local-level approaches to synergy among the stakeholders; and
- iv. to help in identifying the common threads in the issue areas covered under the environment-related treaties to which the individual country is a signatory. National workshops were held in some LDCs, including Benin, Burkina Faso, Mali, Uganda and the United Republic of Tanzania.

SCHEDULE FOR THEMATIC GROUP MEETING

1. Thematic Group on UNFCCC

SL	Name of TG	Resource Person	Meeting date
1.1	TG on Mitigation, Kyoto Protocol – mandates and elements (CDM)	Mr. A. H. M. Maqsood Sinha, Executive Director, Waste Concern	02.11.06 3.00PM
1.2	TG on Adaptation, implementing NAPA – five year PoW on Adaptation (including access to LDC fund, Special CC fund, KP Adaptation Fund, GEF-RAF etc.)	Mr. Mohammad Reazuddin, Director (Technical), Department of Environment	30.11.06 3.00 PM
1.3	TG on reporting and post 2012 climate change regime (e.g. NatCom and NAPA)	Dr Atiq Rahman Executive Director Bangladesh Centre for Advanced Studies	27.12.06 3.00 PM

2. Thematic Group on CBD

2.1	TG on Bioprospecting and ABS issues	Dr. Md. Abdur Razzaque, Member Director (Crops), BARC	28.11.06 3.00 PM
2.2	TG on Cartagena Protocol on Biosafety including risk assessment and risk management	Mr. Solaiman Haider Assistant Director Department of Environment (DoE)	17.12.06 3.00PM
2.3	TG to address capacity needs to implement CBD 2010 Countdown (including NBSAP, 4 th National Biodiversity Report of Bangladesh to CBD, GTI, SBSTTA etc)	Dr. G P Das, Country Coordinator, Agricultural Biotechnology Support Project II	29.11.06 11.00 AM

3. Thematic Group on UNCCD

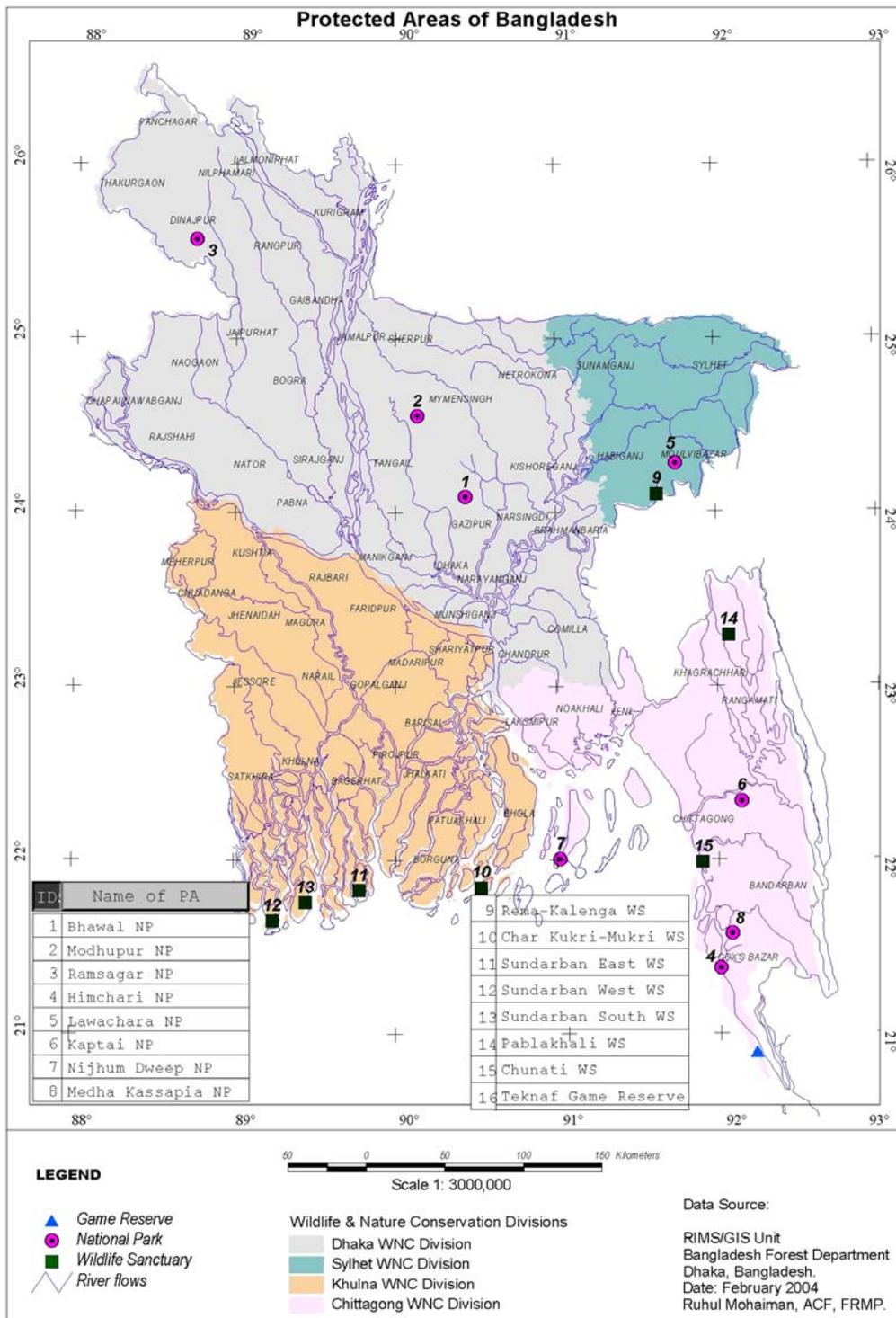
3.1	TG on land degradation including resource mobilization (Global Mechanism of GEF)	Mr. Jalal Uddin Md. Shoaib, Principal Scientific Officer, Soil Resource Development Institute (SRDI)	14.12.06 3.00PM
3.2	TG on issues other than land degradation, and reporting and communication including NAP	Dr. S.M. Imamul Huq Professor Department of Soil, Water and Environment University of Dhaka	20.12.06 3.00 PM

4. Thematic Group on Synergy

4	Thematic Group on synergies among the Rio Conventions	Mr. M. Qamar Munir, Project Manager, Institution and Policy Support Unit (IPSU), Ministry of Environment and Forest	19.02.07 11.00 am
---	---	--	----------------------

Annexure 02

List of Protected Areas & Ecologically Critical Areas in Bangladesh



Map Showing Locations of Protected Areas of Bangladesh

**List of Protected Area for *in situ* Conservation under the Control and Management of
Forest Department, Government of Bangladesh**

Sl. No	Name	Forest Type	Area in Ha	Established in year
National Parks				
1	Modhupur National Park	Sal forest	8,436	1962/1982
2	Bhawal National Park	Sal forest	5,022	1974/1982
3	Himchari National Park	Hill forest	1,729	1980
4	Lawachara National Park	Hill forest	1,250	1996
5	Kaptai National Park	Hill forest	5,464	1999
6	Ramsagar National Park	Sal forest	28	2001
7	Nijhum Dwip National Park	Coastal Mangroves	16,352	2001
8	Meda Kochchapia National Park	Hill forest	395	2004
9	Satchari National Park	Hill forest	240	Proposed
Wild Life Sanctuaries				
10	Sundarban East WS	Natural mangroves	31,227	1960/1996
11	Pablakhali WS	Hill forest	42,087	1962/1983
12	Char Kukri Mukri WS	Coastal mangroves	40	1981
13	Chunati WS	Hill forest	7,761	1986
14	Rema Kalenga WS	Hill forest	1,796	1996
15	Sundarban West WS	Natural mangroves	71,502	1996
16	Sundarban South WS	Natural mangroves	36,970	1996
17	Hazarikhil WS	Hill forest	2,443	Proposed in 1974
Game Reserves				
18	Teknaf GR	Hill forest	11,615	1983

Source FD June 2005

**List of Ecologically Critical Areas of Bangladesh under the Control and Administration of
Department of Environment, Government of Bangladesh**

Sl. No.	Name of ECA	District	Area (ha)
1	Strip of 10 km. outside the Sundarbans Reserved Forest	Khulna, Bagerhat, Satkhira	762, 034
2	Sea Front of Cox's Bazar and Teknaf	Cox's Bazar	10465
3	St Martin's Island	Cox's Bazar	590
4	Sonadia Island	Cox's Bazar	4916
5	Hakaluki Haor	Moulvibazar	18383
6	Tanguar Haor (also declared as Ramsar Site)	Sunamganj	9727
7	Marjat Baor	Jhenaidaha	200
8	Gulshan Lake	Dhaka city	20

Eco-Parks & Safari Parks under FD Government of Bangladesh

Sl. No.	Name of Eco-Park &/or Safari Park	Location	Area (ha)	Year of Establishment
1	Sitakunda Eco-Park	Chittagong	403	2000
2	Kaptai Eco-Park	CHT		
3	Modhutilla Eco-Park	Sherpur	100	1999
4	Kuakata Eco-Park	Barguna & Patuakhali	5661	2006
5	Banshkhali Eco-Park	Chittagong	1200	2003
6	Tilagarh Eco-Park	Sylhet	46.2	2006
7	Borshijura Eco-Park	Maulavi Bazar	326	2006
8	Dhanshiri Ec-Park	Jhalokathi	20.2	2006
9	Dulahazara Sarafi Park	Cox's Bazar	900	1997

Fish Sanctuaries Established under Fisheries Act.

Sl. No.	Name of Fish Sanctuary	Location	Area (ha)	Year of Establishment



Requesting Your Advice Towards Capacity Building for Sustainable Environmental Management

Bangladesh is a signatory to a number of Multilateral Environmental Agreements (MEAs) including Rio Conventions i.e. United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD) and United Nations Convention to Combat Desertification (UNCCD). The capacities of the country at different levels to implement these conventions are limited. The issue of capacity building has become a major priority to the nation as well as global community. Identifying of capacity needs at all levels and strengthening of existing capacities are urgently required.

In this perspective, the Ministry of Environment and Forest has undertaken a project entitled "National Capacity Self-Assessment (NCSA)" with the technical support of The World Conservation Union (IUCN) and financial assistance of Global Environment Facility (GEF) / UNDP. The objective of the project is to building capacity of Bangladesh – both in public and private sector – for national, regional and global environmental management effectively. Towards this objective, a Capacity Development Action Plan is being prepared on the basis of identification of priority environmental issues for sustainable development and sound environmental management.

With a view to assessing the needs of capacity building at individual, institutional and systemic levels, the NCSA team has developed a questionnaire to capture citizen's opinion relating to the impacts of climate change, loss of biodiversity and land degradation issues. The citizens are requested to provide their views/suggestions on the following aspects:

1. What are the priority environmental issues of Bangladesh relating to the following arena?
 - a) Climate change
 - b) Loss of biodiversity
 - c) Land degradation
 - d) Any other major concern
2. Who are the main stakeholders affected by climate change, loss of biodiversity and land degradation?
3. Please identify the capacity needs in the light of above-mentioned priority environmental issues in the following levels:
 - a) Individual level: e.g. nature of training, knowledge and skill development needed for a particular community, professional group, civil society or NGO worker;
 - b) Institutional level: e.g. need of restructuring, reforming and/or strengthening an organization, civil society and other NGOs including private sector;
 - c) Systemic level: e.g. need for interventions into existing policies, acts, rules, regulations and/or formulation of a new policy;
4. What are the possible actions/activities to prepare a capacity development action plan at:
 - a) Individual level, b) Institutional level, c) Systemic level
5. Any other suggestions

We would request you kindly provide the NCSA team with your suggestion to develop a 'Capacity Development Action Plan' and send them by 28 February 2007. You can also log on to NCSA website at www.iucnbd.org/nrsa to express your opinion. Contact person of the NCSA team is given below:

Monowar Islam, Project Manager, NCSA Project, IUCN Bangladesh Country Office
 House 11, Road 138, Gulshan 1, Dhaka 1212, Phone: +8802 9890423, 9890395, extn.121;
 Fax: +8802 9892354; Email: nrsa@iucnbd.org





টেকসই পরিবেশ ব্যবস্থাপনার লক্ষ্যে দক্ষতা উন্নয়ন সংক্রান্ত পরামর্শ আহ্বান

বাংলাদেশ পরিবেশ সংক্রান্ত বিভিন্ন আন্তর্জাতিক / বহুপাক্ষিক চুক্তিতে স্বাক্ষর করেছে। এ সকল চুক্তির মধ্যে জলবায়ু পরিবর্তন সংক্রান্ত চুক্তি (United Nations Framework Convention on Climate Change), জীববৈচিত্র্য সংরক্ষণ সংক্রান্ত চুক্তি (United Nations Convention on Biological Diversity) এবং মরুময়তাবোধ সংক্রান্ত চুক্তি (United Nations Convention to Combat Desertification) উল্লেখযোগ্য। এ সকল আন্তর্জাতিক চুক্তি পূরণোপরি বাস্তবায়ন করার জন্য বাংলাদেশের সামর্থ্য বা দক্ষতা সীমিত। বর্তমানে আন্তর্জাতিক পরিসরে দক্ষতা উন্নয়ন বিষয়টি বিশেষ অগ্রাধিকার পাচ্ছে। তাই সম্ভাব্য সকল স্তরে (ব্যক্তি, প্রতিষ্ঠান এবং নীতি নির্ধারণ) দক্ষতার চাহিদা চিহ্নিতকরণ, দক্ষতা অর্জন এবং বিদ্যমান দক্ষতা প্রসার করা খুবই জরুরী।

এ প্রেক্ষিতে বন ও পরিবেশ মন্ত্রণালয় আই ইউ সি এন - দি গ্লোবাল ফনডারডেশন ইউনিয়ন এর কাঠিন্য সহায়তায় "ন্যাশনাল ক্যাপাসিটি সেন্টর এ্যাসোসিয়েটেড" (এন সি এস এ) শীর্ষক একটি প্রকল্প গ্রহণ করেছে। গ্লোবাল এনভায়রনমেন্ট্যাল ফান্ডিংসিটি এবং জাতিসংঘ উন্নয়ন কর্মসূচী-এর আর্থিক সহায়তায় এ প্রকল্প বাস্তবায়ন করা হচ্ছে। প্রকল্পের মূল উদ্দেশ্য হল জাতীয়ভাবে, আঞ্চলিকভাবে তথা সমগ্র বিশ্বে কার্যকর পরিবেশ ব্যবস্থাপনার জন্য সরকারী এবং বেসরকারী পর্যায়ে সাময়িক দক্ষতা উন্নয়ন। এ লক্ষ্য বাস্তবায়নের পাশাপাশি টেকসই উন্নয়ন এবং পরিবেশ ব্যবস্থাপনার জন্য বিভিন্ন অগ্রাধিকার ইস্যুর ভিত্তিতে একটি "দক্ষতা উন্নয়ন কর্ম পরিকল্পনা" প্রণয়ন করা হচ্ছে।

ব্যক্তি পর্যায়ে ও প্রতিষ্ঠানিকভাবে সাময়িক দক্ষতা উন্নয়নের সম্ভাব্যতা যাচাইয়ের জন্য এন সি এস এ প্রকল্প জলবায়ু পরিবর্তন, জীববৈচিত্র্য বিলুপ্তি এবং ভূমি ক্ষয়ের বিরূপ প্রভাব সম্পর্কে জনসাধারণের মতামত গ্রহণের জন্য একটি প্রশ্নমালা তৈরি করেছে। যে কোন ব্যক্তি বা সংস্থা একক অথবা সিমিলিতভাবে নিম্নোক্ত বিষয়সমূহের উপর মতামত প্রদান করতে পারেন:

১। নিম্নোক্তের চারটি ক্ষেত্রে বাংলাদেশের প্রধান প্রধান পরিবেশগত সমস্যাগুলো কি কি?

- জলবায়ু পরিবর্তন
- জীববৈচিত্র্য বিলুপ্তি
- ভূমি ক্ষয়
- অন্যান্য

২। জলবায়ু পরিবর্তন, জীববৈচিত্র্য বিলুপ্তি এবং ভূমি ক্ষয়ের মত বিপর্যয়ের কারণে বাবা সরাসরি ক্ষতিগ্রস্ত হচ্ছে?

৩। পরিবেশ সংক্রান্ত প্রধান প্রধান সমস্যাসমূহের আলোকে নিম্নোক্ত ক্ষেত্রসমূহে দক্ষতার চাহিদা নিরূপণ করুন। অর্থাৎ নিম্নের কোন কোন ক্ষেত্রে কি ধরনের দক্ষতা প্রয়োজন:

- ব্যক্তি পর্যায়ে: নির্দিষ্ট কোন সামাজিক গোষ্ঠী, পেশাজীবী, সুশীল সমাজ, এনজিও অথবা বেসরকারী বাজে কর্মরত কর্মীদের জন্য কি ধরনের প্রশিক্ষণ, জ্ঞান বা দক্ষতা উন্নয়ন প্রয়োজন।
- প্রতিষ্ঠানিক পর্যায়ে: সরকারী / বেসরকারী সংস্থা, সুশীল সমাজ, এনজিও-এর ক্ষেত্রে পুনর্গঠন, সংস্কার অথবা শক্তিশালী করার প্রয়োজনীয়তা।
- নীতি নির্ধারণী পর্যায়ে: বিদ্যমান / প্রচলিত নীতিমালা, আইন, নিয়মকানুন পরিবর্তন করে নতুন কিছু সংযোজন, অথবা নতুন নীতিমালা গ্রহণের প্রয়োজনীয়তা।

৪। "দক্ষতা উন্নয়ন কর্ম পরিকল্পনা" তৈরি করার জন্য নিম্নোক্ত খাতসমূহে সম্ভাব্য করণীয় / কর্মকাল কি হওয়া উচিত?

- ব্যক্তিগত পর্যায়ে
- প্রতিষ্ঠানিক পর্যায়ে
- নীতি নির্ধারণী পর্যায়ে

৫। অন্য যে কোন সুপারিশ (যদি থাকে)

একটি "দক্ষতা উন্নয়ন কর্ম পরিকল্পনা" তৈরি করার জন্য এন সি এস এ এর প্রকল্প ব্যবস্থাপক-কে আগামী ১৫ মার্চ ২০০৭ তারিখের মধ্যে আপনার মূল্যবান পরামর্শ দেয়ার জন্য অনুরোধ করা যাচ্ছে। প্রকল্পের ওয়েব সাইটের মাধ্যমেও (www.iucnbd.org/ncca) আপনার মতামত জ্ঞানতে পারেন।

তথ্য প্রেরণের ঠিকানা: মনোয়ার ইসলাম, প্রকল্প ব্যবস্থাপক, এন সি এস এ প্রকল্প, আই ইউ সি এন বাংলাদেশ কাফ্রি অফিস, বাড়ি ১১, রোড ১৩৮, গুলশান ১, ঢাকা ১২১২, টেলি: ৯৮৯০৩৯৫, ৯৮৯০৪২৩, ৮৮৫২৭৪৩, ফ্যাক্স: ৮৮০ ২ ৯৮৯২৮৫৪, ই-মেইল: ncca@iucnbd.org, monowar@iucnbd.org



Sixteen strategies of NBSAP.

Sixteen strategies have been developed to shape and direct the actions towards achieving the goals and objectives of the NBSAP. These are:

- Strategy 1:** Recognize the value and importance of biodiversity for the Bangladesh people and document properly its components, distribution and value.
- Strategy 2:** Conserve ecosystems, species and genetic pool of the country to ensure that the present and future wellbeing of the country and its people are secure
- Strategy 3:** Restore ecosystems and rehabilitate endangered species
- Strategy 4:** Adopt national measures and standards to deal with invasive alien species and genetically modified organisms
- Strategy 5:** Promote equitable sharing of biodiversity conservation costs and benefits among different sectors of the society
- Strategy 6:** Contribute to raising awareness and building capacity of biodiversity conservation among the different sectors of the society
- Strategy 7:** Promote use of traditional knowledge for conservation, use and protection of the local communities' intellectual property rights
- Strategy 8:** Establish institutions for inter-sectoral implementing mechanism for the Bangladesh National Biodiversity Strategy and Action Plan.
- Strategy 9: **Enhance Protected Area management, recognizing the benefits of collaboration with local communities in their management (co-management).**
- Strategy 10:** Ensure wise use of wetland resources.
- Strategy 11:** Establish participatory mechanisms to receive and utilize the inputs from private sector, civil society, academia and local communities about the different processes leading to biodiversity conservation, use and sharing of benefits.
- Strategy 12:** Review and develop biodiversity related legislation(s) and establish a specific branch in the Judiciary to deal with biodiversity and environmental issues
- Strategy 13:** Establish an open and transparent monitoring and reporting system status and trends of implementing the principles of CBD
- Strategy 14:** Develop a financial strategy that is innovative and sustainable.
- Strategy 15:** Address issues of synergies with other Multilateral Environmental Agreements (MEAs) and processes that deal with climate change, disaster management, livelihoods, food security and sustainable development
- Strategy 16:** Integrate biodiversity conservation into the national development making, planning and processes