



National Biodiversity Strategy and Action Plan for Bangladesh

MINISTRY OF ENVIRONMENT AND FORESTS

Government of the People's Republic of Bangladesh

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Foreword

I am genuinely happy that the 'National Biodiversity Strategy and Action Plan' (NBSAP)-- a framework for conservation of biodiversity prepared by the Ministry of Environment and Forests has been finalized. Bangladesh is rich in both floral and faunal diversities evident in a varied range of ecosystems starting from the northern and eastern hills to the southern seas; moist deciduous forests to the mangroves and different agro-ecosystems spread over the wetlands, floodplains as well as the hills. The economy of Bangladesh and the livelihood sources of its people depend heavily on biological resources.

Industrialization, intensified land use and introduction of high yielding varieties of seeds, rapid urbanization, rural infrastructural growth and over harvesting of natural resources coupled with population boom have put severe stress on the environment, resulting in the destruction of ecosystems and habitats and depletion of the biological resource bases of the country both in the wild as well as cultivated states occurring at the ecosystem, species and genetic levels. Globally too, such trends and unabated threats causing widespread irreversible biodiversity loss everywhere have called for international commitment towards biodiversity conservation. Those good intentions and concerns coupled with the global environment friendly politics and policies were tabled during the 1992 Earth Summit (UN Conference on Environment and Development) in the form of several internationally agreed Conventions, of which the Convention on Biological Diversity (CBD) addressed the critical elements of sustainable development and equitable sharing of benefits arising from the sustainable use of biological resources.

As a Contracting Party to the CBD, Bangladesh is committed to initiating and implementing conservation and sustainable management of its national biological diversity according to the CBD principles for the sustenance of her present as well as future generations. . This NBSAP document embodies Bangladesh's strategic approach to conserving the nation's biological diversity as well as the action plan for fulfilling our obligations as a signatory to the CBD, drawn from the extensive consultation process involving a variety of stakeholders from all walks of life, including government officials, NGO representatives and donor communities nationwide. .

I am sanguine of the myriad potentials of this document-cum-guide, which will basically serve as a guide for those who are involved in the conservation and management of the country's biodiversity resources. The implementation of the strategy will be based on partnerships and coalitions between specialised government organisations, NGOs, conservation partners, the private sector, academia and other exponents of the civil society.

On behalf of the Government of Bangladesh, I thank the Global Environment Facility (GEF) and UNDP, Bangladesh for providing financial support in implementing the project. I thank IUCN Bangladesh Country Office especially for implementing the project.

Tariqul Islam

Minister

Ministry of Environment and Forests.

Foreword

I feel quite privileged being proffered this opportunity to say a few words on the occasion of publishing this important National Biodiversity Strategy and Action Plan (NBSAP) document. Biodiversity is no more a mere buzzword of the moment in environment conservation. In effect, biodiversity is the mainstay of our economy and livelihood.

The generally perceived trends of depleting biological resources countrywide may be traceable to unplanned or haphazard development due to anthropogenic pressures, industrialisation, mechanisation of agriculture, change in land use practices, invasion of alien species etc. etc.. The Convention on Biological Diversity (CBD) has been a most welcome move for arresting and reversing biodiversity erosion occurring globally. The NBSAP constitutes the first formal step in implementing the CBD in any country. In other words, this document is the framework for relevant actions in the field of biodiversity conservation.

I am pleased to note that the Government of Bangladesh has a definite policy framework for the conservation of biodiversity in the country now. Following a thoroughly consultative participatory planning process, the NBSAP documentation exercise has brought out the perceptions of all relevant stakeholders of biodiversity conservation, as well as their commitments to achieving the goals in this regard. A number of our state agencies have been entrusted with the responsibilities of managing the natural resources of the country. It is, therefore, imperative to seek the ways and means of integrating the relevant sectoral plans and policies. Getting rid of the overlaps and gaps and effecting necessary coherence in our legal and policy regimes in the context of the CBD are also important. This document has successfully identified such crucial issues. The roles of different ministries in this context have also been broadly defined to enable the stakeholders in natural resource management and consumption understand their respective responsibilities towards conservation and sustainable use of the biodiversity. Equally important facets of this document are its implementation mechanisms, financing and communication strategies, which will certainly be helpful in the implementation of the NBSAP.

The NBSAP is a living document in the sense that it is responsive, flexible and practical. Hence the need for reviewing, updating and revising it periodically and also as required.

I convey our indebtedness and gratitude to the Global Environment Facility (GEF) and UNDP, Bangladesh for providing necessary funds for NBSAP formulation.. I would like to thank IUCN Bangladesh Country Office for timely accomplishing the task of preparing this document. I would also like to acknowledge the meaningful contribution of all the process participants involved in NBSAP formulation.

I hope that this document will strengthen and facilitate the coordination and promotion of all national efforts in the conservation and management of biodiversity of the country.

Jafrul Islam Chowdhury

State Minister

Ministry of Environment and Forests

Preface

The Convention on Biological Diversity (CBD) is one of the outcomes of the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992. Bangladesh is a Contracting Party to the CBD with its Ministry of Environment and Forests (MoEF) acting as the country focal point. Major commitments of the Contracting Parties to the Convention included the implementation of the CBD through the preparation of respective National Biodiversity Strategy and Action Plans (NBSAP). Most of our neighbouring countries have already prepared their NBSAPs; many are implementing theirs and some have even updated the same. The MoEF had initiated the preparation of the NBSAP for Bangladesh opportunely, when the Global Environment Facility (GEF) through UNDP provided financial support for the purpose and IUCN - The World Conservation Union Bangladesh Country Office was contracted to conduct the consultations and prepare the document.

The NBSAP is a national framework for initiating and executing activities leading to the conservation and sustainable use of biodiversity, and establishing mechanisms to ensure equitable sharing of the benefits derived from such activities. The guiding principles for the formulation and implementation of the document are basically those of the CBD. While preparing the NBSAP, the other documents consulted and used outside the CBD were the Poverty Reduction Strategy Papers (PRSP) of the Government of Bangladesh, the Millennium Development Goals of UNDP, related sectoral policies of the country and other pertinent international protocols.

The publication of this document is the culmination of a long and arduous preparatory process. The preparation of this strategy was an intensely participatory one, which combined both 'top-down' and 'bottom-up' planning approaches. As a part of the top-down approach, several consultation meetings were organised, centred around different relevant themes, with professionals from various fields of the country participating. Following the bottom-up approach, six regional workshops were held in six administrative divisions of the country with stakeholders from all walks of life. Sharing of experience between different institutions and implementing agencies was also organised. Exchange of views and ideas amongst the representatives of different donors was arranged. Several draft versions of the document were reviewed rigorously over a period of one and a half years.

Apparently, Bangladesh has been a late starter in initiating and preparing its NBSAP compared to some of its neighbouring countries. But this delay proved to be rather beneficial for us, because while preparing this document, the members of the planning team could get down to the real nitty-gritty of other NBSAPs, review the lapses and so, conveniently tried to overcome or circumvent them, as necessary. The fact that the mechanisms of implementing and financing the proposed activities and the relevant communication strategies have been very explicitly stated might be very useful to those who'll implement the proposed conservation activities in the near future. . Enunciating the arrangements even better, the roles of the various ministries concerned with natural resource management have been thrashed out in details separately along with the role of donors as development partners, with a view to raising the awareness of all concerned in this regard.

This limited space here will not suffice if I go on mentioning everyone who all happened to contribute in executing this enormous task. Succinctly speaking, I take this opportunity to extend my gratitude to all the consultation participants, discussants and contributors including the members of the Project Steering Committee, whose concerted efforts and all round cooperation made the

preparation of this vital document possible. I am thankful to my colleague Mr. Monowar Islam, Deputy Secretary, Ministry of Environment and Forests and National Project Director, NBSAP project, and IUCN Bangladesh Country Office staff members who worked untiringly through the documentation and publication of this document. I also acknowledge the financial support received from GEF through UNDP Bangladesh for the purpose.

Concluding, I would like to express my gratitude to Mr. Tariqul Islam, Hon'ble Minister, Mr. Shajahan Siraj, former Minister, Mr. Jafrul Islam Chowdhury, Hon'ble State Minister, Ministry of Environment and Forests for their timely and continued support to the NBSAP process. I also thank Mr. Sabihuddin Ahmed and Syed Tanveer Hussain, former Secretaries, Ministry of Environment and Forests for paying due attention to the process, as required

As the national focal point for the CBD, the Ministry of Environment and Forests ardently hopes and expects that this document will surely strengthen and streamline all future natural resource management and conservation initiatives undertaken in Bangladesh.

Jafar Ahmed Chowdhury
Secretary in-charge
Ministry of Environment and Forests

EXECUTIVE SUMMARY

Bangladesh has signed and ratified the Convention on Biological Diversity (CBD) in 1992 and 1994 respectively. The National Biodiversity Strategy and Action Plan (NBSAP) of Bangladesh has been prepared to fulfil the country's commitment to the CBD. The CBD defines biodiversity as "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 NBSAP provides a framework for conservation, sustainable use and sharing the benefits of biodiversity of the country. A major focus of the plan is to ensure cross-sectoral linkages, reflecting the fact that in Bangladesh, more so than most other countries, biodiversity conservation is closely inter-woven with social and economic development. Thus, the NBSAP also provides a framework for securing the necessary environmental settings to reduce poverty, ensure sustainable development and implementation of Poverty Reduction Strategy Paper (PRSP).

The root causes of biodiversity loss range from natural processes to man-made interventions like climate change, unsustainable use and over exploitation of resources. Threats to biodiversity arise from loss of habitat, deforestation, inappropriate water and agricultural management and natural disasters. Underlying causes are predominately related to issues of land tenure and users' rights, and institutional capacity constraints. Elements of institutional capacity constraints include conflicting and fragmented policies and mandates within government agencies, and a long-standing focus on production at the expense of conservation and sustainable management. The links among various stakeholders namely, policy makers, government departments, private sectors, non-governmental organizations, development partners, and local communities play vital roles in achieving sustainable means of conserving biodiversity.

The NBSAP preparatory process was participatory so as to ensure the ownership of the strategy among all stakeholders and responsibility for implementation is widely shared. Three national workshops, six regional workshops and seventeen thematic consultation meetings provided the basis for the strategies and actions that collectively constitute the plan. Strong emphasis has been laid on capacity building, strengthening of legal and regulatory frameworks, and awareness building.

The major objectives of the NBSAP are to:

- *conserve, and restore the biodiversity of the country for well being of the present and future generations;*
- *ensure that long-term food, water, health and nutritional securities of the people are met through conservation of biological diversity;*
- *maintain and to improve environmental stability for ecosystems;*
- *ensure preservation of the unique biological heritage of the nation for the benefit of the present and future generations;*
- *guarantee the safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country; and*
- *stop introduction of invasive alien species, genetically modified organisms and living modified organisms.*

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

The Ministry of Environment and Forests will coordinate the implementation of the NBSAP. All relevant Ministries/ Divisions, government agencies, institutions, academic institutions, non-governmental organisations and communities will be responsible for activities that fall within their mandate. An 'Apex Body' has been proposed to coordinate the implementation of the NBSAP.

A financing strategy has been proposed for re-sourcing the implementation of the NBSAP. This focuses on increasing of public budget allocations, use of domestic instruments like taxes on water, timber, levies from road, rail and air passenger tariffs, debt swap trust funds and development partners' contribution. A communication strategy has been incorporated in the plan for effective awareness raising and information dissemination.

The plan has been drafted keeping in mind that it should be responsive, flexible and implementable. Status of implementation will be reviewed and monitored regularly with provisions for periodical reporting. The NBSAP is a 'living document' and will be revised and updated every six years.

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1. INTRODUCTION

1.1 Definition of Biological Diversity or Biodiversity

The Convention on Biological Diversity (CBD), defines biodiversity as “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”.

Ecosystem Diversity: Refers to variety and frequency of different ecosystems. An ecosystem is a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit, such as the forest ecosystem, the wetland ecosystem.

Species Diversity: Refers to the frequency and diversity of different species within a geographic area or an ecosystem, such as mango, tiger.

Genetic Diversity: Refers to the frequency and diversity of different genes and /or genomes. In the definition of biological diversity, genetic diversity is represented by the phrase “the diversity within species”, such as the *fazole*, *lengra*, *chosa* varieties of mangoes.

1.2 Significance of Conservation

Biodiversity is an essential resource base for development and livelihood security through provision of biological resources and ecosystem services. Through agriculture, forestry and fishery diversity nature provides food and fibre, medicine and timber, and contributes significantly to national economy and employment. Ecosystems provide essential services including nutrient cycling, air and water purification, flood and drought mitigation, and soil recuperation (Box – 1.1). 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) (Table – 1.1). 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.

Over the years, due to over exploitation of natural resources, degradation of resource base due to population explosion, and adverse impact of environmental pollution have hit hard on biodiversity of an area. To protect these invaluable resource bases, UN Convention on Biological Diversity was promoted in 1992. Almost all countries of the world are now taking special steps to protect their biodiversity resource base. An important element of these measures is the preparation of the National Biodiversity Strategy and Action Plan (NBSAP).

Table 1.1: Ecosystem Services and Estimated Economic Value

Ecosystem Services	Estimated Economic Value (global, US\$/ha/year)		
	Wetland	Forest	Rangeland
<i>Climate regulation</i>		141	0
<i>Disturbance regulation</i>	4539	2	
<i>Water regulation</i>	15	2	3
<i>Water supply</i>	3800	2	
<i>Soil formation</i>		10	1
<i>Erosion control</i>		96	25
<i>Nutrient cycling</i>		361	
<i>Waste treatment</i>	4177	87	87
<i>Pollination</i>			25
<i>Biological Control</i>		2	23

Source: Constanza et al. (1997)

Box 1.1: Goods and Services Provided by the Ecosystems

- Provision of food, fuel and fibre
- Provision for shelter and building materials
- Purification of air and water
- Detoxification and decomposition of waste
- Stabilization and moderation of Earth's climate
- Moderation of floods, droughts, temperature extremes and forces of wind
- Generation and recuperation of soil fertility
- Pollination of plants including many crops
- Control of pests and diseases
- Maintenance of genetic resources as key inputs to crop varieties and livestock breeds, medicines and other products
- Cultural and aesthetic benefits
- Ability to adapt to change

1.3 The Convention on Biological Diversity (CBD)

The Convention on Biological Diversity (CBD) was agreed up during the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The three objectives of the CBD are:

- Conservation of biological diversity;
- The sustainable use of its components and;
- The fair and equitable sharing of the benefits arising out of the utilisation of the use of genetic resources.

It is the first and only global agreement to address all aspects of biological diversity: genetic resources, species and ecosystem.

Bangladesh is a signatory to the CBD in 1992 and ratified it in 1994. Article-6 of the CBD requires that "Each Contracting Party" shall, in accordance with its particular conditions and capabilities:

- a. *“Develop national strategies, plans or programs for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programs which shall reflect, inter alia, the measures set out in this Convention relevant to the Contracting Party concerned”, and*
- b. *“Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies”.*

Implementation of the Article-6 of the CBD and preparation of NBSAPs were further emphasised in the Decision VII/2 of the Conference of Parties (COP) of the CBD. The Ministerial Declaration during the 7th Meeting of the COP in 2004 called for Parties to make efforts to significantly reduce the rate of loss of biodiversity by 2010. Bangladesh can respond to this call through formulation and implementation of the NBSAP.

The National Biodiversity Strategy and Action Plan (NBSAP) is a national document that responds to the obligations of the CBD. It includes strategies and action plans for the conservation, sustainable use and equitable sharing of benefits of biodiversity.

1.4 Biodiversity and Livelihoods

Ecosystem services form the basis of human survival. They help to meet the livelihood needs of the farmers, fisher folk, forest dwellers, craft persons and others. So, ecological **security** and **livelihood security** in Bangladesh are critically dependent on biodiversity and its components.

Biodiversity in Bangladesh contributes significantly to the country's economy. The people of Bangladesh depend on biodiversity for their day-to-day sustenance as well as overall livelihood security. For example, over 60 million people are dependent on aquatic resources everyday. One million people are full-time fisher folk and another 11 million have taken to part-time fishing in the country. Consumption of fish provides 50% to 65% of the country's protein requirement. The fisheries sector contributes about 3.3% of the GDP of Bangladesh, earning more than 11% of the total export revenue, and employs 5% of the country's total work force (Parveen and Faisal 2001). The agriculture sector provides 63.5% of the country's employment and contributing 24% to the GDP (BBS 2002). Of the sector's contribution to the GDP, approximately 7.1% is covered by the forestry. The various forestry-related projects in the country together generate 90 million person-days of job opportunities every year. The Sundarbans provides livelihood and employment to an estimated 112,000 people (Khan 2001).

With more than 130 million people, a population growth rate of 1.48%, and a population density of 834 people per square kilometre, the pressure on natural resources is tremendous. Box 1.2 provides more information on the future trends of Bangladesh's populations and the natural resources on which it depends.

Box 1.2: The Future Scenario

In the year 2020, the estimated population of Bangladesh will be 170 million and population density, 1118 per sq km. Seventy per cent of the country's land is currently under cultivation. Land resources for agriculture consist approximately of nine million hectares which renders a per capita figure of 13 persons per ha. With the population reaching 170 million by 2020, this figure will increase to 20 persons per hectare counting the possible loss of cultivable land to alternative uses like housing, urbanisation, etc. The pressure of the rising number of people on finite amounts of land, water and other natural resources has already resulted in mounting deforestation (a reduction from 10 to 6 percent in forest cover) that may become irreversible within the next 20 years, rising salinity and water logging of cultivated land, declining water tables and soil fertility and high levels of erosion in the hills. The riches of floodplain fisheries and wetlands have all been depleting precariously, caused by both natural forces and human interventions. If the negative trends cannot be reversed, they could reduce the current levels of fish production by 12 – 14 per cent. If the current two per cent per year deforestation rate is not reversed at all, the country's forests will probably disappear totally by 2020, and with them vanish the centuries old heritage of biodiversity.

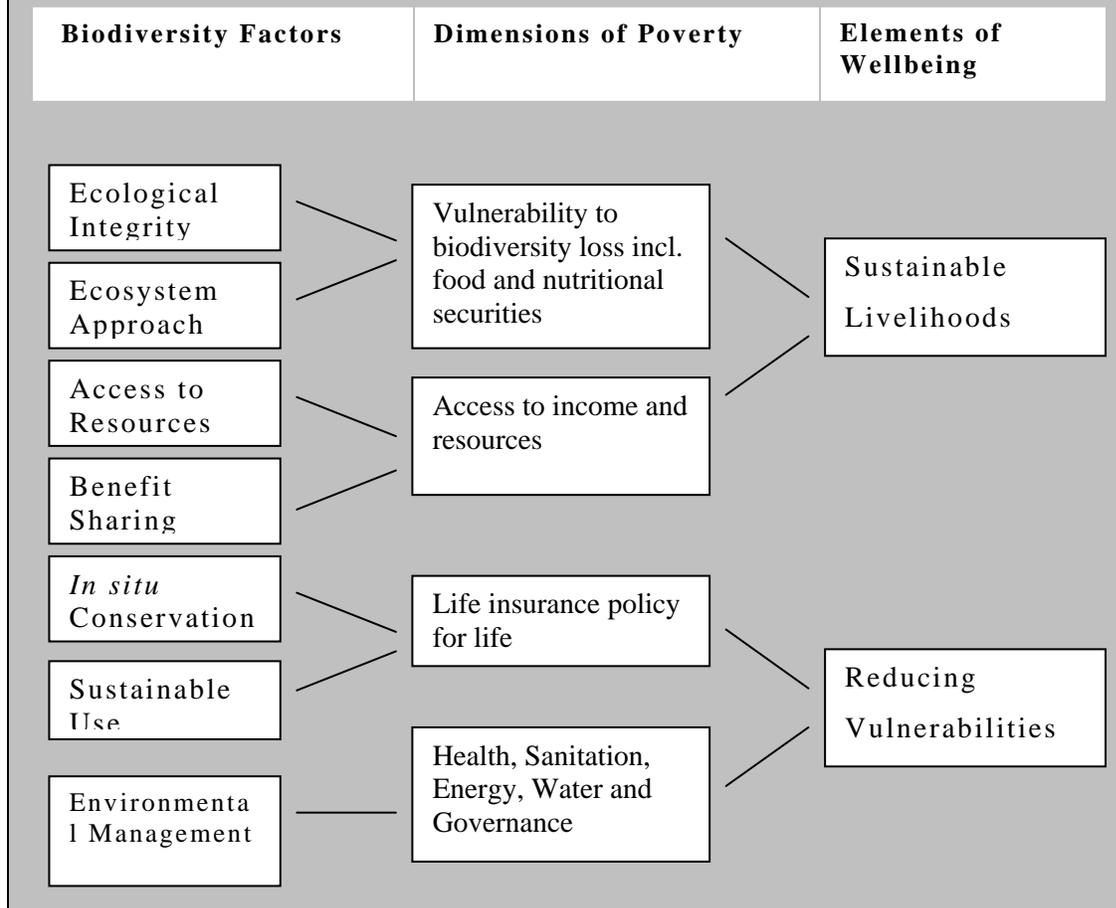
Source: The World Bank and Bangladesh Centre for Advance Studies, 1998.

contribution of biodiversity in the primary sector is immense, because a lion's share of the employment and rural livelihoods lie within formal and informal industries. The over-extraction of resources for livelihood sustenance is a major reason for the depletion of biodiversity in Bangladesh. Along with that, development initiatives that do not consider biodiversity can also be held responsible for this loss. At the same time, ecological threats from climate change, water and air pollution, and build-up of solid wastes will degrade the ecosystems, which ultimately exacerbate the social costs of poverty. Hence there exists a direct link between poverty and biodiversity in Bangladesh. Conserving biodiversity poses a formidable challenge without considering alleviation of poverty simultaneously. Box 1.3 highlights the linkages between biodiversity and dimensions of poverty. While these linkages apply to every country, the particular circumstances of Bangladesh, in which a huge and still rapidly growing population is forced to rely on limited natural resources, mean that they are especially important for the country.

Improving environmental management to reduce poverty requires comprehensive understanding of how local environmental conditions relate to poverty, the ability to identify and set priorities with regard to alternative policy options and the capacity of evaluating their effectiveness and impact. Usually, the environmental data tend to focus on environmental change without determining the poverty linkages, while poverty monitoring systems often ignore environmental concerns. Indicators are, therefore, needed to measure the health status and vulnerability of the poor and these needs to be integrated into the national poverty monitoring systems and assessment.

Box 1.3: Biodiversity- Poverty Linkages

(Source: World Bank, 2002)



1.5 Linkages between Conservation and Development Planning

As biodiversity affects, and is affected by many sectors of the economy, the NBSAP cannot exist in a policy vacuum. As discussed earlier, the link between biodiversity conservation, sustainable management of natural resources, and economic development are related. It is important to understand the linkages between the NBSAP and other national and international development processes.

1.5.1 The NBSAP and Poverty Reduction Strategy Paper (PRSP)

The underlying causes of biodiversity loss are very similar to drivers of poverty, which include centralized planning, constraints on access and ownership, unregulated markets, weak political commitment etc. The challenge for development here is to ensure that:

- biodiversity and the environment continue to provide goods and services needed for human subsistence and development;
- costs and benefits from the use of such goods and services are equitably and sustainably shared;
- policies influencing sustainability are developed based on participatory approaches; and
- the scientific and technological impacts on services provided by biodiversity be assessed and ecosystem friendly alternatives and efficiencies be found.

The Poverty Reduction Strategy Paper (PRSP) in Bangladesh takes into account aspects of environmental health, energy, agriculture, natural resources, climate change and disaster management. It addresses forestry and fisheries issues, in a bid to reverse the downward spiral of poverty and environmental degradation. The underlying causes of biodiversity loss are linked to the causes of poverty, as shown in Box 1.3. The challenges for sustainable development, that address both biodiversity and poverty issues are the equitable sharing of the costs and benefits of biodiversity goods and services, policies and programmes based on participatory approaches and solutions for environmentally sound technologies used in development. Improving environmental management to reduce poverty requires pooling of local knowledge and experience and mainstreaming the biodiversity concerns into all sectoral development strategies.

Caring for environment as stated in the PRSP has been shown in Box 1.4.

Box 1.4: Caring for Environment in the PRSP

Chapter 5 of the PRSP (para 5.85) states, “Under the strategy, environmental conservation would be integrated into national poverty alleviation strategies. Given the large number of environmental problems across various ecological zones, some target groups of people are always at high risk of exposure to poverty and environmental degradation. They would be identified clearly. The nexus among poverty and environment as well as with development and population policies would then be understood in a holistic manner. Isolated poverty alleviation strategies will not be effective if these are not environmentally sound, participatory in nature and focused on building local and national capacities for self-reliance. Incorporating people’s knowledge, perception and attitudes in planning and implementation will be taken as vital for environment friendly development.”

Source: ERD/MoF(2003).

Strategies and actions identified in the NBSAP towards the conservation and sustainable management of biodiversity should thus be complementary to the realisation of the PRSP objectives.

Biodiversity elements of the PRSP are enshrined in its environmental perspectives that consider environmental health, agriculture and natural resource management, and capacity building. The NBSAP responds to the issues and concerns identified under the major thrust areas of the PRSP through identification of strategies that deal with improving livelihoods by enhancing sustainable use and conservation of biodiversity and suggesting actions on issues of synergistic implementation of the NBSAP and PRSP provisions.

1.5.2 The NBSAP and the Millennium Development Goals (MDGs)

The Millennium Development Goals were formally established when the United Nations General Assembly adopted the Millennium Declaration in 2000. Its adoption paves a significant way of addressing the issues of poverty eradication and sustainable development through determining a set of targets and dates. Though the links are implicit, biodiversity conservation plays a crucial role in ensuring the targets set by the MDGs.

Though the MDG-7 deals specifically with ensuring environmental sustainability, however, the relevance of biodiversity in achieving other MDGs cannot be underestimated.

Box 1.5: The Millennium Development Goals and Targets

Goal 1 - Eradicate Extreme Poverty and Hunger

Targets: Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day; Halve, between 1990 and 2015, the proportion of people who suffer from hunger.

Goal 2 - Achieve Universal Primary Education

Target: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.

Goal 3 - Promote Gender Equality and Empower Women

Target: Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015.

Goal 4 - Reduce Child Mortality

Target: Reduce, by two-thirds, between 1990 and 2015, the under-five mortality rate.

Goal 5 - Improve Maternal Health

Target: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.

Goal 6 - Combat HIV/AIDS, Malaria and other Diseases

Targets: Have halted by 2015 and begun to reverse the spread of HIV/AIDS; Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Goal 7 - Ensure Environmental Sustainability

Targets: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources; Halve, by 2015, the proportion of people without sustainable access to safe drinking water; have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.

Goal 8 - Develop a Global Partnership for Development

Targets: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system; Address the special needs of the least developed countries; Address the special needs of landlocked countries and small island developing states; Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term; In cooperation with developing countries, develop and implement strategies for decent and productive work for youth; In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries; In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies.

Source: MDG 2000

Goal 7 aims to integrate the principles of sustainable development into the country level policies and programmes and reverse the loss of environmental resources. Thus implementation of the NBSAP will contribute directly to the Goal. The goals of biodiversity conservation are also mainstreamed in the other targets of the MDG; for example, poverty alleviation, food security, education, gender, health and global alliance are ingrained therein as cross cutting themes, the benefits of which are accrued to the society at large.

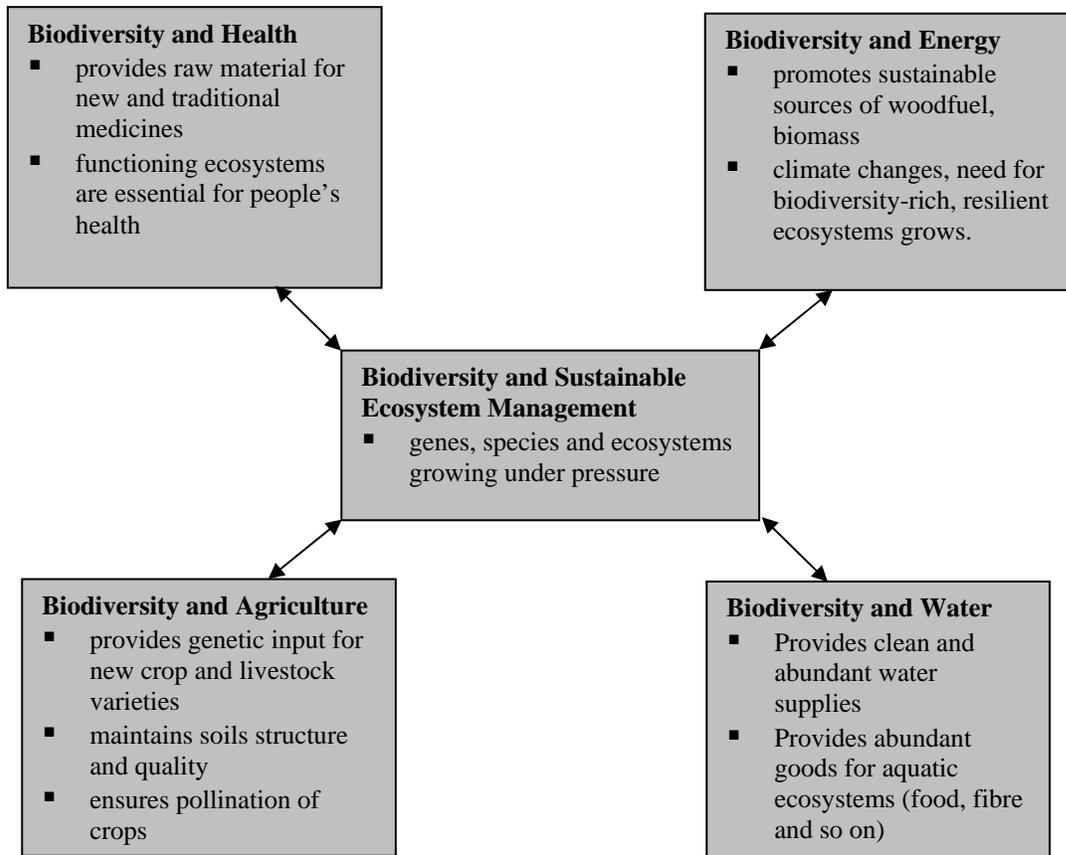
1.5.3 The NBSAP and the WEHAB Framework

In September 2002--thirty years after the Stockholm Summit and ten years after the UNCED --the world leaders, scientists, policy makers and communities met in Johannesburg to assess the progress and achievement towards attaining sustainable development through interventions including sound environmental management. A significant element of the Johannesburg World Summit on Sustainable Development (WSSD) outcomes is a framework of action known as the Water, Energy, Health, Agriculture and Biodiversity (WEHAB) initiative. The critical role of biodiversity and sustainable

ecosystem management in WEHAB priority areas is exemplified in Figure 1.1. Under this, biodiversity is considered as the “*life insurance policy for life itself*” (McNeill and Shei, 2002).

Figure 1.1: Examples of the Critical Role of Biodiversity and Sustainable Ecosystem Management under the WEHAB Priority Areas

(Source: McNeill and Shei, 2002)



1.6 The Planning Process for Development of the NBSAP

The NBSAP is a national document owned by the people. Its development has been based on a participatory process involving many stakeholders. The first step in this endeavour was obviously determining the methodology for development of the NBSAP. This was accomplished through the Inception Workshop held on 29 December 2002. The participants at this Workshop, which included representatives of government agencies, NGOs, research organizations, the media, donors, and experts, suggested the adoption of a combined approach of both ‘bottom up’ and ‘top down’



Figure 1.2: A Group Discussion in the Regional Workshop at Khulna

planning processes. The ‘bottom-up’ approach was to be achieved through regional workshops at which representatives of grass-roots and local organizations, could participate effectively while the ‘top-down’ approach was to be achieved through a number of thematic consultation meetings.

Six regional workshops were held in the six administrative Divisions of Bangladesh to ensure wider stakeholder participation in the collection of information, analyses and priority setting for the NBSAP and developing the elements of the Strategy and Action Plan. Ideas and proposals generated through the regional workshops were

Box 1.6: Stakeholders of Regional Workshop

The regional workshops involved stakeholders from most of the walks of life, starting from the grassroots to the policy makers, along with the implementation agencies. The participants were people of all walks of life comprising of people’s representatives (Union Parishad Chairmen, Members), primary school to university teachers, social leaders, lawyers, civil administration, development workers, different implementing agencies, researchers, and representatives of ethnic communities, physicians, and media people

were complemented by reports commissioned under the five thematic groups, viz. *Species Conservation; Ecosystem Management; Legal, Regulatory and policy issues; Education, Training, and Awareness Raising; and Linkages and Institutional issues*. Each Thematic Group was further divided into sub-groups. In total there were nineteen Thematic Consultation Meetings. The participatory process also included Focus Group Discussions with different biodiversity user groups. Some case studies covering different ecosystems of the country were analysed to develop understanding about their existing situations.

Discussions of the thematic consultations came up with the status of biodiversity, causes of degradation, threats and conservation actions needed. Also many cross-cutting issues like awareness raising, enactment of existing laws, integration of existing policies and involvement of different policies were the outcomes of the thematic meetings. Participants in the regional workshops identified the trend and status of decline in biodiversity in the region, causes behind them, issues and actions for conservation of biodiversity in the region in particular at the national level in general. Views from the regional workshops and consultation meetings were discussed at the national level in two national workshops. The participants in these workshops identified the strategies and actions for the NBSAP.

For better communication, a website was launched for the project at [www. iucnbd.org/nbsap](http://www.iucnbd.org/nbsap). This site contained the outcomes of all the workshops and consultations and sought feedback. In addition, announcements seeking views and comments from the people were published in four national dailies. About 120 people responded with their comments. These comments were duly considered in preparation of the NBSAP.

The findings from the regional workshops and consultation meetings were presented in the First National Workshop held on 04 October 2003. Based on the comments received, the draft NBSAP was formulated. This draft document was presented in the Second National Workshop held on 24 March 2004. Based on the comments and views of these stakeholders, the NBSAP was finalised in July 2004.

In addition, the Project Management Team and the inter-ministerial Project Steering Committee met periodically and monitored the participation of the stakeholders at different levels as well as reviewed the documents.

1.7 The Structure of the NBSAP

The NBSAP contains eight main chapters. Chapter 1 provides this introduction. Chapter 2 describes in brief the status of biodiversity in Bangladesh. Under chapter 3, the status of biodiversity of the country with the associated threats and trends are stated. Chapter 4 discusses the major issues including the cross-cutting ones, while analysing the gaps as the process moves ahead. The Proposed National Biodiversity Policy has been laid out in chapter 5. Chapter 6 deals with the key strategies and relevant actions; also, a total of 16 strategies have been defined herein. Each strategy is followed by a brief description and the proposed befitting actions to implement the same. The actions have again been grouped into those which can yield important outcome in the short term (0- 3 years), medium term (4 – 7 years) and long term (8 - 10 years) ones. Whether considered short, medium, or long-term, all actions could begin implementation as soon as possible, however, **Annex 1** indicates the priority actions for immediate implementation. Chapter 7 states the implementation mechanism of the NBSAP with its institutional set-up, monitoring and reporting system, implementing agencies and their roles, communication strategies for implementing the NBSAP and its follow-up and necessary refurbishing needs to be effected in the immediate near future. A separate financing strategy has been dealt under chapter 8.

2. BIOLOGICAL DIVERSITY IN BANGLADESH

Bangladesh supports a diverse set of ecosystems, notwithstanding its relatively small geographical area. It is bounded in the north and the east by the eastern Himalayan and western Myanmar hills, which are centres of plant diversity as well as locations of many biodiversity hotspots (WWF and IUCN 1994-1995). The entire country is biogeographically a transition between the Indo-Gangetic plains and the eastern Himalayas and, in turn, part of the Indo-Chinese sub-region of the Oriental realm.

2.1 Ecosystem Diversity

A broad range of ecosystem types are found in Bangladesh, including tropical rain forests, mangrove forests, floodplains and charlands, freshwater and coastal wetlands, littoral, sub-littoral and benthic communities of the Bay of Bengal.

As in many parts of the world, very few ecosystems in Bangladesh are really free of human interference. Nishat *et al.* (2002) divided Bangladesh into 12 broad bio-ecological zones, shown in Figure 2.2. The ecosystems of Bangladesh can be placed under 4 broad types viz., coastal and marine ecosystem, inland freshwater ecosystem, terrestrial forest ecosystem and man-made ecosystem (Daniels, 2003).

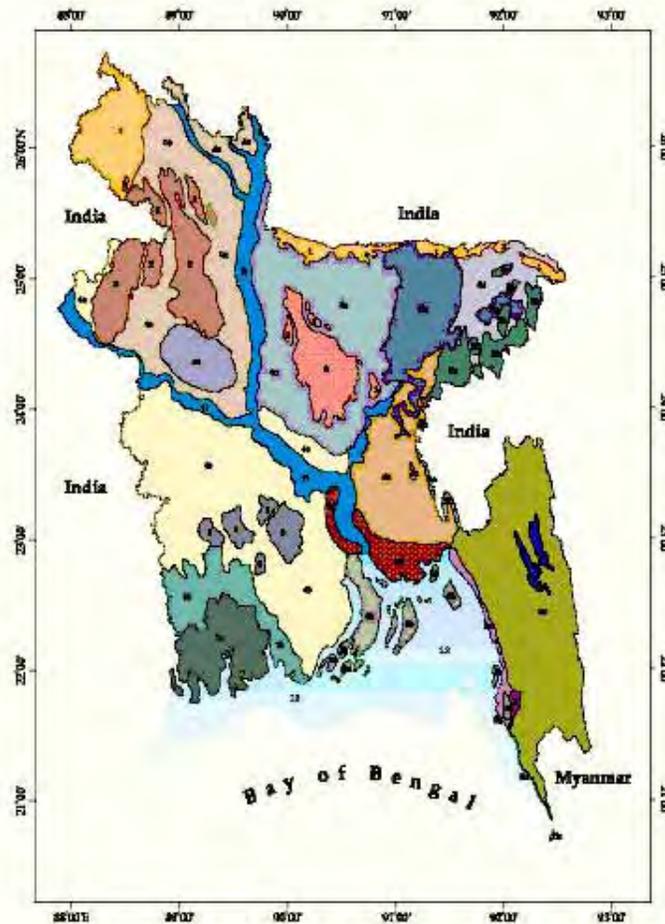
2.1.1 Coastal and marine ecosystems

Worldwide, Bangladesh is best known for its extensive coastal and marine ecosystems. The Sundarbans is of global importance as the largest mangrove forest in the world and the Cox's Bazar is distinguished as the world's longest beach.



Figure 2.1 A view of the Sundarban

Bio-ecological Zones of Bangladesh



- | | |
|-----------------------------------|-----------------------------------|
| 1. Himalayan Plateau Plain | 7a. Sunderbans |
| 2. Barind Tract | 7b. Chokaria Sunderban |
| 3. Madhupur-Bal Tract | 8a. Coastal Plains |
| 4a. Teesta Floodplain | 8b. Offshore Islands |
| 4b. Ganges Floodplain | 8c. Kartal Jyrisa Coral Island |
| 4c. Brahmaputra-Jamuna Floodplain | 8d. Meghna Estuarine Floodplain |
| 4d. Surma-Kushiyara Floodplain | 8e. Sandy Beach/Sand Dunes |
| 4e. Meghna Floodplain | 8f. Chittagong Hills and the CHTs |
| 5a. Haor Basin | 8g. Sythel Hills |
| 5b. Chalan Beal | 8c. Lalmai-Tippan Hills |
| 5c. Karail Lake | 10. Saline Tidal Floodplain |
| 6. Gopalganj/Wharves Peat Lands | 11. Major Rivers |
| | 12. Coastal and Marine Wetlands |



IUCN
The World Conservation Union

Figure 2.2 Bio-ecological Zones of Bangladesh

Box 2.1: Sundarbans: An unique and diverse mangrove ecosystemAt the advent of the British rule in India, the Sundarban was twice its current size, which has got lost to agriculture and human habitat in general. Sundarban was declared "Reserve Forest" during 1875-76 under Act VII of 1865 and was placed under the Forest Department for management. Since then FD is managing this area as Sundarban Reserved Forests (SRF). During the partition of greater India in 1947, the portion of Sundarban that became the part the then East Pakistan, at present is the Bangladesh Sundarban, a valuable natural resource of the country. Since then its area in Bangladesh has remained mostly unchanged except that an area of about 3,000 hectares was found to have reduced between 1985 and 1995 inventory, may be due to shifts of the bordering rivers. Situated between 89°00' and 89°55' East and 21°30' and 23°30' North, at the southwest corner of Bangladesh, the Sundarban extends over an area of about 600,386 hectares of which 189,159 hectares is water (Runkel and Ahmad 1997). It is the single largest chunk of productive mangrove forest in the world.

The SRF provides a resilient buffer for the lives and assets of the 3 million people who live in the immediate vicinity, as well as offers protection to infrastructure and urban populations in major towns such as Khulna and the international shipping port of Mongla. The Sundarbans has been acknowledged for its high biodiversity value. In addition to produce like timber, fuelwood, pulpwood, harvest of NTFP materials, honey, bees-wax, fish, crustacean resources of the forest takes place regularly. Tidal lands of the Sundarbans also function habitat, nutrient producer, water purifier, sediment trap, storm barrier, shore stabilizer, storage unit and aesthetic attraction. In Bangladesh, three wildlife sanctuaries totaling 324 km² were established along the southern edge of SRF in 1977. Since then, the sanctuaries have been expanded to include river channels, bringing the total current area to 1,397 km² or 23 percent of SRF. At the 21st session of the World Heritage Committee (1-6 December 1997), these sanctuaries together were declared a world heritage site as they constitute one of the largest mangrove areas in the world, supporting an exceptionally wide range of fauna (including the Bengal tiger) and providing a significant example of delta formation, tidal influences, and plant colonization.

As the largest forest area in the country, and with extensive aquatic and marine components, the SRF represents a significant storehouse of biodiversity, which includes 245 genera and 334 species of plants (Prain 1903). The Sundarbans flora is characterized by the abundance of *Heritiera fomes*, *Excoecaria agallocha*, *Ceriops decandra*, *Sonneratia apetala*, *Nypa fruticans* etc.. Since Prain's report there have been considerable changes in the status of various mangrove species and taxonomic revision of the mangrove flora (Khatun and Alam 1987). Whilst most of the mangroves in other parts of the world are characterized by members of the Rhizophoraceae, Avicenniaceae or Lagunculariaceae, the mangroves of Bangladesh are dominated by the Sterculiaceae and Euphorbiaceae (Hussain and Acharya 1994). Chaffy *et. al.* (1985) has listed 61 species of plants while a recent survey (2003) conducted by IUCN Bangladesh listed 108 plant species including 17 orchid, 21 fern and fern allies, 6 algae and 16 lichen species from the Sundarban. Out of 60 species (Saenger *et. al.* 1983) of true mangrove globally, 21 are found in Sundarban.

Sundarbans is one of the world richest biodiversity store house which supports 300 species of birds, 50 species of mammals, 50 species of reptiles, 8 species of amphibians, 177 species of fishes, 24 species of shrimps, 7 species of crabs, 32 species of mollusks, 8 species of locust lobsters, 3 species of turtles etc (IUCN 2003). The SRF is the country's major habitat for wild shrimp breeding, and home to many species of fish, birds, dolphins, and other wildlife. It is also the most important contiguous habitat in the world for the highly endangered Bengal tiger. It also offers tourism and recreation benefits, and is a major pathway for nutrient cycling and pollution abatement. Other significant faunal components include Barking deer (*Muntiacus muntjak*), Gangetic dolphin (*Platanista gangetica*) and Irrawaddy dolphin (*Orcaella brevirostris*), Olive ridley turtles (*Lepidochelys olivacea*), estuarine crocodiles (*Crocodylus porosus*), King cobra (*Ophiophagus hannah*), green frog (*Euphlyctis hexadactylus*) etc. Sundarbans supports a large variety of resident and overwintering migrant birds. Notable among these are the globally endangered masked finfoot (*Heliopais personata*) and White stork (*Ciconia ciconia*), white-bellied sea eagle (*Haliaeetus leucogaster*), Pallas's fish eagle (*Haliaeetus leucoryphus*), Lesser adjutant (*Leptoptilos javanicus*), Ruddy kingfisher (*Halcyon coromandra*), Mangrove whistler (*Pachycephala grisola*), Red jungle fowl (*Gallus gallus*), certain migratory waders, gulls and terns.

Over the last decade increased environmental stress resulted to decline the Sundarbans biodiversity. Sundarban is not continuing as it was, rather appears to have entered a premature transitional stage seemingly induced by human interventions, particularly emanating from hydrological change in the upstream. These impacts would be exacerbated by climate change and sea level rise estimated at 60cm over 50 years. By 2050 the following may happen:

- Freshwater mangroves are totally replaced by saline water mangroves
- Decrease in total area under true mangroves
- Increase of the area with mesophytic vegetation
- Major loss of biodiversity through changes in communities
- Major decline in timber production
- Increase of use of non-timber forest products (NTFPs).

A large number of offshore islands are scattered in the Bay of Bengal. Narikel Jinjira is the only coral bearing island of Bangladesh, and therefore, it is of significance in the context of coastal and marine ecosystems. Estuarine flood plains, sand dunes and beaches characterize the coastal ecosystems of Bangladesh. The Meghna flood plains of Noakhali and Lakshmipur districts are seasonally inundated by salt water which attracts a wide varieties of birds including migratory ones. Rare species of birds including the Indian skimmer (*Rhynchops albicollis*) visit these ecosystems. The beaches and sand dunes also attract sea turtles. This extensive open water ecosystem extends southwards into the Bay of Bengal.



Figure 2.3: Nijhum Dweep supports 50% of the globally endangered Indian Skimmer population

Box 2.2: Marine Biodiversity of Bangladesh – A Short Note

The Bay of Bengal, the marine area of Bangladesh, is endowed with the presence of a semi-enclosed tropical basin. It is considered as a Large Marine Ecosystem. Along with the 710 km long coastline, an area of more than 166,000 km² of the Bay of Bengal falls under the economic jurisdiction of Bangladesh. The country's shelf area covers roughly 66,000 km² and coastal waters are shallow with less than 10 m depth covering about 24,000 km². Though the marine ecosystems have hardly been explored and investigated, some information on the species types and their interaction is available.

Nineteen species of seaweeds are found along Bangladesh's coasts. Among them, the *Hypnea* spp. is the most abundant. A total of 475 fish species have been recorded from the marine waters of Bangladesh. The fish species that are presently exploited consist mainly of the demersal fishes, shallow water estuarine species and some mid-water species. These include about 100 commercial species, of which 15 species are highly commercial, contributing about 75% of the total demersal exploitation. Generally, five species of marine turtles travel in the Bangladesh marine territory. Among them, the Olive Ridley is the major nesting species all over, from the Sundarbans to St. Martin's Island. Green Turtles nest only in a few places. St. Martin's Island is the only spot in Bangladesh where the Hawksbill comes to nest. The important species of sharks and rays are also recorded. About 36 species of shrimps have been recorded from the marine waters of Bangladesh among which the brown shrimp *M. monoceros* contributes about 56% of the total shrimp catch.

The rich marine biodiversity not only directly contributes in maintaining the quality of the life and livelihood of the people of Bangladesh but also provide important resource base for the country. Around one million people are directly dependent on the marine resources for their livelihood.

Source: Excerpt from the PDO-ICZMP, 2004. Profile of the Coastal Zone of Bangladesh. Programme Development Office for Integrated Coastal Zone Management Plan); Water Resources Planning Organization (WARPO); Ministry of Water Resources; Government of the People's Republic of Bangladesh.

2.1.2 Inland freshwater ecosystems

Perhaps more so than for any other nation, the fate of Bangladesh—its people and its prospects for sustainable development—is determined by its relationship with water and wetlands. During the monsoon season, at least seven to eight million ha, or about half of the country (and sometimes considerably more), may be considered wetland (Hughes *et. al.* 1994). The country's wide range of wetlands includes more than 700 rivers and streams, thousands of shallow freshwater lakes and marshes (known locally as *haors*, *baors* and *beels*), floodplains, inshore coastal areas and extensive estuarine systems. More than 90% of the country's total area consists of alluvial plains, crisscrossed by a complex network of rivers and their distributories. These include three of the world's great river systems, i.e., the Ganges, Brahmaputra and Meghna Rivers. Bangladesh channels nearly all the outflow of the Ganges-Brahmaputra basin to the Bay of Bengal. As much as 4.9 million ha (34% of the country) are inundated for some 5-7 months annually. Bangladesh possesses enormous area of wetlands including rivers and streams, freshwater lakes and marshes, *haors*, *baors*, *beels*, water storage reservoirs, fish ponds, flooded cultivated fields and estuarine systems with extensive mangrove swamps. Wetlands of coastal and marine origin are less important in Bangladesh. *The haors* (bowl-shaped natural depressions between the natural levees of the river subject to monsoonal flooding every year), *baors* (oxbow lakes), *beels* (low-lying depressions in the flood plain) and *jheels* are of fluvial origin and are commonly identified as freshwater wetlands. These freshwater wetlands occupy four landscape units - floodplains, freshwater marshes, lakes and swamp forests. The manmade wetlands include lakes, *dighis* (big pond), ponds and borrow pits. Floodplains are made of river-born sediments and are subject to periodic inundation and occasional flooding. Freshwater marshes are more or less shallow water bodies lying at the back-slope of floodplains. Total area under wetlands in Bangladesh has been variously estimated at seven to eight million hectares, which is about 50% of the total land surface. The haor basin includes about 47 major haors and some 6,300 beels of varying size, out of which about 3,500 are permanent and 2,800 are seasonal. In greater Sylhet the most prominent haors are Sanoar haor, Hail haor, Hakaluki haor, Dakur haor, Maker haor, Chayer haor, Tanguar haor, and Kawadighi haor. The haors are considered the most productive wetland resources of Bangladesh. The basin supports a large variety of wetland bio-diversity and works as natural reservoir. A majority of Bangladesh's 120 million people are critically dependent on the country's wetland systems as vital natural resources to sustain them, primarily through agriculture and fishing.

2.1.3 Terrestrial ecosystems

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



Figure 2.4: A view of the Chittagong Hill Tracts

Box 2.4: The Chittagong Hill Tracts: An Overview

Chittagong Hill Tracts (CHT) is situated in the southeastern part of the country. It has three districts, namely Rangamati, Khagrachari and Bandarban. The total area of CHT is 5,089 sq. miles.

The topography is hilly and undulated, often with very steep slope. The three major rivers are Matamuhuri, Sangoo and Karnafuly. Most of the CHT land is under forests. But it has cultivable land, lakes and habitations.

According to 1991 population census, the total population of the CHT is 10.41 million of which 9% are settlers while the rest are tribal. The settlers are mostly from plain lands of the country. The culture and life style of the tribal groups significantly differ from that of the settlers. There are over 36 tribes in CHT of which the major tribal groups are Chakma, Tangchangya, Dengnak, Tripura, Riang, Mrung, Marma, Bawm, Pangkhua, Lushai, Khumi, Khiang, Mru and Sak. Chakma population is in majority followed by Marma and Tripura. Traditionally their major agricultural activity or farming system is jhuming (slash and burn agriculture). Couple of decades back the jhuming cycle used to be about 20 years but now it has reduced to 2 to 3 years. Jhuming is the prevalent form of land use, practiced on the steep to very steep slopes. From land tenural viewpoint the land is either reserved forest (RF) or unclassed state forest (USF). The economy in general is self-sustaining. These tribal people produce everything that they need. The RF land are managed by the Forest Department on behalf of the government where in jhuming is prohibited whereas the USF lands are open to jhuming, but a tax is required to be paid yearly to the local tribal king.

The forests in the Chittagong Hill Tracts are predominantly tropical semi-evergreen type. The important natural tree species are Garjan (*Dipterocarpus turbinatus*), Civit (*Swintonia foribunda*), Boilam (*Anisoptera glabra*), Kadam (*Anthocephalus chinensis*), Telsur (*Hopea odorata*), Champaphool (*Michelia champaca*), Chapalish (*Artocarpus chapalasha*), Chondul (*Terrameles nudiflora*), Narikel (*Sterculia alata*), Champa (*Michelia excelsa*), Chikrassi (*Chukrasia tabularis*), Bhadi (*Lannea grandis*), Jarul (*Lagerstroemia flosreginae*), Pitraj (*Amoora rohituka*), Bura (*Macaranga denti culata*), Hargaza (*Dillenia pentagyna*), Kusum (*Schleichera trijuga*), etc. But some of these have become rare. Besides these there are large natural bamboo barracks and extensive plantations, mostly of Teak (*Tectona grandis*).

Among the fauna, tiger, bison and samber have already become rare. A few herds of elephants are seen though their abundance has sharply reduced. Wild bores are common and abundant. Besides these monkeys and barking deer are often seen. Among birds, wild fowl, partridge, green pigeon, 15 species of woodpecker, 4 species of barbet, 2 to 3 species of hornbill, 3 to 4 species of bee-eater, 7 to 8 species of kingfisher, 4 to 5 species of swift, 6 to 7 species of parrot, 10 to 12 species of pigeon and dove, several species of owl, several species of cuckoo, several species of stork and heron are often seen.

Hills: Of the terrestrial ecosystems, the hill ecosystem covers around 12% of the country's land area. Hills in Bangladesh are largely confined to the north, northeast and south-eastern limits of the country. The Chittagong Hill Tracts (CHTs) and Chittagong together hold 90% of the hilly ecosystem within their limits.

The hill ecosystem of Sylhet, representing 9% of the country's hills, is generally of the low elevation type. The vegetation of the hill forests has generally been classified as tropical evergreen and semi-evergreen.

Undulating terrain: The northern undulating terrain is part of the Himalayan Piedmont Plain Bio-ecological Zone (Nishat et al., 2002). The largest concentration of the ecosystem is in the northwest in the Tentulia-Panchagarh regions, extending as a narrow corridor eastwards through Jamalpur, Netrakona, Sherpur and Sunamganj along the Bangladesh-India border. Together, the Piedmont Plains may cover an

area of about 6,000 sq km. Being an ecotone between the hills and the lowland swamps, this ecosystem is rich in biodiversity.

The Barind Tract: This tract is locally known as *Barendra Bhumi*. It is situated in the upper half of the north-western Bangladesh, covering an area of 7,728 sq km. The original vegetation cover of the Barind Tract was dominated by the *sal* (*Shorea robusta*) and semi-evergreen species. Presently, the tract is dominated by scrubs resembling that in the semi-arid tracts. Over 260 species of birds and 40 mammals are reported from this ecosystem.

The highlands of Madhupur: The highlands of Madhupur spread across the districts of Gazipur, Tangail and Mymensingh. *Sal* forests cover approximately 240 sq km of the Madhupur tract. Nineteen species of mammals, more than 170 species of birds and 28 species of reptiles are reported from the Madhupur forest ecosystem.

2.1.4 Man-made ecosystems

In Bangladesh, human beings have extensively modified aquatic and terrestrial ecosystems. As a result, in some areas and ecosystems, the impact has been long-standing and sustained, and the present biodiversity that inhabits the landscape has become so different from what it had been, that it is no longer possible to treat the ecosystem at par with any of the known natural types. Such ecosystems vary from small aquaculture ponds to large lakes as the Kaptai reservoir and amongst the terrestrial ones, they might vary from the many kinds of agro-ecosystems in the hills and plains to those in rural homesteads and urban centres.

It is an established and admitted fact that man-made ecosystems are home to a large number of domesticated plants and animals including plant cultivars, crops (cereals, pulses, vegetables, fruits, etc), ornamental plants, livestock, pets and fish.

2.2 Ecosystem Conservation

There are 18 Protected Areas in Bangladesh of which two are proposed, covering about 2444 sq km and representing 1.63% of the country's surface area, and 9.14% of its forest area (Gani, 2003) (Table 2.1; Figure 2.5 – showing 16 PAs). The Forest Department has the mandate for management of these protected areas. The Bangladesh Wildlife Preservation (Amendment) Act, 1974, recognises three categories of Protected Areas (Table 2.1), viz. national parks, wildlife sanctuaries and game reserves. These are defined in the Act as:

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

The Bangladesh Environment Conservation Act, 1995 (Act I of 1995) deals exclusively with environmental issues. When the ecosystem of any area has reached a critical state due to the degradation of environment, the Government, by notification, may declare the same as ‘ecologically critical area’ under the provision of this act, where restrictions on economic activities are imposed. There are eight Ecologically Critical Areas (ECA) in the country (Table 2.2).

The middle grounds and the southern patches of the Bay of Bengal, comprising 698 sq km area have been earmarked as to constitute a **Marine Park** in the year 2000 under the Marine Fisheries Act, 1985.

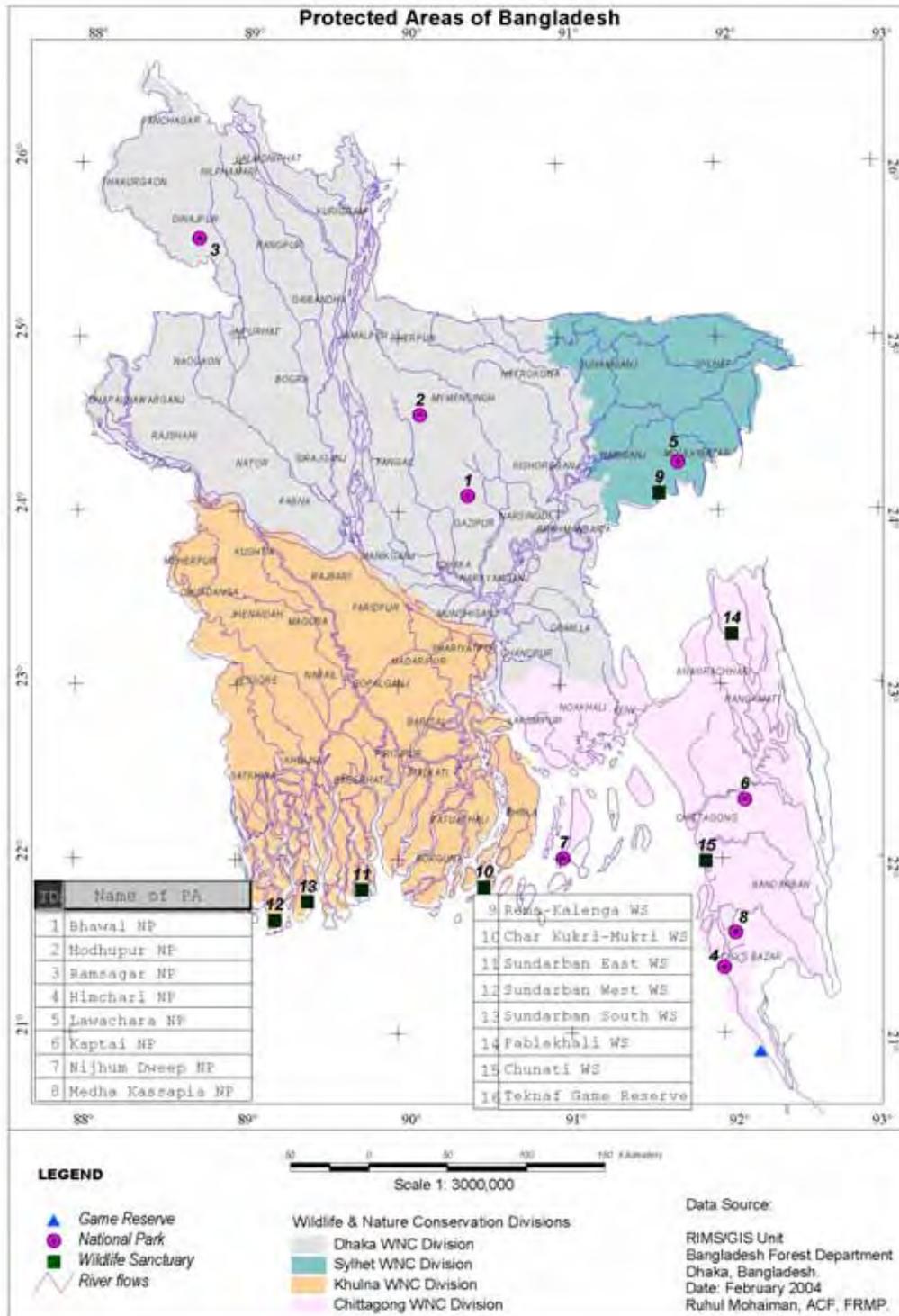


Figure 2.5: Map Showing Protected Areas of Bangladesh

Table 2.1: Protected Area for *in situ* Conservation under the Management of Forest Department

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

Table 2.2: List of Ecologically Critical Areas of Bangladesh

Sl. No.	Name of Wetland	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	Sunamganj	9727
7	Marjat Baor	Jhenaidaha	200
8	Gulshan Lake	Dhaka city	20

2.3 Species Diversity

2.3.1 Wild plant diversity

The number of species of non-flowering plants excluding algae (bryophytes and pteridophytes) is still not completely known. Many species are disappearing even before they are identified and registered. Table 2.3 shows estimated numbers of species of wild plants in Bangladesh.

Box 2.5: Threatened Plants

Khan et al. (2001) have listed 106 species of plants as endangered including 2-3 species of ferns, 4 species of gymnosperms and the rest, angiosperms. Of these, the palm *Corypha taliera* has been considered as 'critically endangered'; the last surviving individuals of the species in the whole world are limited to Bangladesh

Table 2.3: Recorded and Estimated Number of Wild Plant Species of Different Plant Groups

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

Source: Hassan (2003)

2.3.2 Wild animal diversity

Though least known, the invertebrates form a major bulk of the faunal diversity, particularly aquatic invertebrates. Scanty information is available, mostly in scattered literature. A tentative number of taxa under invertebrates including zooplankton and protozoa, and vertebrates are provided in Table 2.4. Monera and Protista have also been included.

Table 2.4: Number of Animal Species Belonging to the Major Taxonomic Groups

Major Taxonomic Group		Number of species mentioned in this document
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)

The status of the various groups of vertebrates determined based on the numbers of threatened species and modified IUCN categories (IUCN-Bangladesh, 2000) are shown in Fig.2.6 below.

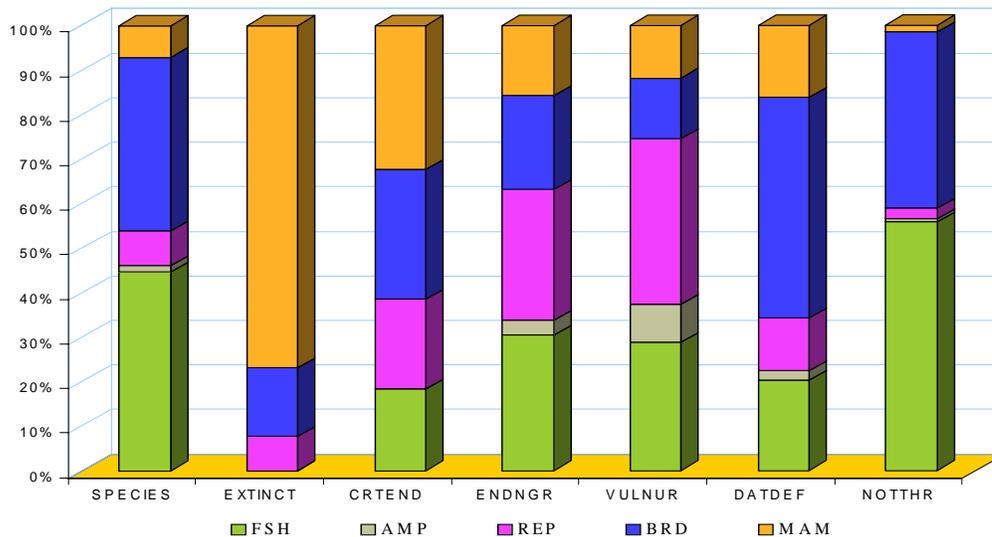


Fig. 2.6 Status of the various groups of vertebrates determined based on the numbers of threatened species and modified IUCN categories (IUCN-Bangladesh Red Data Book, 2000). (MAM-Mammal, BRD-Bird, REP-Reptile, AMP-Amphibia, FSH-Fish, CRTEND-Critically Endangered, ENDNGR-Endangered, VULNER-Vulnerable, DATDEF-Data Deficient, NOTTHR-Not Threatened).

2.3.3 Invasive alien species

Decision VI/23 of the Sixth Conference of the Parties (COP-6) of the CBD, defines “Invasive Alien Species” as alien species whose introduction and/ or proliferation threatens biological diversity.

Plants: Hassan (2003) and Hossain (2004) provide a long list of alien and invasive alien plant species from Bangladesh, some of which are listed in Box 2.6. *Eichhornia crassipes* (Kachuri pana) is a notorious weed of fresh water ecosystems; *Eupatorium odoratum* (Ayapan) and *Mikania cordata* (Assam lota) are two invaders of terrestrial ecosystems that overtop the canopy of shrubs and young tree saplings. *Croton bonplandianum* (Bon khira) and *Lantana camara* (Nak phul) grow along the edges of forest and waste lands and invade local vegetations

Box 2.6: Invasive Alien Plant Species in Bangladesh

Invasive alien species (IAS) compete and suppress the survival of native species, rendering habitats vulnerable to fire and deterioration. Important IAS in Bangladesh are the following:

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

Source: Hossain and Pasha (2001).

Animals: Little information is available on invasive alien animal species in Bangladesh, although Rashid (2004) has provided a brief review on the subject. The introduction of alien species of fauna, particularly fish, started in the early 1950s. The decision to introduce the alien species was primarily to increase productivity. Rashid (2004) reports that so far at least 32 fish species have been introduced in the country. The impact of alien species on indigenous species has not yet been thoroughly studied. Among the exotics, tilapia of two species, viz. *Oreochromis mosambicus* and *O. niloticus* has caused grievous concerns because these species have invaded all available habitats, including the estuaries (Rashid 2004).

2.4 Genetic Diversity

Wide genetic variations occur in plants and animals both in the wild as well as cultivated/ domesticated states, and the diverse agro-ecosystems of Bangladesh are rich in genetic resources of plants and animals. Local communities have selected and conserved genetic variations in plants and animals in the various agro-ecological zones for centuries. More recently, there have been organized efforts in preserving the domesticated biodiversity by both governmental and non-governmental agencies, which have built up large germplasm collections.

Box 2.7: “Nayakrishi Andolon” and the Local Varieties of Rice

UBINIG, an NGO through its “Nayakrishi Andolon” collected 110 local varieties of *aman* and *aus* rice from Tangail, Noakhali and Sherpur areas of which some varieties are popular among the *nayakrishi* farmers. The varieties have very fascinating names that reflect the local culture/heritage of the area, e.g. *Jamaiaduri*, *Tulsimala*, *Modhumaloti*, *Chinigura*, *Kalobinni*, *Moinaguri* etc. Invasion of HYV rapidly eroded these local varieties in the recent past. Efforts to conserve these resources are needed immediately.

Plants: Domesticated plants in Bangladesh range from rice and millets to tubers such as *Dioscorea* (yam), *Colocasia* (taro), *Ipomoea batatas* (sweet potato), legumes, oil seeds, vegetables, fruits, spices and fiber (cotton and jute) (Haque, Mamtazul 2003). The greatest diversity in any crop is that which is known in rice (*Oryza sativa*). Six thousand varieties of rice are known to have existed in the country (Khan., 1997). (Also see NBSAP background materials by Hassan, 2003; Haque, 2003; Hossain, 2004; Yusuf, 2003).

Animals: Domesticated animal biodiversity in Bangladesh is largely limited to livestock. To a very small extent, dogs, cats and ornamental fish contribute to the diversity. Other than these, there are domesticated pigs in the tribal settlements in the hills. A number of fish species are cultured throughout the country.

Box 2.8: Domesticated Animals of Bangladesh

Livestock population in Bangladesh is around 164 million comprising chicken 60%, ducks 18%, cattle 13%, goats 8%, sheep 1% and buffalo 0.4%. Essentially, poultry dominates the livestock scene (78%).

Source: Kamaruddin (2003).

3. SITUATION ANALYSIS AND THREATS TO BIODIVERSITY

3.1 Status

Around 100 of the estimated 6000 vascular plant species in Bangladesh have been listed as threatened to date (Khan et al., 2001). Many others, especially the medicinal plant species, are facing great pressure due to loss of habitat and indiscriminate exploitation. About 220 species of vertebrates, including fish, amphibians, reptiles, birds and mammals have been listed in the Red Data Books of Bangladesh as they are faced with the threat of extinction. An analysis of the past and the present trends of animals subject to extinction and population decline suggests that species that are dependent on aquatic ecosystems are more vulnerable. In contrast, among plants the most threatened species are those found in terrestrial forests, where endemism is also very high.

3.2 Analysis of Institutional Responsibilities

The Ministry of Environment and Forests is the focal point of the CBD, and hence responsible for the conservation and management of biodiversity in the country. However, the conservation and management of the nation's natural resources is the responsibility of many different government bodies, including the Ministry of Agriculture, Ministry of Fisheries and Livestock, Ministry of Land, and Ministry of Water Resources. The Forest Department (FD) is a specialized body of MoEF dealing with the management of forest reserves, wildlife and protected areas. The Department of Environment (DoE) is another specialized body under the MoEF, dealing primarily with "brown" and "grey" issues and management of ECAs in the environment sector. Many research institutions like BFRI, BNH, BARI, BRRI, BLRI, and many university departments are conducting research and action programmes on biodiversity documentation and management. IUCN Bangladesh Country Office and many other NGOs are also engaged in implementing action programmes on biodiversity conservation and addressing policy issues. Recently, the FD has undertaken a co-management project for PAs management with support from the USAID.

Responsibilities, communication channels and coordination mechanisms among these many different agencies, ministries and departments remain poorly defined and unclear. A review of the mandates and policies of these agencies shows that responsibility for management of natural resources, and therefore, for conservation and sustainable management of biodiversity, is fragmented, and there is no coordination at either national or institutional levels. From the institutional analysis exercise, the following major issues could be identified:

- Policies and actions are not coordinated at the national level;
- Even within the same ministry, there may be conflicting policies regarding conservation and management of natural resources. For example, the FD is responsible for protected area management on the one hand and planting of exotics in monocultures on the other;
- Institutional and individual capacities are limited;
- Funding is irregular and unpredictable, which thwarts the timely implementation of planned programmes.

3.3 Analysis of National Legal Regime

Bangladesh has over a hundred laws that deal with the various aspects of the environmental issues. The following are the major legal instruments related to biodiversity.

Environment Conservation Act, 1995 (Amendments 2000, 2002) and the relevant Notifications and Circulars

The Environment Conservation Act 1995 (ECA) is a powerful law for ensuring conservation and sustainable use of the biological resources of the country and protection of its environment. Many of its loopholes were remedied subsequently in the form of Amendments, Notifications and Circulars.

The ECA has been designed with a view to conserving the environment through improving environmental standards and controlling and mitigating environmental pollution. It has overridden other inconsistent laws, established a Department of Environment empowered to intervene in almost all areas of environmental concerns, provided operational definition of important concepts viz. conservation, environment, ecosystem, pollution etc. and prescribed punishment for various environmental offences.

Section 5 of the Environment Conservation Act, 1995 provides for *in situ* conservation by empowering the Government with the authority to declare areas as Ecologically Critical Areas and to take measures to protect the ecology of such areas provided that it is convinced that the ecosystem concerned has reached or is likely to reach a 'critical state warranting strict conservation measures'. In the ECAs, a ban is imposed on a number of activities, including the felling or extraction of trees and forest products; hunting and poaching of wild animals; catching or collection of snails, corals, turtles and other creatures; any activity that may threaten the habitat of flora and fauna; activities likely to destroy or alter the natural characteristics of soil and water; establishment of industries that may pollute soil, water, air and/or create noise pollution and other activities that may be harmful for the fish and other aquatic life.

The apparent shortcoming of the above Act as well as its subsequent notifications, lies in its failure to specify a monitoring mechanism for the enforcement of its provisions.

Environment Conservation Rules (ECR), 1997

Under the provisions of the ECR 1997, it is mandatory for industries to carry out an EIA, install waste/pollutant treatment plants, conform to the environmental quality standards, report accidents or unforeseen discharges of pollutants, and take remedial measures, as warranted. The DoE issues Environmental Clearance Certificates in favour of those industrial units which conform to the above ECR standards..

The Environment Court Act, 2000 (amended 2002)

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

The Wildlife (Preservation) Order, 1973, Wildlife Preservation (Amendment) Act 1973 and subsequent Notifications

The wildlife law provides for the protection of wildlife as well as their habitat. The Wildlife Order defines various protected areas in the form of game reserves, national parks and wildlife sanctuaries and aims to preserve wildlife in those protected areas. The wildlife sanctuary regime also requires undisturbed breeding ground for the protection of wildlife as well as all natural resources contained in the sanctuary.

The Act classified the wild animals as game and protected animals and listed them in the annexed schedules. While the game animals can be killed or hunted with a permit, protected animals are fully protected except for saving life, crops or livestock. However, by an executive order dated 18 June 1998, the Prime Minister's office prohibited hunting of all types of wild animals for the following five years. This provision has not yet been renewed.

The schedules of the Act are revisited and modified regularly as the status of threats to different species changes. The Act does not currently conform to the provisions of CITES, nor does it ensure sustainable management of exports of species like pet birds, turtles and crabs.

Penalties for first time offences under the Wildlife Order may be payment of a nominal amount of compensation (between BDT 1000 and 2000) to the Conservator of Forests. Offences under the Act can also be tried by a First Class Magistrate.

The Forest Act, 1927 (amended in 1990, 2000)

The Act empowers the Government to declare any area of forest as Reserved and by doing that it may take measures for *in situ* conservation of biological diversity. The Government may also establish some control over private forests through Private Forest Ordinance. Under the State Acquisition and Tenancy Act however, the private forests that used to be owned by the landlords have got vested with the government. The government however, has relaxed some its control over tree resources of villages, through the last revision of the Forest Act. With the introduction and expansion of Community Forestry, the government is gradually trying to introduce community oriented Co-management even on the tracts of reserved forests, which in the recent past, was almost out of bound unless permitted, to the members of the public. Any act or omission detrimental to the natural resources of reserve and protected forests are prohibited and hence punishable offences. Among them, the more serious ones include making fresh clearing of forest lands, removing timbers, setting fires, felling or otherwise damaging trees, clearing or breaking up any land for cultivation or any other purpose, hunting and poisoning water. The Act, however, has the provisions to permit some of these acts but not all. The Act however, fails to establish a stringent regulatory regime for the protected forest areas. It also fails to recognize adequately the indigenous practices and techniques of forest conservation including sustainable methods of zoom cultivation.

The Forest Act, 1927 was amended further in April 2000 to provide for establishment of social forestry involving local community participation in its management. The rules are still under preparation. It is apprehended that unless conservation guidelines including those concerning alternative livelihood are

framed and implemented properly, the communities might tend to be more easily guided by the needs for overexploitation of forest resources.

By virtue of Section 26 (1A) and Section 32, the fisheries resources of the water bodies of any reserve or protected forest are protected against illegal fishing, poisoning of water and setting traps and snares. Coordination among different management regimes (e.g. forestry, fisheries, land) established in various water bodies is needed for better conservation of aquatic species and their habitats.

Protection and Conservation of Fish Act, 1950 (amendments in 1963, 1970, 1982, 1995, 2002)

The Act defines fish to cover a wide variety of aquatic species e.g. fish, amphibians, tortoises, turtles, frogs and explains fisheries as any water body serving the purpose of fish habitat. It empowers the government to make rules mostly for the protection of fishes by, for example, prohibiting and regulating the process, period and size of fish to be harvested, pollution and other activities detrimental to fish population and fisheries. The execution of the law is rarely observed, partly, due to the shortage of magistrates and institutional weaknesses of the Fisheries Department.

Protection and Conservation of Fish Rules, 1985, (amendment in 1987)

A powerful provision for conservation is contained in section 28 of the rules that empowers the Government to build any marine reserve in which fishing and any other detrimental activities can be prohibited under section 10.

Marine Fisheries Ordinance, 1983

Limited fishing by deploying non-mechanised local fishing vessels and local fishing by using boats with limited engine power is allowed only in specified zones. No entry of foreign fishing vessels is allowed into Bangladesh's waters except under license. The Government may declare any area which requires special protection and regeneration of the aquatic life in the territorial waters and Exclusive Economic Zone (EEZ) of Bangladesh a marine reserve; a marine park was established under the Act in 2000. The Act does not provide for specific preventive or precautionary measures for protection and conservation of aquatic life though.

Agricultural Pesticide Ordinance, 1971

Under Section 5 of the above Ordinance, the Government can impose a ban on registering any pesticides detrimental to vegetation, human or animal health. But the adverse effects of the harmful pesticides on fisheries or aquatic organisms, which are particularly vulnerable in the inundated flood plains and the surrounding habitats of agricultural lands, are yet to be taken into account. The Government, advised by the Pesticides Technical Advisory Committee established under the Act, has banned certain pesticides, although no effective legal mechanism has been put in place to halt their illegal importation and sale under different names and labels.

The Fertilizer Regulation Order, 1995

The Technical Sub-Committee, constituted under Article 12 of this Order, shall conduct environmental assessment of the impact of new fertilizers and bio-fertilizers and make recommendations to the

government regarding their production, importation, marketing and use. No provisions exist for the already imported or produced harmful chemical fertilizers that could affect the biodiversity resources adversely.

In fine, the existing laws are not adequate to deal with the various emerging issues such as climate change, genetically modified organisms (GMOs), locally modified organisms (LMOs), bio-safety, bio-prospecting, intellectual property rights (IPRs), and international cooperation. Even issues like waste management, management of wetlands, and conservation of agro-biodiversity are yet to be adequately addressed.

3.4 An Analysis of the National Policy Regime

An analysis of the existing legal and policy regimes for biodiversity management was carried out as background material for the *Report on National Biodiversity Laws and Policies* (Islam, 2004). This analysis reflects the need of integrating biodiversity concerns into the existing policies having a direct or indirect bearing on the biodiversity issues. This integration would enable the policies facilitate the conservation and sustainable and equitable use of biological resources more effectively.

The national policies embody the various legal standards established and practiced in a country. But unlike rules and regulations of the law, the standards the policies manifest are more generalised than commitments and hence the ensuing lack of relevant specific and particular actions. Policies are mostly guidelines for the ministries and other government bodies and they may lay the foundation for future legal developments.

The importance of policies in strengthening the environmental regime has been recognized in a number of important international instruments including the 1980 World Conservation Strategy and the 1987 Brundtland Report. Paragraph 14 of Chapter 8 of Agenda 21, the non-binding action plan for a global partnership for sustainable development, underscored the necessity of formulation of national policies as well as laws for environmental protection and sustainable development.

The implication of adoption of policies has special bearing in countries like Bangladesh where the pace of legal development is comparatively slower than in the developed world. Although, according to Article 152 of the Bangladesh Constitution, policies are not the sources of judicially enforceable obligations, they enjoy binding impact on the activities of the Government agencies and therefore, can greatly influence the shaping of national environmental regimes.

The environmental policies of Bangladesh have mostly been formulated in the post-Rio era. Among them, the Environment Policy of 1992 focuses solely on environmental issues while others like the Forestry Policy of 1994 and Land Use Policy of 2001 address sectoral aspects of sustainable development. In the environment and the forest policies, the conservation of biodiversity has received fragmented treatment. Other important policies relating to the natural resource management regime in Bangladesh include the Fisheries Policy of 1998, National Agriculture Policy of 1999, Livestock Development Policy of 1992, National Water Policy of 1999, Industry Policy of 1999, Energy Policy of 1995, Export Policy of 1997-2002 and National Science and Technology Policy of 1983.

The existing policy regime does not cover some important sectors. For example, the Education Policy has been awaiting approval for years. The Commission Report of 1997 on the basis of which it is to be developed, covers a wide range of issues except that of natural resource management. Unless those issues are included in the final policy, it would have no direct impact in influencing people's attitude towards environment protection. Among other policies, the Housing, and the Health policies are under preparation by the concerned Ministries of the Government.

The formulated policies, although fairly rich in content, are frequently not bolstered or supported by necessary actions of implementation. A National Conservation Strategy is still awaiting approval of the Government, which might facilitate to effectuate the environment-related provisions contained in the policies. Furthermore, although many of the policies underline the importance of amending existing laws and formulation of new laws, only two such examples exist, namely the ECA of 1995 and the ECR of 1997.

Policies are not always convenient to implement either. This is due to a number of factors including the lack of consistency between them and the institutional weaknesses of the line agencies of the Government. As mentioned above, some provisions of the Fisheries Policy contradict that of the Land or Industrial Policy; the Environmental Policy does not conform to the narrowed down objectives of the Export Policies etc. The Agriculture Policy puts emphasis on increased irrigation from surface water sources viz. *khals* (canals), *beels* (wetlands) and rivers, without considering its impact on navigational as well as non-navigational use of the surface water. This contradicts the interests of other water-based sectors like fisheries and forestry.

Under the Environmental Policy, the Department of Environment is assigned with the responsibility to implement the policies concerning the protection of ECAs. The Forest Department is responsible for managing Protected Areas and wildlife, whereas many forest areas lie actually beyond the legal jurisdiction of the MoEF. Furthermore, most of the concerned Ministries and Departments including the MoEF lack institutional capacities in terms of human, technological and financial resources needed for proper implementation of the policies.

It is, therefore, imperative to make coordinated and integrated efforts to prioritise the areas of relevant legal and policy reforms for facilitating wise and sustainable use of our biological resources.

Two policy instruments in particular are of major and very direct relevance to biodiversity conservation. These are:

Bangladesh National Conservation Strategy (NCS)

The National Conservation Strategy (NCS) is an important step towards achieving the objective and integrating the policies on environment. The updated NCS builds on the Poverty Reduction Strategy Paper, World Summit on Sustainable Development and Millennium Development Goals. By adopting the NCS, the Government would not only reinforce its national and international commitments for achieving conservation of resources and sustainable development but also strengthen the economy in the long run.

The 17 chapters of the NCS document delineates the various different sectoral profiles. The sectors span all the important areas that warrant inter-sectoral and intra-sectoral considerations viz. Human

Resources, Land Resources, Water Resources, Forest Resources, Biodiversity, Fisheries Resources, Crop Agriculture, Industry, Rural Development, Energy and Minerals, Urbanization, Health and Sanitation, Transport and Communication, Disaster and Disaster Management, Environmental Education and Awareness, Gender Issues and Environment and International Obligations.

Each sectoral chapter presents an intensive analysis of the current status, main issues, policy discussion and qualitative discussion of the subject, essential quantification, major sources of conflicts, management practices, institutional matters and the state of research initiatives. The Bangladesh National Conservation Strategy sets forth the parameters of policy and legislative change, institutional responsibility, reorientation, strengthening and coordination needs, research, survey and monitoring and complementary aspects to reverse the environmental degradation and establish sustainable development practices in Bangladesh.

Under the NCS Implementation Project, pilot interventions include Tanguar Haor Wetland Biodiversity Conservation and Conservation of Coral Resources of Narikel Jinjira.

While the NCS provides for coordinated conservation of natural resources, it does not explicitly address issues of biodiversity conservation. For example, measures which promote conservation of fisheries, but result in a narrowing of the genetic base that supports such fisheries, would be possible under the NCS. The NBSAP, therefore, whilst being fully consistent with the measures identified in the NCS, aims at addressing such gaps.

National Environment Management Action Plan

The National Environment Management Action Plan (NEMAP), the first ever participatory plan was developed in Bangladesh in 1996. It was developed over a period of 5 years, through organization of consultations at the grassroots, sub – national and national levels, by the NGOs. Based on the NEMAP, the first programme approach initiative in the environment sector called Sustainable Environment Management Programme, consisting of 26 project components launched by the Government of Bangladesh, and executed by the Ministry of Environment and Forests, has been under implementation throughout the country by 21 government and non – government agencies since 1998. The following are the five focus areas identified in the NEMAP that had been transformed into projects under the SEMP:

- Policy and Institutions
- Participatory Ecosystem Management
- Community–based Environmental Sanitation
- Advocacy and Awareness
- Training and Education

3.5 Threats to Biodiversity in Bangladesh

The following table summarizes various threats to the biodiversity in Bangladesh along with their underlying causes. These emerged from the consultation meetings, focus group discussions, people’s responses to the nationally publicised issue based queries, and regional and national workshops. The examples of threats and their underlying causes provided in Table 3.1 incorporate many more specific instances that were highlighted during the consultations. Among the threats, habitat loss is considered as

the single most crucial one. Among the underlying causes, the land tenure and user rights issues emerged as the most significant ones.

Table 3.1: Threats to Biodiversity

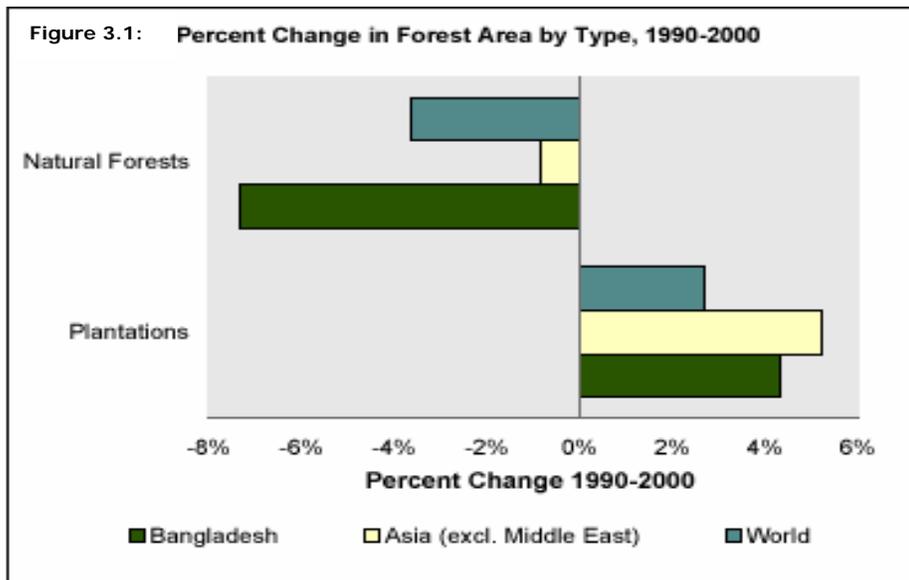
Nature of threat/ underlying cause	Examples of specific threats/underlying causes
Threats	
Loss of habitat	Deforestation (for agricultural expansion, human settlements) Urbanization Draining/filling water bodies Destruction of fish breeding areas Hill slope cultivation and associated silting of water bodies Clear felling for plantation Jhum (slash and burn) cultivation Forest fire Alien and invasive species Upstream withdrawal of water /salinity intrusion downstream
Over harvesting of resources	Unregulated/unscientific logging Indiscriminate collection of medicinal plants Hunting/trafficking in wildlife Harmful fishing gear/trap
Increasing productivity	Indiscriminate breeding of livestock Indiscriminate introduction of HYVs Introduction of hybrid fishes
Natural calamities	Floods Droughts Earthquakes Others
Underlying causes of threats	
Pollution	1. Disposal of untreated industrial wastes/oil spillage from ships 2. Indiscriminate use of pesticides/fertilizers
Awareness	1. Major focus of policy makers is on development 2. Sole priority of poor stakeholders is economic uplift
Land tenure and user rights issues	1. Conflictive and incomplete legislative measures 2. Conflictive sectoral policies 3. Legal instruments and policies do not conform with conservation science 4. Traditional land management systems disappearing
Institutional capacity constraints	1. Conflictive institutional mandates and responsibilities 2. Many of the protected areas are essentially “parks on paper” 3. Expertise in many government agencies dedicated to production rather than conservation
Human population growth	1. Increasing demand for space/resources 2. Change in agricultural practices and local culture 3. Land use change/conflict 4. Poverty

3.6 Trends

The important role of biodiversity in the economy of Bangladesh is quite evident and irreplaceable. Unfortunately, due to the various pressures of the development interventions, gaps in policy and legislation, and conflictive institutional mandates, vast portions of the major ecosystems have been lost or degraded in the recent past. Many species have been lost during the last 100 years, including a large

number of mammals such as, the rhinoceros, gaur, banteng, swamp deer, wolf, *nilgai* and birds such as, the peafowl, pink-headed duck and at least one reptile--the marsh crocodile.

With regard to forest resources, the dire situation is illustrated in Figure 3.1. The rate of forest loss in Bangladesh has exceeded 7% in the 1990s, far exceeding the average for Asia, and even the global average. The rate of compensatory plantation establishment is insignificant. In any case, plantation establishment virtually never considers the biodiversity issues.



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

The establishment of Protected Areas as a tool to combat deforestation has not yet registered any detectable effect. The 18 locales that have been brought under the different types of Protected Areas, and which range in size from only 0.5 to 420 sq km, are not fully representative of the different terrestrial forest ecosystems. For example, the 300-odd wild elephant population which is largely confined to the hills of Chittagong region is not protected. The Biosphere Reserve concept, which would seem to be especially relevant to Bangladesh in this regard, has not been introduced here.

The fishery sector can be sustained only if the major aquatic ecosystems are sustainably managed. The most important freshwater ecosystems are the *haors*, *beels* and *baors*. Unfortunately, however, these have not been adequately protected to date. The approximately 200 sq km area of this ecosystem that has been declared 'Ecologically Critical Areas' need effective management regime to be introduced. The Tanguar *haor* which has been declared a Ramsar site especially warrants a sound management plan urgently, with a view to initiating its being sustainably utilised.

Traditional systems of agriculture and the associated biodiversity are rapidly eroding due to haphazard large-scale indiscriminate introduction of cash crops and plantations, high yielding varieties of crops and lack of positive incentives. The all pervading deteriorating trends in knowledge and conservation of traditional crops and diminishing domesticated livestock are not limited to the hills only. Indiscriminate use of fertilizers and pesticides, whimsical crossing of exotic livestock with indigenous breeds, and

introduction of invasive alien species (IAS), especially fish have all accelerated the erosion of the country's conservation traditions.

The few positive and redeeming trends include the fact that in the recent past, Bangladesh had been attracting global attention due to its emerging civil society organizations and NGOs working on issues related to sustainable development.

3.7 Major Initiatives in Biodiversity Conservation

The Government of Bangladesh has taken a number of initiatives directed at biodiversity conservation, in line with the obligations entailed due to signing and ratifying a number of International Conventions, Treaties and Protocols (ICTPs); the Convention on Biodiversity (CBD) is a major one amongst them. The NEMAP as a pioneering exercise emphasized the actions and commitments for ensuring extensive participation of the grassroots in the planning and implementation of programmes and projects. The Sustainable Environment Management Programme (SEMP) is a follow-up action to implement vital elements of the NEMAP.

Box 3.1: Major Government Initiatives

- SEMP: UNDP funded project, being implemented to conserve important ecosystems and their resources
- NCSIP: a number of pilot projects implemented
- Sundarban Biodiversity Conservation Project
- Forestry Sector Project
- Coastal and Wetland Biodiversity Management at Cox's Bazar and Hakaluki Haor in Greater Sylhet.
- Nishorgo: Co-management of Protected Areas.

The MoEF has been implementing the SEMP since 1998 with financial support from the UNDP. SEMP has 26 components, dedicated to addressing different aspects of the environmental issues. Successful implementation of all the components will establish SEMP as a role model for sustainable development. One of the sub-programmes of SEMP is sustainable ecosystem management under which a model for sustainable utilization of ecosystem based resources is also being tested and developed. Biodiversity conservation is thus emphasized in this sub-programme.

Box 3.2: Sustainable Environment Management Programme (SEMP)

Sustainable Environment Management Programme (SEMP) is a follow up to NEMAP. Activities under SEMP are being implemented in five main areas related to policy and institutions; participatory eco-system management at grass root level, community based environmental sanitation, awareness and advocacy, and training and education. The five broad themes have 26 components being implemented by twenty sub-implementing agencies. Under the community based ecosystem management, IUCN Bangladesh is working for community based wetland management in the *haors* and floodplains of Bangladesh with emphasis on natural resource management through establishment of community managed micro-sanctuaries for flora and fauna, promotion of IPM, use of medicinal plants, promotion of environment-friendly energy sources, provision of alternative livelihood to reduce pressure on natural wealth etc. SEMP too does not hold up all the principles of the CBD.

In connection with the NEMAP and NCS implementation activities, the GoB took further steps to halt the loss of biodiversity by undertaking the implementation of the Coastal and Wetland Biodiversity Management Project at Cox's Bazar and Hakaluki Haor Project (CWBMP). The CWBMP is supported

by GEF-UNDP and focuses on the conservation and sustainable use of globally significant biodiversity of the project area. It is a seven-year project with the MoEF as the executing agency and the DoE as its implementing body. The focus of the CWBMP is on:

- a) Establishing a sound ECA management system, and developing this towards shaping the same as a national tool for biodiversity conservation and sustainable use; and
- b) Developing the capacity of the DoE for ECA management (Box 3.3).

Box 3.3: Main Objectives of CWBMP

The concept of the CWBMP is stated in the Project’s Development Objective: “To establish an innovative system for the management of Ecologically Critical Areas in Bangladesh that will exert a significant and positive impact on the long-term viability of the country’s important biodiversity resources”. Establishing modalities for sustainable use of natural resources by local communities is a central aim of the project along with the goal of conservation of globally significant biodiversity. Thus the project outcome is envisioned to contribute paramountly in improving the management of Bangladesh biodiversity and ecosystems. Formulating project site ECA management plans and monitoring their impacts consist in the main work of the project, which all will be achieved with the involvement and participation of the local communities.

The ‘Nishorgo’ is a Protected Areas Support Project undertaken by the Government of Bangladesh that aims to establish a ‘co-management’ model for the major stakeholders of the Forest Department with maximum participation of the local people. ‘Nishorgo’ is supported by the USAID and other international development partners and eventually envisages formulating a sustainable management system for the protected areas of Bangladesh. The project is being operationalised in 5 selected areas viz. Lawachhara National Park, Rema- Kalenga Wildlife Sanctuary, Satchhari Wildlife Sanctuary, Teknaf Game Reserve and Chunati Wildlife Sanctuary.

Box 3.4: Main Objectives of the ‘Nishorgo’ Support Project

- Developing co-management model for protected areas and creating a synergy between the Forest Department and local stakeholders
- Creating alternative income generation opportunities for the local people
- Proper implementation of laws and legislation for efficient management and building an Association for enforcing them
- Capacity building and institutional strengthening of the Forest Department
- Enabling resource users sustain the positive outcomes of the project
- Developing infrastructure and facilities for attracting tourists and promoting tourism
- Formulation and implementation of biodiversity action plans for the protected areas
- Resolution of conflicts stemming from the use of natural resources
- Providing assistance to research projects on protected areas and biodiversity conservation

4. KEY AND CROSS-CUTTING ISSUES ON BIODIVERSITY CONSERVATION

It has been evident from the situation analysis that there exist a number of issues related to biodiversity and its conservation and management. The consultation meetings and workshops held at regional and national levels have identified a number of issues concerning biodiversity conservation. In identifying the major issues, threats to biodiversity in Bangladesh, their underlying causes, the principles of the CBD, CBD related MEAs and the national sectoral policies were considered. The issues identified through the consultation process were presented before the First National Workshop participants and they discussed threadbare and prioritized them. During the presentation of the draft NBSAP at the Second National Workshop, the participants finalised the issues and organised them in the present order.

The conservation of the natural resources of a country such as ours is the responsibility of a number of government bodies and the communities who use them. Thus, most of the issues related to biodiversity conservation and management are cross-sectoral in nature. Because of the inseparable linkages, all the relevant conservation issues have to be considered holistically in biodiversity conservation planning at the national level.

4.1 Key Issues

The key issues identified during the NBSAP development process are as follows:

Knowledge of species diversity: The first step in appreciating biodiversity is to know about it. There exists a considerable amount of information on the species of higher plants and animals available in the country. A fair amount of information also exists on biodiversity at the level of ecosystems too. But major gaps exist in the information available on the lower plants, fungi, micro organisms, invertebrates, and marine biological resources.

Information on ecosystem structure and function: Conservation and sustainable use of biodiversity need to be based on the knowledge of the life history, population structure and status of species and communities, habitats and ecosystems that they belong to as well as their ecological services and values. Species and ecosystems that carry a lot of market value are usually highly exploited. Information about the rates of depletion of biodiversity is most vital to any efforts leading to their conservation and sustainable use.

Habitat degradation: One of the most grievous causes of biodiversity loss is the degradation of habitats in all ecosystems and landscapes of the country. Change in land use and cropping patterns, expansion of agricultural lands, introduction of the HYVs, urbanization, expansion of road networks, unplanned embankments and other anthropogenic factors have caused immense damage to habitats in all ecosystems.

Over-exploitation of resources: Unregulated logging, illicit felling, indiscriminate harvesting of medicinal plants and NTFPs (Non-Timber Forest Products), hunting and trafficking, fishing using bag nets, bottom trawling fishing, fishing in the breeding season and other factors are causing severe depletion of biodiversity.

Invasive Alien Species (IAS): A number of exotic plants and animals (including fishes) have been introduced into Bangladesh for agriculture, horticulture, forestry, animal husbandry and fisheries. Some of them happened to escape from their confined habitats accidentally, and adapting to the local conditions, proliferated profusely. The local people have nurtured some of these in varying agro-ecological conditions and again, some have become invasive over the local flora and the fauna eventually.

Environmental pollution: One of the biggest threats to biodiversity in Bangladesh lies in the pollution of air, soil and water. Water pollution is the most widespread menace, exacerbated by chemical fertilizers, insecticides, industrial effluents etc; also, massive arsenic contamination of groundwater has occurred countrywide—all of which tantamount to alarming depletion of aquatic and riparian natural resources.

Awareness of biodiversity and its value: Most Bangladeshis do not even know that there exist so many species of organisms in Bangladesh. Even the educated are not familiar with the laws that ban hunting and trade in wild animals, laws that protect certain species and ecosystems and laws that are meant to control environmental pollution. Many policy makers are not aware of the need to balance development with conservation, or of the categories and management regimes of different types of Protected Areas.

Information management: Many public organizations are conducting research and implementing biodiversity related activities in the country. But there is no central database accessible to the public or any organization. People have no idea about any place where to find information and seek help in dealing with biodiversity.

School environmental education curricula: Environmental education component embodying elementary level information was introduced in the formal primary education curriculum for grade 1 – 5, but the secondary school curricula pay little attention to such matters. Biodiversity as a concept is rarely discussed or taught at length either at the primary or in the secondary school levels. Teachers, who happen to be the products of the same hackneyed educational system, hardly possess any basic understanding of the key conservation issues.

Institutional capacity: Many government agencies were originally established only to promote the utilization of natural resources, and the government officers overseeing such utilisations were trained accordingly. Consequently, such guardian or supervisory institutions as well as their staff members appear to be ill-equipped or inept while the question of implementing more holistic management systems directed towards conserving and sustainably managing the biodiversity resources arises. Although the Bangladesh media often tend to get more involved in environmental matters, the personnel reporting and writing on environment and especially, biodiversity related issues happen to be a counted few to date.

The legal and policy environment is conflictive and incomplete: As discussed earlier, a large number of laws address the issues of biodiversity conservation, directly or indirectly. These laws, however, are often inconsistent, and incomplete in dealing with the three basic requirements of the CBD viz., conservation, sustainable use and equitable sharing of benefits. The consultations held in the NBSAP process identified the need for formulation of a Biodiversity Policy and a Biodiversity Act as appropriate measures to address this issue.

Coordination in management and planning: Because a lot many laws affect biodiversity, and a variety of agencies have the mandate for their implementation, there is an obvious need for coordination and cross-sectoral integration. Despite this, there is currently no provision for cross-sectoral planning in the country. Consequently, there is little cooperation between the different biodiversity user groups, resulting in conflicts regarding the ownership and user rights. The different sectoral plans have so far paid little attention to biodiversity, livelihood and food security of the local people.

Enforcement and monitoring: Compounding the problems caused by conflictive and incomplete laws and fragmented governmental mandates, enforcement has rarely been effective so far. Monitoring is essential as the basis for enforcement. Monitoring is also valuable in understanding the status and future of ecosystems, habitats and rare and endangered species; it is also vital for the management of natural resources and IAS. With the exception of the flagship species such as elephants and tigers, other components of biodiversity have rarely been monitored systematically in Bangladesh.

Laws and policies are ineffectively implemented: Consultations at various levels identified that integration and cooperation among the agencies responsible for implementing the diverse laws and policies are weak, hence weak or no implementation at all of such legal instruments has rather been the order of the day. The establishment of a national body to coordinate biodiversity activities is one rational approach to addressing this issue.

Engagement of local communities in biodiversity conservation and sustainable use: Since the livelihood of different communities including some tribal ones are hinged critically on local level biodiversity countrywide, the grassroots certainly have major stakes in biodiversity conservation. During the consultations, it became evident that local communities were nowhere involved in either the management or the sustainable development of local level biodiversity resources and hence their apparently nonchalant attitude. Measures to engage the local communities in biodiversity conservation and sustainable use of resources must be adopted most urgently.

Compartmentalization of responsibilities with regard to Multilateral Environmental Agreements (MEAs): A common problem perceived in many countries is that the governmental responsibilities for fulfilling the obligations entailing under various MEAs are compartmentalized and fragmented. With a view addressing this issue, the NBSAP presents an opportunity to promote synergies between environment, biodiversity and sustainable development generally. Linking the actions that the different MEAs entail is possible here by identifying relevant NBSAP strategic elements along with the respective appropriate actions. Article 22 of the CBD calls for synergies between other obligations, unless it would cause any serious damage or threats to biodiversity. An important initial step in promoting synergies among the MEAs has been already undertaken through the National Capacity Self-Assessment (NCSA) project implementation.

The following Conventions have relevance to biodiversity conservation and therefore, strategy to mainstream biodiversity while national sectoral policies are reviewed needs to be developed.

- **Biodiversity and the United Nations Framework Convention on Climate Change (UNFCCC):** Climate change threatens and undermines the opportunities for sustainable development, adversely affecting the biodiversity and impacting the livelihoods of the poor. Climate change may alter the quality and productivity of natural resources and ecosystems as

well. These, in turn, will affect biodiversity, leading to further degradation of the environment. Climate change may directly affect biodiversity through changes in phenology, the growing season and species distribution. The UNFCCC supports the concept of "sustainable development", calls for developing and sharing environmentally sound coping technologies and emphasizes the need to educate people about climate change.

- **Biodiversity and the United Nations Convention to Combat Desertification (UNCCD):** Globally, land degradation has been a continuous and increasingly alarming concern, as the world's precious but limited store of productive land erodes unabatedly. The UNCCD focuses on improving land productivity and rehabilitation, conservation and sustainable management of land and water resources. The biophysical processes of biodiversity, climate change and land degradation are inseparably linked. Climate change will influence heat extremes, water supplies, soil humidity and temperature, and agricultural production. Land degradation has been affecting agricultural productivity including natural vegetation, wildlife, and soil fertility. The loss of biodiversity, likewise, undermines environmental health, making land more vulnerable to human and natural pressures.
- **Ramsar and Biodiversity:** The Ramsar Convention on Wetlands, 1971 has adopted criteria based on fish for the identification of important wetlands. The broad objectives of both Conventions, Ramsar and the CBD, are mutually compatible. The Convention on Biological Diversity (CBD) has developed a programme of work on the biodiversity of inland waters (Decision IV/4). The NBSAP seems quite opportunely launched, when it clearly responds to the mandate provided by the relevant CBD and Ramsar decisions. Freshwater biodiversity today appears to be much more severely threatened than both marine and terrestrial ones.
- **Convention on International Trade in Endangered Fauna and Flora (CITES) and Biodiversity:** The goals of the CBD and CITES are complementary, but the CBD has a broader agenda, with CITES limiting itself to addressing the species threatened by international trade. The Secretariats of the CBD and the CITES signed an Memorandum of Understanding in the year 1996, agreeing that the strengths of both Conventions should be realized at the national level and as the parties pass national legislation to implement the CBD, implementation of the CITES would also be harmonized in tandem.

4.2 Other Cross-cutting Issues

One of the ways to integrate biodiversity into development planning is through EIAs, which, when conducted religiously, would identify and address the environmental, economic and social impacts of projects, programmes and policies in general. Impact assessment is a potentially powerful tool for implementing the CBD as it:

- Ensures that the CBD objectives are integrated into the decision making processes
- Enables avoid/ mitigate adverse environmental impacts
- Ensures that alternative measures such as economic incentives are considered
- Calls for monitoring and auditing systems which generate relevant data for further conservation and sustainable use of natural resources
- Facilitates environment-friendly technology development and public participation.

Health and biodiversity: Medicinal plants are still widely prescribed by the traditional healers (herbal healer/ kaviraja) and used as household remedies, particularly in countries like ours where public health care services are limited. It may be worthwhile to mention that interest in herbal, traditional, complementary and alternative medicine has grown rapidly of late in the industrialised countries too.

While some medicinal plants are commercially cultivated, the majority, in terms of the number of species, is collected from the wild. Collecting medicinal plants can be an important source of income for the local people in the villages, which, in turn, may generate sufficient incentives for the conservation of these species and their natural habitats. Knowledge of traditional medicines is important to maintenance of health of the rural families as well as livestock and hence consists in an important aspect of biodiversity preservation. Loss of biodiversity or ecosystems can further impair our impoverished diets, exacerbating the susceptibility to disease outbreaks.

Trade and biodiversity: Recent developments in the area of protecting knowledge and intellectual property, privatization of resources and global trade policies have significant impacts on biodiversity. The review of the “Uruguay Round Agreement” on Trade Related Aspects of Intellectual Property Rights (TRIPs) upholds important clauses relevant to biodiversity conservation. The most significant of these is Article 27(3)(b), which deals with patenting of life forms. Issues of basic food security, medicine, and sharing of benefits from resources used in improving food security and medicines are highly significant to a developing country like Bangladesh. The CBD aims to encourage the development of innovations relating to biodiversity in a manner that ensures their availability to all. TRIPs set the minimum relevant standards, which limit the member states from implementing more extensive protection measures. Article 27 (3) (b) does permit the member states to exclude from patentability;

“Plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof.”

This introduces some ambiguity concerning the impact of TRIPs on the CBD, and consequently Paragraph 19 of the Doha Ministerial Declaration (2001) mandates the TRIPs Council, in collaboration with the CBD Secretariat, to continue clarifying the relationship between the TRIPs Agreement and the CBD.

The WTO Agreement on Agriculture and the Doha Ministerial Declaration mandated further negotiations relating to agricultural trade, on market access, export subsidies and on trade-distorting domestic support. Special and differential treatment for developing countries is an integral part of all elements of the negotiations and non-trade concerns are taken into account. This mandate has important linkages with the Convention’s programme of work on incentive measures and its focus on positive incentives for the conservation of biodiversity and its sustainable use as well as on the removal or mitigation of perverse incentives.

In Bangladesh, a *sui generis* system of plant protection is currently being developed, under the guidance of the Bangladesh Environmental Lawyers Association (BELA). Implementation of the NBSAP needs to ensure that the emerging *sui generis* system accounts for the provisions of the CBD. It is also essential

that Bangladesh's interests, including those of biodiversity conservation, are adequately reflected in the continuing negotiations under the Doha Declaration.

Water and biodiversity: Water is the key to development in all its dimensions. It is an essential element for human survival, and the coordination of safe drinking water, adequate sanitation and hygiene is recognized as fundamental to human wellbeing. As in many other countries, agriculture will continue to be a key sector for many poor people in Bangladesh. Limited supply or availability of water for irrigation will affect productivity. It is, therefore, important to look at packages of initiatives to improve the efficiency of tapping rainwater and management of irrigation besides focusing on on-farm water management in rain-fed agriculture. Crop diversification and where possible, intensification will also help increase productivity with limited water supplies.

Better conservation and management of forests will slow the rate of run-off in watershed. By slowing the rate of run-off, forests help to minimise flooding in smaller watersheds besides increasing minimum stream flows during the dry season. Besides, the forests also increase ground water recharge, and affects aquatic productivity.

Better conservation of biodiversity and management of natural resources provide a sound base to achieving elements of water management strategies. The NBSAP attempts to address this through several strategies and related actions.

Poverty and livelihoods: According to a recent World Bank report, poverty is a multidimensional phenomenon encompassing, amongst others – food, health and nutritional securities, lack or control over resources and vulnerability to shocks. Rural communities still derive a significant proportion of their food and income from biological resources and therefore, the availability and sustainability of biodiversity is of direct relevance to poverty reduction for these people. In addition, a large proportion of the poor live in marginal environments with low productivity and fragile lands. In these environments, there is a high dependency on genetic, species and ecosystem diversity to support their livelihoods. While it is often through the actions of the poor rural people that biodiversity is threatened, the underlying causes are often related to the denial of their rights to natural resources.

Even though population pressure leads to more demands on biodiversity, it often provides an opportunity to be innovative in using resources more wisely. Linked to this is the fact that the poor have a more direct interest in investing in biodiversity conservation and management, since biodiversity is their livelihood capital. Equipped with their traditional knowledge and wisdom of managing local resources, the rural communities often fare better in conserving, using and sharing biodiversity.

Disaster management and biodiversity conservation: Bangladesh faces considerable disaster threats due to flooding, cyclones, droughts and water pollution (primarily due to arsenic contamination of groundwater). Sea level rise and changes in precipitation patterns seriously undermine the local livelihoods; degradation of soils and water also cause health problems as well as spread of diseases. The NBSAP of Bangladesh aims to mainstream the concerns of conservation in the management of natural disasters, aiming at addressing the issue of how biodiversity conservation can assume a suitable risk management strategy role.

Biodiversity conservation and education: The role of education and communication in achieving biodiversity conservation and sustainable development cannot be over-emphasized. Education includes the formal (schools, colleges etc), non-formal (nature centres, extension programmes and like) and informal (folk theatre, newspapers, television etc) systems which all play a critical role in raising the awareness of the people to deal with the conservation, sustainable use and equity issues earnestly.

The NBSAP of Bangladesh, after reviewing the education systems, contents and their roles in supporting conservation in the country, lays emphasis on the following elements and urges implementation of actions as follows to consider and utilise education as the basic and cross-cutting element for achieving success.

- **Education in social and economic dimension:** Mainstream issues of cooperation, poverty reduction, changing consumption patterns, population reduction, protecting human health and decision-making.
- **Education in conservation and management of resources:** Develop curricula in formal (primary and secondary school levels), informal and non-formal methods to deal with the issues of protecting the environment, stopping pollution, promoting sustainable agriculture, forestry and fisheries, sustainable use of biodiversity, ethics and equity on sharing benefits and managing risks.
- **Education in strengthening roles of major groups:** Focus on the role of education in influencing actions of major groups like the NGOs, youth, women, children, indigenous people, local authorities, business and industry, students and farmers.
- **Education in implementing the NBSAP:** Education in the form of information, options and experiences on technology transfer, financing, science and development, training, capacity building and decision-making.

Gender and biodiversity: Women in many parts of the world have traditionally played a key role in preserving biological diversity. It is clear that since the early days of domestication of economic plants about 12,000 years ago, women have played a pivotal role in the selection, domestication and conservation of plants. In most of the cases of traditional health care systems, women have been the main custodians and practitioners of knowledge related to conservation. In Bangladesh, they initiate homestead forestry and poultry rearing in the villages, thus conserving the local diversity and the traditional knowledge of the medicinal plants as well.

In addition, women have generally been on the forefront of the environment conservation movement, such as the Nanda Devi, Gaura Devi and their ‘tree-huggers’ of the *chipko* movement in India, under which women practiced non-violent resistance to socially unpopular logging. Recognising gender roles in biodiversity conservation and management explicitly will be an important step in ensuring and up scaling of the conservation and sustainable as well as equitable use of biodiversity countrywide. Bangladesh has recognized the role of women in national development and during the fifth five year plan period (1997 – 2002) and three years Rolling Plan (2003 – 2006) formulated specific policies to reduce gender gaps and encourage women’s role in biodiversity management.

5. PROPOSED NATIONAL BIODIVERSITY POLICY

According to the Convention on Biological Diversity (CBD), biodiversity is defined as “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”. Biodiversity is a key for human livelihoods as well as development and provides the life support system against all our current and future needs. Thus, biodiversity is all about people’s lives.

The root causes of biodiversity loss range from natural processes such as climate change to man-made interventions like unsustainable use and exploitation. Conserving our biodiversity is a national goal in addition to individuals’ responsibility. The links between sectors and stakeholders, government departments and NGOs, donors and local communities, private sector and policy makers play vital role in achieving sustainable methods of conserving our biodiversity, using them sustainably and sharing the benefits of such use equitably.

As a signatory country of the Convention on Biological Diversity, and being aware of the above-mentioned implications, the Government of Bangladesh undertook the task of developing a National Biodiversity Strategy and Action Plan (NBSAP). The task has been accomplished through a participatory process by holding six regional workshops and two national workshops, with a view to obtaining various relevant inputs from all related expert groups, professionals as well as the grassroots. Along with the identification of issues, policy guidelines were also developed. In developing the policy guidelines, both ‘top-down’ and ‘bottom-up’ consultation processes were deployed and the findings were filtered through the CBD principles and CoP decisions. Also, all other relevant national policies were consulted duly.

From the above workshops and meetings emerged a number of clear implications that led to the formulation of the NBSAP for Bangladesh, in accordance with the basic relevant provisions laid down in the CBD.

5.1 Policy Statement

The Convention on Biological Diversity affirms that the States (Countries) have sovereign rights over the biological resources present within the country. In the line of the principles of the CBD, this Policy appreciates 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 the genetic resources.

5.2 Objectives

The primary objective of the Policy is to:

- establish conditions to conserve, and wherever necessary, to restore the biodiversity of Bangladesh as an essential component to ensure the wellbeing of the present and future generations, and equitable sharing of benefits.

The secondary objectives are to:

- ensure long-term food and health security of the nation and ecosystem services;
- maintain and improve environmental stability for proper functioning of ecological systems, including biosafety considerations in development of biotechnology, and;
- ensure preservation of the unique biological heritage of the nation as an asset for the benefit of the current and future generations

5.3 Policy Guidelines

With a view to conserving and sustainability using the biodiversity, the Government commits itself following principles and guidelines to:

1. Recognise the value and importance of biodiversity and the need to document properly its components, distribution and services.
2. Conserve ecosystems, species and genetic pools to ensure the present and future wellbeing of the country and its people and to mitigate the impacts of natural disasters.
3. Restore ecosystems and recuperate threatened species.
4. Adopt bio-safety standards to deal with invasive alien species, genetically modified organisms and living modified organisms.
5. Ensure the equitable sharing of benefits of biodiversity and protect against bio-piracy.
6. Promote awareness raising and build capacity about biodiversity conservation and sustainable use among the different sectors of the society.
7. Document traditional knowledge and the protection of the intellectual property rights of the local communities on use of products and conservation of biodiversity.
8. Establish institutions for inter-sectoral implementing mechanism for the Bangladesh National Biodiversity Strategy and Action Plan.
9. Enhance Protected Area management, recognizing the benefits of collaboration with local communities in their management (co-management).
10. Ensure wise use of wetland resources.
11. Facilitate the participatory mechanisms to receive and utilise the inputs from the private sector, the civil society, the academia and the local communities for biodiversity conservation.
12. Ensure and strengthen the enforcement of existing biodiversity related legal regime.
13. Develop monitoring and reporting system on biodiversity conservation.

14. Develop a sustainable system to fund the biodiversity conservation process through appropriate and equitable mechanisms ensuring the fair contribution of all sectors (particularly those affecting biodiversity conservation negatively).
15. Establish synergy with other International Conventions, Treaties and Protocols (ICTPs) that deal with climate change, disaster management, livelihood, food security and sustainable development.
16. Integrate biodiversity conservation into national development planning, thus ensuring that poverty alleviation and conservation are mutually supportive.

6. KEY STRATEGIES AND ACTIONS FOR BIODIVERSITY CONSERVATION

In order for the NBSAP to be effective, the Policy Statement enunciated in section 5.1 needs to be elaborated in terms of strategies and specific actions. This chapter develops ideas that were presented at the various consultation meetings to propose numerous action items. As it is not feasible to undertake all the proposed action items immediately, Annex 1 prioritizes the proposed actions.

As described in section 5.2, the objectives of the proposed Bangladesh Biodiversity Policy are to:

- Establish conditions to conserve, and wherever necessary to restore, the biodiversity of Bangladesh as an essential component to ensure the well being of the present and future generations, and equitable sharing of benefits.
- Ensure long-term food, water, health and nutritional securities for the people by instituting provision of opportunities for economic development through conservation of biological diversity.
- Maintain and improve environmental stability for proper functioning of ecological systems.
- Ensure preservation of the unique biological heritage of the nation as an asset for the benefit of the current and future generations.

The policy guidelines identified in section 5.3 are presented below as elements of the overall National Biodiversity Strategy. The actions associated with each element (as prioritized in Annex 1) represent the National Biodiversity Action Plan

Each of the proposed actions is presented as a **short term (0- 3 years)**, **medium term (4-7 years)**, or **long term (8-10 years)** intervention. Short-term actions may be completed quickly. Those identified as medium-term or long-term may also be initiated immediately, but cannot be expected to yield results as quickly as short-term actions.

The actions proposed below will need to be kept under frequent review as conditions change. The implementation mechanism described below in Chapter 7 will need to support participatory reviews of the strategy and action plan as circumstances demand. Any revisions should be based on the same, or a similar participatory planning approach as that used in preparing this initial strategy and action plan.

Strategy 1: Recognize the value and importance of biodiversity for the Bangladesh people and document properly its components, distribution and value.

Two of the CBD objectives relate to the conservation of biodiversity and sustainable use of the components of biodiversity. In order to achieve the targets of conservation, sustainable use efforts and promoting access to biodiversity for value addition, Bangladesh has to start with conceiving pragmatically of its biological resources as valuable assets. Lack of inventories of the biodiversity at ecosystem, species and genetic levels and also lack of documentation as regards the associated traditional knowledge still available at the community level have been identified as important issues during the NBSAP planning process. In addition, the economic values of biodiversity have so far been grossly underestimated in Bangladesh. This is because no proper valuations were carried out in the past. It is envisaged that a proper understanding of the value of resources that exist within the country will provide the needed justification not only for increased focus on conservation but also on the possible ways in which such rich resources can be tapped for income generation and livelihood uplift. Through deploying this strategy, it is hoped that Bangladesh and its people would understand the value of biological resources available within the country as well as the support needed from other sectors in implementing any relevant actions.

Actions

Short term (0- 3 years)

- Document existing ecosystems, species and genetic pools of Bangladesh, including their status and extension, with specific emphasis on ecosystems such as forests, coastal and marine environments, inland water, agriculture and fisheries; species including flora, fauna, microorganisms, underutilised species and insects.
- Determine values in economic terms of the different goods and services provided by the different biodiversity components to the benefits of the country's economy and its people.
- Support identification of the biodiversity services that contribute to reducing poverty and providing means for sustainable household economic securities.

Medium term (4-7 years)

- Understand the economic values of biodiversity and empower local communities to achieve economic gains by developing suitable market linkages and strategies
- Conduct village-based inventory of flora and fauna, including their traditional uses.

Long term (8 -10 years)

- Develop a National Biodiversity Information System that acts as the National Clearing House Mechanism on biodiversity.

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

Species and genetic conservation are critical factors in contributing to livelihood securities as well as enhancing the productivity of ecosystems. Conservation and sustainable use of biodiversity such as forests, fisheries, agriculture, coastal and marine areas, specific species assemblages like wild relatives of crop plants and animals, micro organisms, pollinators and invertebrates—all need priority attention.

Conservation of such biodiversity can be promoted by both *ex situ* and *in situ* means. The role of Protected Areas in promoting such efforts in addition to maintaining buffer zones and community conservation areas is critical in ensuring that conservation efforts are well managed and sustained. Developing the scientific basis for conservation and supporting suitable institutional mechanisms also happen to be crucial to commissioning any serious and well-meant conservation campaign. The following actions provide the basis for addressing the conservation efforts as well as improving livelihoods.

Actions

Short term (0- 3 years)

- Develop action plans for protection and conservation of endangered native and endemic species of Bangladesh.
- Document and map existing community reserves in the hill ecosystems along with their management modes.
- Develop the proposals for methodology to integrate biodiversity concerns into EIA, SEA etc.
- Carry out a GIS-based high resolution ‘life-scape’ mapping of the country
- Develop conservation plans for the prioritised hot spots, especially for agrobiodiversity and fisheries.
- Develop national systems and plans for conservation and management of Ecologically Critical Areas.
- Develop community managed medicinal plant gardens in the different bio-ecological zones.
- Identify indicators for monitoring the health of ecosystems.
- Develop management and action plans for key ecosystems and landscapes following the bio-ecological zones of Bangladesh.
- Support breeding programmes for Black Bengal goats, indigenous buffalo, *garole* sheep and *Nageshwari* duck, Red Chittagong Cattle and *Nilgai*, by ensuring that the native genetic stocks are maintained.
- Identify the impacts of climate change, desertification, floods and other processes on the integrity of ecosystems and species and develop suitable management plans.

Medium term (4-7 years)

- Develop and implement actions to support management of soil biodiversity for enhancing productivity and implement options for conservation of pollinators.
- Support minimum nutritional standards for the people by: promoting cultivation of nutritional crops and drought-resistant varieties; setting up community seed banks; provision of access to nutritious food; and raising awareness of addressing spells/cycles of hidden and transient hunger.
- Promote such agricultural practices as can provide better household nutrition e.g. by encouraging the development of home gardens, Medicinal Plant Conservation Areas, mixed cropping etc.
- Supporting on-farm management and improvement of plant genetic resources for agriculture (PGRFA).
- Conserve biodiversity and develop management plans for all islands especially Maheshkhali, Sonadia, Kutubdia and Nijhum Dweep.
- Operationalize the Ecologically Critical Areas (ECA) concept through the development management plans and declare more habitats such as oxbow lakes namely Jhapar and Bukhara *baors*, Kaptai (man – made reservoir) and natural lakes as ECAs.

Long term (8 -10 years)

- Support sustainable harvesting of biodiversity and management of biological resources.
- Conserve the genetic pool of plants and animals, both in *ex-situ* and *in-situ* conditions, through appropriate local actions.
- Promote indigenous methods of conservation and management of *jhum* agrobiodiversity with appropriate incentives.
- Promote sustainable agriculture through diversification of crop production and introducing broader diversity in crops as well as innovative techniques such as participatory plant breeding.
- Incorporate ecosystem conservation efforts into the national disaster management plan implementation.
- Develop model ‘eco-villages’ for biodiversity conservation involving village level local government institutions and communities.

Strategy 3: Restore ecosystems and rehabilitate endangered species

Population pressure, excessive and unregulated harvesting, encroachment on forest land for agriculture, plantation of exotic species, monoculture, filling of water bodies, unplanned infrastructure development, industrial and agricultural pollution and other anthropogenic factors have rendered ecosystems degraded, which, in turn, have caused the gradual loss of biodiversity at species level; fragmentation of the population size that ultimately leads to loss at genetic level, to species becoming rare and endangered. Unless measures are taken to protect such ecosystems and species, irreversible losses to biodiversity will occur certainly. The suggested actions under this section focus on responding to the CBD’s 2010 targets in respect of reducing the rate of biodiversity loss.

Actions

Short term (0- 3 years)

- Support rehabilitation of the rare, threatened and endangered native, wild and domesticated species.
- Implement plans for management of species under the rare, threatened and endangered categories.
- Develop action plans for reducing levels of pollution – both in rural and urban areas to support conservation efforts.
- Support development of assessment, management and monitoring plans both at ecosystem and species levels.
- Create and launch initiatives for restoration of degraded ecosystems.

Medium term (4-7 years)

- Develop mechanisms to halt degradation and restore ecosystems as much as possible.
- Review and update Red Book lists of threatened and endangered species.

Long term (8 -10 years)

- Encourage afforestation and reforestation programmes with indigenous species.
- Regulate shifting cultivation and introduce and extend, as appropriate, innovative farming practices developed and adopted by farmers.

Strategy 4: Adopt national measures and standards to deal with invasive alien species and genetically modified organisms

A number of invasive alien species are present in Bangladesh that poses serious threats to the local biodiversity and ecosystem integrity, besides costing local economies. Unless carefully monitored, introduction of such fish and agricultural crop species may cause serious damage to ecosystem health and productivity. Globalisation and trade policies are increasingly favouring extensive use of GMOs. Chance introductions, lack of identification, labelling procedures and weak capacities to carry out risk assessment and management of GMOs are causes of serious concern. Bangladesh attempts to respond to these challenges through a set of actions contemplated and identified here and also proposes to create local capacities to deal with the related issues.

Actions

Short term (0- 3 years)

- Develop national management plans for control and eradication of invasive alien species.
- Support capacity building on identification of invasive species and genetically modified organisms.
- Develop a national biosafety framework.
- Locally monitor and prevent the release of IAS and hybrids in aquatic ecosystems.

Medium term (4-7 years)

- Develop capacity building tools and methods for local communities to deal with identification, management and control of invasive species and GMOs.
- Build awareness of biosafety and biopiracy issues among local communities and within the Customs Service.

Long term (8-10 years)

- Support establishment of monitoring systems for addressing issues of regional and international trade and their impact on movement and/or introduction of invasive species and genetically modified organisms.
- Support economic and social impact studies on use of genetically modified organisms and alien species.
- Encourage regional dialogue on sharing of expertise and resources in management of IAS and GMOs.

Strategy 5: Promote equitable sharing of biodiversity conservation costs and benefits among different sectors of the society

With increasing threats of privatisation of knowledge through patents and intellectual property rights, it is important that national policies are developed to provide a guiding framework for extraction of resources and their use and also regulations for protection of such resources, their uses and associated knowledge. National capacities need to be built to address the research and development issues on identification of products and processes as well as sharing of benefits arising out of the use. Several regional and international processes ranging from the TRIPS regime and IPR issues of WTO to the issues of traditional knowledge impact the national processes of access and benefit sharing. Therefore, it is important to address the linkages between accesses and benefit sharing, IPRs and trade regimes.

Actions

Short term (0- 3 years)

- Develop and implement national access and benefit sharing regime on genetic resources.
- Identify impacts of trade and IPR regimes on national policies regarding access and benefit sharing.
- Develop suitable national policies on patents and IPRs, which, in addition to being responsive to local needs, will also contribute to international cooperation in the use of biological resources.
- Encourage documentation and protection of traditional knowledge associated with conservation and use.

Medium term (4-7 years)

- Develop capacities for research and development on use of species and genetic resources.

Long term (8 -10 years)

- Develop mechanisms for private sector investment into sustainable use of biodiversity by revision of appropriate policies and provision of incentives for such investments.
- Promote development and commercialisation of under-utilised crops and species.
- Institute rewards and incentives for the conservation of indigenous crops, genetic materials, and best practices of resource use.

Strategy 6: Contribute to raising awareness and building capacity of biodiversity conservation among the different sectors of the society

Lack of awareness poses the greatest threat to any conservation effort. Very often, species are lost forever due to the lack of information and awareness. Many ecosystems and species are facing threats from non-biological processes undertaken without possible impact assessments. Capacity building to implement the NBSAP is needed both at individual and institutional levels. Such awareness raising and capacity building can be directed at all levels of management – from local to national. One of the main elements of such a process is to ensure that the policy development and implementation of actions dealing with the objectives of the NBSAP are transparent and participatory.

Actions

Short term (0- 3 years)

- Ensure that all sectors of the Bangladesh society, including Government at different levels, are fully aware of both the need to conserve biodiversity and their personal and institutional responsibilities involved in this task.
- Build taxonomic capacity for lower groups of plants, invertebrates, microorganisms and threatened/endangered species.
- Promote understanding and awareness of the stakeholders of the importance and methods of conservation through developing appropriate communication tools, including materials in local language.

Medium term (4-7 years)

- Develop the capacity of different sectors, including the Government, of implementing the necessary tasks in respect of biodiversity conservation, as appropriate.

- Strengthen existing capacity of Department of Environment to address the Environmental Clearance Certificate more efficiently.
- Provide institutional support for conserving homestead forestry.
- Build capacity in local communities, especially those that live around the PAs to serve as tour guides where market research demonstrates a viable ecotourism potential.
- Curriculum development and training of the trainers (ToT) on biodiversity.

Long term (8 -10 years)

- Build capacity of local communities to monitor and report on the status of biodiversity, threats, and underlying causes.
- Integrate conservation and sustainable use into both formal and non-formal education programmes through the provision of education opportunities that particularly target the poor and natural resource dependent communities, e.g. those living in PAs.
- Establish regional herbaria and botanical gardens and the Bangladesh Museum of Natural History.
- Integrate biodiversity-based curricula into the formal education system and update regularly.

Strategy 7: Promote use of traditional knowledge for conservation, use and protection of the local communities' intellectual property rights

Ensuring the participation of the local communities in actions to promote conservation, use and benefit sharing is critical to achieving the objective of the CBD. Local traditions, uses and practices often provide the best suggestions for sustainability of biodiversity as well as securing household livelihood securities. Such knowledge of communities ranges from selection of seeds for sowing to administering medicines for common ailments. But the knowledge is fast disappearing and there is no concerted action to document, protect and use such knowledge. Also, when such knowledge is used there are no means for compensating the communities who provide the knowledge. In order to encourage that traditional knowledge is not lost and when used such knowledge is recognised and rewarded, the following actions are suggested.

Actions

Short term (0- 3 years)

- Document and register the traditional knowledge developed over the centuries by the people.
- Assess extent which the *sui generis* system of Bangladesh is able to protect the intellectual property rights of local communities.

Medium term (4-7 years)

- Provide incentives to communities to conserve indigenous food and other economic plants

Long term (8 -10 years)

- Promote forestry activities with a focus sustainable harvesting and management of fuel wood and Non-Timber Forest Products (NTFPs) by supporting activities such as Joint Forest Management and development of Community Wood lots etc. (creating equitable access among gender, class and caste to forest resources).
- Promote the adoption of People's Biodiversity Registers throughout the country
- Integrate traditional knowledge in local level planning

Strategy 8: Establish institutions for inter-sectoral implementing mechanism for the Bangladesh National Biodiversity Strategy and Action Plan.

One of the key measures that contribute to the success of implementation of an NBSAP is the support structure(s) that are put in place to address issues of development of actions, reviewing constraints, supporting inter-sectoral cooperation and managing evaluation functions of implementation. The designation of an ‘apex body’ to carry out these functions in Bangladesh has been reiterated during the planning process. It is envisaged that this apex body will also contribute to strengthening the institutionalisation of the NBSAP across other government agencies and ministries.

Actions

Short term (0- 3 years)

- Support establishment of an ‘Apex Body’ for biodiversity conservation for implementation of NBSAP with suitable support mechanism

Medium term (4-7 years)

- Develop capacities of the members of this proposed ‘Apex Body’ for better implementation of NBSAP

Long term (8 -10 years)

- Support development of monitoring and evaluation tools for assessing the implementation of NBSAP besides addressing issues of opportunities and threats
- Enhance cooperation among agencies and ministries on issues of ownership of NBSAP
- Support mainstreaming biodiversity conservation, issues and actions identified under NBSAP into other sectors, agencies and their action plans as well as into PRSPs and NAPA.

Strategy 9: Enhance Protected Area management, recognizing the benefits of collaboration with local communities in their management (co-management).

It has been stated in section 2.2 that only 1.63% land of Bangladesh is under PAs which is not adequate for *in-situ* conservation of natural resources of the country. Further, the PAs are not properly managed. But in future the pressure on protected areas will increase as a result of demographic shifts, population increases in urban areas; unsustainable consumption patterns and widespread poverty impacting on environmental services; greater demands for production of goods and services from PAs; development of inappropriate infrastructure, climate change, and invasion of exotic species; fragmentation of natural habitats, etc. Practically, protected areas should be managed in keeping with the Ecosystem Approach as defined by the Conference of the Parties to the Convention on Biological Diversity (Decision V/6) which can be summarised as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Co-management of PAs is one of the widely accepted approaches towards its management. Considering the Ecosystem and Co-management approaches of *in-situ* conservation PAs have been brought under a separate strategy with the following actions in the NBSAP.

Actions

Short term (0- 3 years)

- Identify key habitats that ensure ecosystem integrity and connectivity (corridors, migratory flyways of birds, etc) and support actions to maintain and promote such connectivity between the earmarked critical and sensitive areas.

Medium term (4-7 years)

- Develop suitable measures to promote co-management of PAs and designate community conservation areas.
- Reorganise the structural pattern of the Forest Department and strengthen the capacity of personnel for PA management.

Long term (8 -10 years)

- Identify, create and manage National Biodiversity Conservation Areas, Protected Areas (PAs) and biodiversity hot spots and suggest appropriate actions to promote environmental sustainability.
- Establish a well-managed and representative protected area system, which is responsive to the local needs of communities, in addition to supporting conservation of biodiversity.
- Establish a biosphere reserve in the hilly parts of Chittagong and the CHTs

Strategy 10: Ensure wise use of wetland resources.

The majority of the natural ecosystems of Bangladesh are wetlands. Surface water is the most severely impacted natural resource in the country. Both the fresh water and marine ecosystems are rich in biodiversity and supports livelihood of a reasonable section of people. The wet lands are now under threat. Some of the freshwater wetlands are the source of major mother fisheries. Ramsar convention calls for wise use of the wetland. Considering the size of the wetlands this strategy has been identified with following major actions.

Actions

Short term (0- 3 years)

- Identify key habitats that ensure ecosystem integrity and connectivity (migratory flyways of birds, fish passes, etc) and support actions to maintain and promote such connectivity between the earmarked critical and sensitive areas.
- Develop community-based wetland and aquatic resources management

Medium term (4-7 years)

- Promote and ensure income generation activities during the fish breeding season for people those are dependent on fishing only.

Long term (8 -10 years)

- Promote conservation of biodiversity through ecosystem approach for watershed management in order to ensure adequate water supply, in terms of quality and quantity, for households by developing appropriate management plans for watersheds and their use.
- Establish and manage fish sanctuaries both in fresh water and marine ecosystem including ‘brush piles’ in fresh water ecosystem.

- Ensure the sectoral policies on fisheries, aquatic resources and water managements are in keeping with the NBSAP.

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.

Conservation and sustainable management of biodiversity requires contributions from many sectors and stakeholders. It is therefore important that there is adequate sensitivity and capacity in the various sectors related to biodiversity as well as impacted by biodiversity to address and integrate elements of NBSAP in their plans and projects. Decentralized management of biodiversity through local capacity building and empowerment is an important strategy that will be adopted in Bangladesh.

Actions

Short term (0- 3 years)

- Ensure that appropriate participatory processes/ collaborative mechanisms are put in place in all activities related with biodiversity conservation, including the NBSAP implementation mechanisms.
- Identify and establish the mechanism of cooperation between related agencies for taking forward the actions identified under the NBSAP

Medium term (4-7 years)

- Support development of sectoral action plans, identifying the roles and responsibilities of government agencies and departments.
- Develop capacities as well as understanding on issues of conservation, management and use to relevant stakeholders
- Further develop the finance strategy suggested under the NBSAP to include ways of cooperating with private sector and business community.

Long term (8 -10 years)

- Encourage budgetary allocations to implementation of NBSAPs by different agencies, including local government bodies, private sector and NGOs.
- Enhance support to research and academic institutions working on elements of NBSAP

Strategy 12: Review and develop biodiversity related legislation(s) and establish a specific branch in the Judiciary to deal with biodiversity and environmental issues

A number of laws exist in Bangladesh that addresses, directly or indirectly, the issue of biodiversity conservation, sustainable use and equity. However, they do not reflect the issues of linkages and impacts of local actions on conservation and sustainable use. Awareness on the relevance of such laws and policies are also lacking. Major concerns on the issue of relevance of existing legislative principles deal with the way they ignore the linkages that exist between conservation and development.

Increasing impacts of globalisation, relevance of international laws on national policies are often neglected while developing legal regimes. Issues of IPRs, WTO rules, TRIPS principle, biosafety

standards are missing in sectoral laws and policies. Therefore it is important that review of existing legal regimes besides developing newer one where needed.

Actions

Short term (0- 3 years)

- Review and strengthen the legal and policy regimes for conservation and, sustainable and equitable use of biological resources
- Develop training modules for Judiciary on conservation and environment
- Ensure that the proposed ‘Biodiversity Act’ is compatible to the NBSAP
- Strengthen individual and institutional capacities on issues of trade and IPRs. WTO rules and Access and Benefit Sharing and others.
- Update EIA requirements to incorporate biodiversity and biosafety issues
- Ensure incorporation and implementation of biodiversity guidelines in all related policies
- Develop a national policy to address the issue of human-animal conflicts in and around protected areas, especially trans-boundary issues

Medium term (4-7 years)

- Enhance the understanding of the Judiciary on importance of biodiversity, its links to local livelihoods and environment, emerging international trends in environmental law
- Establish a information sharing mechanism on environmental justice and related provisions

Strategy 13: Establish an open and transparent monitoring and reporting system status and trends of implementing the principles of CBD

For successful implementation of the NBSAP, an active and credible monitoring and reporting system is required. A transparent monitoring and reporting process increases the accountability of different sectors, organizations and institutions in the implementation of the NBSAP. Article 26 of the CBD also provides a mechanism to monitor the implementation of the Convention. Conceptually, the monitoring and reporting system will collect information about the implementation of the NBSAP activities by the different implementing institutions and organizations and report periodically about the mentioned issues to the ‘Apex Body’ established to oversee implementation of the NBSAP

Actions

Short term (0- 3 years)

- Develop tools and techniques for monitoring and implementation of NBSAP
- Prepare biodiversity baseline report and develop reporting tools.
- Identify options for participatory implementation of NBSAP

Medium term (4-7 years)

- Encourage public and private sector initiatives on supporting implementation and monitoring of actions through provision of appropriate incentives.

Strategy 14: Develop a financial strategy that is innovative and sustainable.

One of the critical challenges of implementing an NBSAP is the availability of financial resources for realising the actions identified. Article 20 of CBD calls for each contracting party “to provide, in accordance with its capabilities, financial support and incentives in respect of those national activities which are intended to achieve the objectives of this Convention, in accordance with its national plans, priorities and programmes.” It is therefore a requirement for countries to identify ways in which such financial support will be provided for implementing the NBSAP.

This financing strategy provides the needed framework to assess and cover the costs of the NBSAP implementation, besides providing some ideas on how existing finances can be used as well as new reserves raised so that the implementation of NBSAP is possible as well as sustainable. Also, for long term sustainability, it is crucial to identify ways of raising resources within the country.

Actions

Short term (0- 3 years)

- Identify ways of realising the principles of the financial strategy that identifies possible sources of support for implementation of NBSAP
- Assist agencies and ministries in identifying funding strategies for conservation as well as encourage resource allocations through their annual budgets
- Develop a medium term and long-term investment plan for realising the actions under NBSAP

Medium term (4-7 years)

- Encourage donors and partners to mainstream elements of NBSAP and the actions thereof into their plans and programmes of support

Long term (8 -10 years)

- Support development of innovative funding options for actions under NBSAP
- Encourage private sector partnership on financing implementation with appropriate monitoring mechanisms

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

Article 22 of CBD calls for synergy between the NBSAP and the other ICTPs. Agenda 21 has provided the basic guidelines of integrating biodiversity in sustainable development. Managing ecosystems, species and genetic resources for alleviating poverty; addressing issues of adaptation and mitigation to climate change, sustainable ways of managing water; mainstreaming the role and relevance of biodiversity into realising the PRSPs are some critical areas that need priority attention.

Actions

Short term (0- 3 years)

- Review and revise national disaster management plans that include elements of contributions from biodiversity into implementing such plans.

Medium term (4-7 years)

- Develop local activities on issues of adaptation and mitigation.
- Develop a portfolio of actions on ‘anticipatory research’ to address the future offsets of climate change

Long term (8 -10 years)

- Identify options for carbon markets that are linked to quality carbon sequestration
- Integrate elements of conservation of biodiversity and development planning into National Adaptation Programmes of Action (NAPAs).
- Support development of policies that address issues of mitigating the impacts of trade, globalisation and IPRs on local livelihoods as well as conservation.
- Promote sustainable use practices and market linkages by developing policies and regulations through cooperatives and other appropriate mechanisms
- Promote sustainable agricultural practices by: providing incentives to farmers for following sustainable practices; supporting use of modern and traditional technology blends; supporting effective Public Distribution System

Strategy 16: Integrate biodiversity conservation into the national development making, planning and processes

Poor people, especially those living in marginal environments and in areas with low agricultural productivity, depend directly on genetic, species and ecosystem diversity to support their livelihoods. This dependency is evident through the contribution of biodiversity to food, health, nutrition, household development, income generation and reduced vulnerability. However, the interests of powerful groups, inappropriate policies and inefficient governance at local and national levels suppress these aspects.

Actions

Short term (0- 3 years)

- Develop anticipatory methods to deal with issues of managing the environment, adoption of new technologies and strengthening resource rights.
- Encourage private sector involvement in development planning as well as implementing pro-poor environmental and fiscal reforms.

Medium term (4-7 years)

- Strengthen institutional and individual capacities at the local level to deal with issues of negotiation as well as implementation.
- Improve poverty-environment-development assessment methods so that monitoring and evaluation can be clear, democratic and objective.
- Make foreign direct investment pro-poor and pro-environment.
- Find ways to ensure Multilateral Environmental Agreements (MEAs) more explicitly contribute to poverty reduction in their implementation.
- Encourage sustainable production and sustainable consumption methods.

- Enhance effectiveness of development cooperation and debt relief that is not only based on the WTO principles and negotiations but also on ethics and equity aimed at sustainable development and poverty reduction.

Long term (8 -10 years)

- Integrate poverty-environment-development issues into national development frameworks.
- Decentralise environmental management and prioritize actions on the national development agenda.
- Reduce the environmental vulnerability of poor by providing appropriate coping strategies.

7. IMPLEMENTATION MECHANISMS

7.1 Institutional Set-up

The success of the National Biodiversity Strategy and Action Plan should lie essentially in its implementation and follow-up. A key to the achievement of its effective implementation is the establishment and continuation of an administrative structure that will ensure its implementation and subsequent monitoring and reviewing. The Ministry of Environment and Forests, the focal point of the CBD is responsible for the conservation and management of biodiversity in the country. The responsibility of conserving and managing the nation's natural resources is shared by a number of different government bodies, including the Ministries of Agriculture, Fisheries and Livestock, Land, and Water Resources. The Department of Forest is a specialized body dealing with the management of forest reserves, wildlife and protected areas. The Department of Environment is another specialized body under the MoEF, dealing primarily with the "brown" and "gray" issues and management of ECAs in the environment sector. Research institutions like BFRI, BNH, BARI, BLRI, and many university departments are conducting research and action programmes on biodiversity documentation and management. Some NGOs are also engaged in carrying out action programmes related to biodiversity conservation and policy issues. Responsibilities, communication channels and coordination mechanisms among these many different agencies, ministries and departments remain poorly defined and unclear. Hence the need for effective coordination among the various involved organisations to ensure the successful implementation of the NBSAP. Therefore, commissioning of an 'apex body' for steering the coordination efforts of biodiversity conservation, sustainable management and equitable benefit sharing is an urgent need.

The current chapter outlines the implementation mechanism proposed for the NBSAP.

The essential aspects to be considered when designing the implementation mechanisms are:

- It should be cross-sectoral, involving all relevant government agencies
- It should be participatory
- Different sectors of the society should contribute to this common effort
- It should mainly aim at (a) providing guidance to the system, (b) encouraging activities related to the NBSAP, (c) registering all work undertaken/accomplished addressing biodiversity issues across the country, (d) facilitating coordination between different organizations and sectors, (e) exchanging experiences and lessons learned and (f) assessing general progress towards biodiversity conservation.

- An ‘Apex Body’ is proposed to ensure the implementation and subsequent monitoring and review of the NBSAP. Until an apex body is formed, the MoEF will have to take the initiative to facilitate inter-agency coordination, review and monitoring.

A formal institutional set-up for the conservation of the “Green Sector” of environment has been strongly emphasised in the National Conservation Strategy (NCS) and NEMAP document. This is also a demand of the environmental activists, conservation activists, civil society, NGOs and others to have a permanent institutional set-up to deal with biodiversity conservation issues of the country in a coordinated and integrated manner.

Considering the need for successful implementation of the NBSAP in the light of the present strength of the relevant ministries and concerned agencies, the following institutional set-up is proposed with a view to incorporating biodiversity conservation into the mainstream development of the country.

The proposed mechanism is multilayered, with a national ‘Apex Body’ at the top, consisting of representatives from the Government, civil society, and academia as well the private sector. The nomenclature and formulation of the ‘Apex Body’ will be finally affected by the government. This body, constituted by the Government, will act as a coordinating body with a secretarial unit of biodiversity stakeholders, and its basic mandate will include providing conceptual guidance and promoting exchanges and inter-sectoral agreement.

Terms of Reference of the ‘Apex Body’

The proposed Apex Body will be responsible for guiding the overall management and development of the ‘green’ sector of the environment. However, the proposed Apex Body will be specifically responsible for the following, but not limited to:

1. Overall policy guidance on biodiversity conservation of the country.
2. Review of planning, programme and action towards biodiversity conservation.
3. Resolving cross-sectoral conflicts between different implementing agencies working on biodiversity conservation or natural resource management.
4. Progress review of enforcement of biodiversity conservation regulations.
5. Monitoring and evaluation of biodiversity conservation actions in the country.
6. Vetting and approval of the National Reports, Annual Report of the proposed secretariat and others related activities concerning the CBD issues. .
7. Co-opting members as necessary.

Function of the Proposed Secretariat

Establishing and commissioning a permanent secretariat of the proposed Apex Body is necessary to integrate and coordinate biodiversity conservation activities of the country in a holistic manner. The proposed institutional set-up for the purpose would require a formal institutional mechanism to operate efficiently and effectively. The proposed secretariat will act as the national forum for coordinating the biodiversity conservation efforts of the country and be responsible for affecting the following functions:

1. Overall policy formulation on biodiversity conservation, including support to the preparation and subsequent dissemination of a Biodiversity Act.
2. Integration of planning, programme and action on biodiversity conservation by different agencies.
3. Creation of facilities to serve as central depository of databases on habitats, ecosystems and biodiversity of the country.
4. Monitoring and evaluation of programme and actions on biodiversity conservation.
5. Facilitation of monitoring of enforcement of regulation on biodiversity conservation.
6. Annual report on the status of biodiversity conservation.
7. Providing support to the Ministry of Environment and Forests and other relevant Ministries on the MEAs including the CBD.
8. Dissemination of annual report and other information on biodiversity conservation.
9. Any other issues related to biodiversity conservation.
10. Apex Body to act as clearing/screening house for all biodiversity related projects to be adopted by the public sectors as well as private sectors. It will have power to restrict/curtail/control biodiversity related research or any other works to be conducted in the country by any foreign national, foreign company and foreign NGO.
11. This Secretariat will act as the Secretariat to the proposed Apex Body

The MoEF will finalize the nomenclature, structure and institutional set-up of the proposed Apex Body.

7.2 Monitoring and Reporting (M&R) System

For the successful implementation of the Bangladesh NBSAP, an effective and efficient monitoring and reporting system has to be in place opportunely. Article 26 of the CBD also provides a mechanism to monitor the implementation of the Convention. According to the above Article, each Contracting Party is obliged to report regularly on the Convention implementation to the CBD Secretariat as determined by the Conference of Parties. This M&R system, through the implementation mechanism of the NBSAP, will also work as a reporting organ liaising with the CBD Secretariat.

Conceptually, the Monitoring and Reporting will involve:

- Collection of information about the status of biodiversity in Bangladesh and implementation of NBSAP activities by different implementing institutions and organizations and
- Reporting periodically on the Convention issues to implementing bodies and the public in general

Operationally, the Monitoring and Reporting component will be handled by the Secretariat of the proposed Apex Body.

Monitoring and Reporting will be undertaken to review

- performance on implementation
- impacts on the status of biodiversity

7.2.1 Monitoring

Regarding implementation performance, the M&R System will start by looking at the activities and projects implemented by the different organizations and institutions on the basis of their reports deposited with the relevant authorities.

Regarding **biodiversity status and trends**, the M&R system will:

- begin by preparing a Biodiversity Status Baseline Report, including performance indicators, to be taken as the reference point for future comparisons
- collect secondary information and commission scientific studies on a regular basis to assess the status and trends of key specific issues relevant to the NBSAP
- conduct a new Biodiversity Status Report every five years, the results of which are going to be compared with the baseline ones in order to find the different trends affecting the different areas and issues relevant to biodiversity

7.2.2 Reporting

The M&R System will report periodically about its findings in the different areas to the regular meetings of the proposed Apex Body. Additionally, the M&R System will report regularly to the public through the different communications media of Bangladesh (newspapers, radio, TV and others).

7.3 Implementing Agencies and Their Roles

The Ministry of Environment and Forests (MoEF) is the lead agency for implementing the NBSAP. As biodiversity is a cross-sectoral issue, other ministries also have roles and responsibilities in NBSAP implementation. Major roles of the concerned lead ministries are given in this section.

7.3.1 Role of different ministries

Ministry of Environment and Forests

- Overall policy guidance on biodiversity conservation in the country.
- Review of planning, programme and action towards biodiversity conservation.
- Cross-sectoral coordination and integration.
- Developing the National Biodiversity Information System and Networking
- Resolving cross-sectoral conflicts between different implementing agencies towards biodiversity conservation.
- Progress review of enforcement of regulations concerning biodiversity conservation.
- Monitoring and evaluation of biodiversity conservation actions in the country.
- Taking initiatives in developing and implementing the regular funding mechanisms and budget provisions for implementing the NBSAP.
- Coordinating and ensuring the implementation of biodiversity related activities relevant to the NBSAP by its departments and research institutions.

Ministry of Agriculture

- Overall policy development, guidance provision and implementation of biodiversity related activities and formulation of regulatory mechanisms relevant to biodiversity conservation in the agriculture sector
- Coordinating and ensuring the implementation of biodiversity related activities under the NBSAP by its departments and research organizations, as appropriate
- Exploration, documentation, conservation and management of agrobiodiversity and crop genetic resources
- *In-situ* and *ex-situ* conservation of plant genetic resources
- Regulating introduction of new crop varieties, genes and LMOs/ GMOs through existing national legal instruments

Ministry of Fisheries and Livestock

- Overall policy development, guidance and implementation of biodiversity related activities and formulation and application of regulatory mechanisms of in fisheries and livestock sectors
- Coordination of, and ensuring the implementation of biodiversity related activities under the NBSAP by its departments and research organizations, as appropriate
- Exploration, documentation, conservation and management of aquatic resources both in freshwater and marine ecosystems
- *In-situ* and *ex-situ* conservation of Farm Animal Genetic Resources
- Regulating the introduction of alien varieties, breeds, genes and LMOs/ GMOs of fish and animal resources through existing national legal instruments

Ministry of Science and Information & Communication Technology

- Promoting scientific research in biodiversity assessment, particularly for microorganisms
- Strengthening scientific capacity building
- Coordinating and ensuring the implementation of biodiversity related activities under the NBSAP by its departments and research organizations, as appropriate

Ministry of LGRD & Cooperatives

- Introducing Biodiversity Registers at village/union level by Gram Sarker or Union Parishad
- Involving local government bodies and local stakeholders in biodiversity conservation
- Integrating biodiversity conservation mechanisms in local level planning
- Developing capacities of local level institutes for biodiversity conservation

Ministry of Water Resources

- Overall policy development, guidance provision and implementation of biodiversity related activities and putting appropriate regulatory mechanisms in place in the water sector
- Ensuring integration of comprehensive EIA in all development activities for monitoring the impact of development activities on biodiversity
- Strengthening the capacities of Bangladesh Wetland and Haor development Board in implementing the wetland ecosystem management approach

Ministry of Chittagong Hill Tracts Affairs

- Overall policy development, guidance and implementation of biodiversity related activities and regulatory mechanisms for restoration and management of hill ecosystems
- Documentation of traditional knowledge of the upland communities
- Promoting restoration and management of community reserves
- Developing and promoting alternative farming practices and livelihood for *jhumias*

Ministry of Health & Family Welfare

- Revitalising traditional systems of medicine and promoting conservation and production of medicinal plants resources through community involvement

Ministry of Civil Aviation & Tourism

- Promoting eco-tourism through community involvement
- Establishing and implementing regulations relating to tourism
- Capacity building of the local tour operators

Ministry of Cultural Affairs

- Documentation and preservation of biodiversity related folklore
- Ensuring consideration and incorporation of cultural issues into multilateral and bilateral agreements and monitoring implementation of the envisaged conservation modes

Ministry of Land

- Integration of conservation concepts into the Land and Natural Resource Use Policy
- Introducing conservation related obligations in the leasing processes under the Law Manual and Waste Land Ordinance
- Ensuring the protection of biodiversity (critical ecosystem, rare or threatened plant or animal species) before acquisition of land for any development purpose.

Ministry of Information

- Creating nationwide awareness through all communication media
- Undertaking capacity building activities for effecting mass awareness and communication

Ministry of Commerce

- Promoting biodiversity based product development and market promotion
- Implementing and monitoring biodiversity related clauses in bilateral and multilateral agreements and Conventions

Ministry of Education

- Integrating biodiversity both into formal and informal education curricula
- Capacity building of teachers through Training of the Trainers
- Reaching the students for nationwide biodiversity conservation campaign

Ministry of Law, Justice & Parliamentary Affairs

- Review and amendment of existing laws related to biodiversity conservation

- Creation of an ‘Umbrella Act’ for comprehensive biodiversity conservation in the light of the CBD and other related treaties and Conventions

Ministry of Social Affairs

- Awareness raising and capacity building through local level social institutions

Ministry of Religious Affairs

- Awareness raising through religious leaders and institutions
- Capacity building among the religious leaders

Ministry of Women & Children Affairs

- Promoting women’s participation in biodiversity conservation and management activities
- Creating awareness among the women and children

Ministry of NGO Affairs

- Overseeing and coordinating biodiversity conservation activities
- Creating mass awareness
- Creating and developing alternative livelihood options for biodiversity user groups

Ministry of Energy and Mineral Resources

- Ensuring EIA and continuous biodiversity monitoring and assessment during any mining/quarrying activities.

Ministry of Communication

- Ensuring the protection of biodiversity (critical ecosystem, rare or threatened plant or animal species) before planning any road or communication network

Ministry of Shipping

- Ensuring protection through implementation of existing laws about the protection of marine resources

Ministry of Home Affairs

- Enforcement of existing biodiversity related sectoral laws

Ministry of Establishment

- Strengthening and development of institutional capacities

Finance Division

- Creating and enhancing sectoral allocations in the annual budget for NBSAP implementation

Planning Commission

- Integrating in-built biodiversity assessment and monitoring mechanism into the sectoral development projects

7.3.2 Role of development partners (donor communities)

Many international agencies and development partners (donors) are supporting biodiversity and natural resource management projects in the country for sustainable development, social and gender equity, poverty reduction and livelihood security. In implementing the NBSAP of Bangladesh, there are opportunities for donors to contribute in many action areas, such as, Capacity Building, Co-management

of Protected Areas, Communication and Awareness Raising, Development of Information Base, Networking, Partnership with NGOs and LCOs in securing livelihoods through integrating biodiversity.

To achieve the development goals for poverty alleviation of the country, the donors as development partners could think of:

- integrating elements of the NBSAP into their strategic and annual plans;
- supporting means for its sustainable implementation; and
- suggesting ways of inter-sectoral cooperation through action programmes.

7.4 Communication Strategy

Article 13 of the Convention on Biological Diversity (CBD) calls for each Contracting Party:

“to promote and encourage understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media, and the inclusion of these topics in the education programmes ...”

It is thus a requirement that countries that have ratified the CBD address the issue of how their NBSAP activities will be communicated.

A communication strategy can be defined as a plan of how the activities and initiatives needed for the implementation of the NBSAP will be designed and used in support of biodiversity conservation.

The overarching goal of the communication strategy is to ensure that the actions suggested in the NBSAP can be implemented by the larger stakeholder groups and thereby the stakeholders understand their relevant roles and responsibilities, besides owning the NBSAP. The strategy provides background to the current activities on communication and awareness in Bangladesh and the possible ways of enhancing channels of communication besides providing a set of actions for effective implementation of the NBSAP. The strategy forms a critical part of the NBSAP and it is important for the Ministry of Environment and Forests to pay attention to providing all support for realising the elements of this strategy.

The guiding principles for the strategy are that the strategy should be reaching wider stakeholders (policy makers to local communities), be responsive to the needs of the stakeholders (comprising formal and non-formal ways of communication) and use wider media (from print to electronic and others).

Implementing the NBSAP in Bangladesh gives rise to two types of needs for communication: formal and non-formal. This strategy considers both these categories to ensure that wider range of people understand the NBSAP and involves their participation.

7.4.1 Current status of communication

Currently, information on biological diversity and the methods to conserve them are limited to key resources and ecosystems such as, the Sundarbans, hill ecosystems, wetlands, etc. Emphasis on conservation of key species like tigers and elephants is well understood by all communities. Recently, through the efforts of projects like the Sustainable Environment Management Programme (SEMP), the

Government of Bangladesh supported the use of non-formal methods of communication like folklore to explain the need for conservation of local biodiversity such as, turtles and the like and agricultural biodiversity very effectively. Support provided to such groups is helping peer learning on issues of conservation and methods of sustainable use.

The print media has a key role to play in conveying the message dealing with biodiversity and environment in Bangladesh. Both English and local language newspapers provide relevant information and articles on conservation and biodiversity regularly. Discussion with journalists, however, revealed that they need appropriate training and resource material in the form of data and information to sensitise people to the needs of biodiversity conservation more effectively. The other issue is the availability of information on relevant issues opportunistically to influence decision-making.

The role of radio in communicating information is by far the most effective means of information sharing in this country. With majority of the rural population having no other accessible means of communication, the radio happens to be the key media for communicating messages on conservation. But, the coverage on environment and conservation issues by the radio has been limited. Both the diversity and frequency of such broadcasts should be increased.

Even though Bangladesh is still developing its state infrastructure as regards the electronic media such as, the use of television, there has been a significant impact of the medium in urban and semi-urban areas, both via state and private-owned television channels. The emphasis and focus on environment and conservation, however, has been very limited.

The use of the latest tools of information and communication technology is currently growing considerably in the country though. The use of the Internet has been on the increase of late, though it hasn't reached the rural areas yet. Since the very inception of the CBD, it was understood that scientific knowledge and technological know-how would be crucial in the implementation of the Convention. Now, admitting the fact that expertise in managing information and technology varies enormously from country to country, the Convention has established a "Clearing House Mechanism" to ensure that all governments have access to the information and technologies they need for their work on biodiversity.

Though environment, conservation and biodiversity are keys to people's survival, these vital concepts are yet to find a place in the formal education system, which should start basically at the primary level. In the secondary schools and universities, biodiversity is discussed these days though. What is most needed at the moment is a government backed strong initiative to introduce biodiversity conservation as a regular subject to be studied at the primary, secondary and tertiary levels of education, as appropriate.

In addition to the above, many of the key projects that are currently under implementation in Bangladesh do not have focus on communicating messages and information on environment and conservation. The awareness elements of many projects are limited to producing posters and printing documents – mostly in English – reaching, eventually, a very limited section of the society. Emphasis should be on producing locally relevant messages and in local dialects.

7.4.2 The strategy for communication

The elements of Bangladesh's communication strategy with regard to conserving biodiversity should focus on short, medium and long-term efforts and be built upon the issues identified earlier. The strategy should include ways of using the communication channels like the newspapers, radio, television, school curricula, folk theatre, internet etc. Bangladesh should commit itself to enhancing its rural infrastructure to reach out to more people and involving the local communities in its efforts to implement the NBSAP. The objectives of the strategy include:

- Improving the knowledge and information sources for rural and urban communities on the role and relevance of biodiversity in their survival and livelihoods;
- Enhancing the involvement of formal communication modes in implementing the NBSAP;
- Supporting the role of folk theatre and other forms of non-formal communication channels for reaching out to more people effectively; and
- Developing methods of responding to local needs using the communication strategy efficiently.

7.4.3 Suggested actions for communication

A good number of actions are suggested in this document to reach different stakeholders. The major one is to prepare a short, easy-to-read version of the NBSAP in Bangla to communicate a broader range of stakeholders. Other actions identified are:

1. Formulate and implement a broader communication strategy on issues of conservation, which are relevant for the people from all walks of life--from policy makers to local communities.
2. Develop a stronger and more effective Clearing House Mechanism, using as many channels of communication as possible.
3. Develop specific curricula on biodiversity for school and university students.
4. Improve the accessibility of television, Internet and other communication tools to the rural communities.
5. Support development of the folk theatre to reach more and more people on issues of conservation and biodiversity.
6. Seek the use of television as a medium to communicate messages by developing and utilising partnership both with the state-owned and private channels.
7. Establish an information resource centre on biodiversity information for journalists.
8. Develop an 'expert database' on biodiversity for use by the journalists and other communication personnel.
9. Support development of communication tools and techniques in Bangla.

10. Organise training programmes on communication techniques for policy makers and other stakeholders.
11. Facilitate creation of the locals' ownership of the NBSAP, by using participatory learning and communication models.
12. Assess and monitor periodically the impacts of the communication strategy on conservation. .
13. Provide separate funding windows for conservation related communications with resource allocations from the Ministries of rural development, education, public works and others.
14. Ensure projects dealing with conservation including elements of communication.
15. Establish links to the ongoing activities on awareness raising and information dissemination.

7.5 Follow-up and Responding to Change

The National Biodiversity and Strategy Action Plan is regarded as a 'living' document that is responsive, flexible and practical. It recommends the integration of biodiversity into all sectors, through participatory approaches in its implementation phases. A lot of actions have been identified during the planning processes that have been reflected in different resource materials. It is evident that all activities are not equally urgent and hence not expected to contribute equally to the sustainable management of biological diversity. Furthermore, piecemeal implementation of many of the strategies like establishing Protected Areas, inventories of biodiversity is already being pursued by different agencies. Scarcity of funds and lack of institutional and human capacities will not allow addressing all the issues and objectives at once. Therefore, it is important to prioritise and sequence various activities that have to be implemented under the strategy. It is also desired that different sectors will prioritise their respective sectoral activities and incorporate them in their annual plans.

The MoEF through its proposed 'Apex Body' will coordinate these activities towards their implementation. Monitoring and Reporting have been identified as important components of the implementation mechanisms. As the NBSAP is a living document and hence professes flexibility, feedbacks from the periodical reviews should be incorporated into the document, as necessary.

As donors' support may be gradually withdrawn from the various sectors, therefore, in-built budget provisions and financial mechanisms should be promoted from the internal sources for many planned actions.

This document outlines broad strategies that have to be deployed with a view to reducing the loss of biodiversity by 2010. As it is a 'living document' it needs periodical review. It is proposed that the NBSAP should be reviewed and revised at least every six years, and at shorter intervals if the need is evident. Each revision should follow the same, or a similar participatory approach to that used in the initial formulation.

8. FINANCING STRATEGY FOR IMPLEMENTING THE NBSAP

Article 20 of the CBD calls for each contracting party

“to provide, in accordance with its capabilities, financial support and incentives in respect of those national activities which are intended to achieve the objectives of this Convention, in accordance with its national plans, priorities and programmes.”

It is, therefore, a requirement that countries that have ratified the CBD address the issue of how their NBSAP will be financed.

This financing strategy provides a framework for funding of NBSAP implementation. The framework provides some ideas on how existing finances can be used as well as new reserves raised so that implementation of the NBSAP is financially sustainable. The financing strategy does not only indicate ways of raising funding, but it also deals with the implementation responsibilities of different sectors so that Bangladesh becomes self-reliant on raising resources for conservation. The strategy also provides a framework for donors in prioritising their support to conservation efforts in Bangladesh. The strategy, therefore, founds its principles on sustainability (securing sufficient resources in the long-term), feasibility (politically acceptable and legally correct ways of raising resources), diversity (identifying diverse sources of funding), cost-effectiveness (spreading responsibility) and equity (sharing boons of conservation).

8.1 Financing Conservation of Biodiversity: the Current Situation

The costs of biodiversity conservation in Bangladesh are currently financed mainly from budgets of the government agencies (especially through the Ministry of Environment and Forests), and through donor funding, NGO support and some contributions from the civil society.

8.1.1 Government contributions

Government contributions to biodiversity conservation of Bangladesh cannot be ascertained exactly as budget allocations to different national organisations support a variety of activities, among which conservation benefits are not always explicitly indicated. A rough estimate for the Protected Areas management only is about US\$2.2 million per annum as indicated in the annual development budget for 2003 – 2004. Allocations for other organisations and ministries like that of the Fisheries and Livestock, Agriculture, Health, Hill Tracts Affairs, Water Resources etc. will also amount to substantial amounts, though not explicitly ear-marked for biodiversity conservation.

8.1.2 Donor funding

This forms an important component of funding for conservation in Bangladesh. There are currently about 10 projects under the MoEF, MoFL, and LGRD, supported by donor finances. Between 1990 and 2002, there were only a very small number of conservation projects funded by external agencies, but there has recently been a perceived increase in donor finances for biodiversity conservation.

NGOs and other organizations are also funding biodiversity conservation. At the community level, local people contribute significant amounts of time and material resources for conservation, which have not been quantified.

8.2. Constraints

In spite of considerable support available for conservation of biodiversity in Bangladesh, there exist several constraints. The major constraint relates to the volume, timing, and sustainability of financial support to biodiversity conservation.

The current levels of funding are clearly far too small to address all of the action items identified in Chapter 6 and Annex 1. Changing priorities among donors and the government threatens the sustainability of such funding. As the benefits of biodiversity conservation interventions are not immediate, long-term commitments are important. Yet many donors and government agencies tend to respond to the challenges of biodiversity conservation in a project mode rather than through a programmatic approach. The links to poverty reduction, education, health, disaster management and infrastructural development are still weak, especially, in relation to the services biodiversity can provide to achieving national targets.

The timing of support often is a concern. Responses to conservation occur, in many cases, in relation to either a disaster or a commitment to an international obligation. Hence the category and volume of support seem staggered and inadequate.

8.3. Options for Securing New and Additional Finances

A major challenge in implementing the NBSAP is to secure additional financial resources needed to realise the actions identified in the NBSAP, build capacities to sustain actions and provide support to pay for indirect costs.

It is, therefore, essential to find ways of enhancing and supplementing the current level of support, to seek new partnerships with the business community, NGOs, private sector etc., and to find better ways of administering available finances. This challenge will require innovation. The following paragraphs describe some approaches used in other parts of the world, from which lessons may be drawn for biodiversity conservation in Bangladesh.

8.3.1 Public budget allocations

In addition to the Ministry of Environment and Forests, a number of other Ministries are either directly or indirectly involved in conservation efforts. These include the Ministries of Health, Public Works, Agriculture, Fisheries and Livestock, Land, Science and Information & Communication Technology, Rural Development, Chittagong Hill Tracts Affairs, and Disaster Management. Their contributions to actions at the local level typically do not directly address biodiversity issues but do support actions identified in Chapter 6. A function of the 'Apex Body', as discussed in the preceding chapter, will be to liaise with other Ministries so as to improve coordination of such activities, and ensure relevance to biodiversity conservation.

For example, in Cameroon, socio-economic analyses of the benefits of floodplain ecosystem restoration demonstrated clear poverty reduction benefits, leading the government to increase support for such actions. A similar example has already emerged in Bangladesh, where the conservation benefits of the “MACH” project, in terms of establishing fish sanctuaries, were demonstrated to have significant food security benefits, as improved breeding success in the sanctuaries led to increases in fish populations.

8.3.2 The Global Environment Facility (GEF)

The GEF is the financial mechanism of the CBD. Between 1991 and 1999, the GEF allocated USD 991 million in grants and mobilised an additional 1.5 billion dollars through co-financing for biodiversity conservation projects. Financial support for the development of this NBSAP was provided by the GEF. The GEF has also provided support to the Sunderbans Biodiversity Conservation Project, the Coastal and Wetland Biodiversity Project (CWBMP), at Cox’s Bazar and Hakaluki Haor, and to the biodiversity component of Fourth Fisheries project. The NBSAP, representing Bangladesh’s strategy to meet its obligations under the CBD, provides the basis for further support from the GEF, as the financial mechanism of the CBD.

8.3.3 Other donors

The consultative process followed in preparation of the NBSAP involved the donor community in Bangladesh. Consequently, the NBSAP not only serves to establish the clear priorities of the people and government of Bangladesh in relation to biodiversity conservation, but also reflects the concerns and priorities of the donors. This should simplify the process of establishing a “programmatic approach” to biodiversity conservation in Bangladesh, the development of which is a responsibility of the proposed ‘Apex Body’. Not only will this promote increased donor coordination, but it will also serve to highlight areas of synergy, under which support to themes of particular priority to different donors (such as poverty alleviation, and disaster management) can also benefit biodiversity conservation.

8.3.4 Domestic fiscal instrument

Many countries have used taxes or levies as a means to support environmental conservation. For example, in Iran, all private sector companies dependent on natural resources, such as mining companies, must pay 1% of their annual revenues to support anti-pollution measures. The Department of Conservation in Papua New Guinea meets its wildlife trade monitoring costs through taxes levied on export of crocodile skins. In Nepal, 30% of the Mount Everest climbing fees are invested in community development work, while in Pakistan, the Government allows community retention of 60-80% of timber sale revenues. Bangladesh should also identify appropriate fiscal measures to support implementation of elements of the NBSAP. For example, about 99 million passengers travelled domestically by rail in the financial year 1999 – 2000 and another 1.36 million by plane. Small amounts of levies on such travels could generate considerable volumes of funds.

8.3.5 Payments for environmental services

Many environmental services have, in the past, been viewed as being free of cost. However, since the conservation of forests or other ecosystems that provide such services incurs costs, those making use of environmental services should meet these costs. In many cases the natural resources from which environmental services are derived are partly or wholly owned by communities or individuals from within local communities. Thus, payments for environmental services can serve not only to promote

conservation, but also can simultaneously provide new and additional income opportunities for local communities.

The best-known examples of payments for environmental services involve water supply. For example, Quito in Ecuador has established a fund to finance sustainable use and management of areas around watersheds, largely funded by the Metropolitan Sewage and Water Authority paying 1% of revenue from sale of drinking water, plus an annual flat fee. In Costa Rica, landowners in watershed areas are paid \$10/hectare/year to maintain or restore forest cover in their holdings to provide water services for a downstream hydropower scheme, while in Guatemala, the city of Puerto Barrios pays an annual fee for management of the Cerro San Gil protected area from which the municipal water supply is derived. There are, however, many other examples of payments for environmental and related services. In Bolivia, companies routing gas pipelines passing through protected areas pay for the right and in Guatemala negotiations are underway concerning leasing of telecommunications sites, which are located on higher ground, frequently in protected areas.

In some circumstances, international payments can be negotiated. In Sabah, Malaysia, the US Company New England Electric Systems has invested \$0.45 million in a reduced impact logging system under a pilot carbon offset agreement.

Similar opportunities should exist in Bangladesh. Wise management of *haors* can mitigate the social and economic costs of flooding, while the hilly areas in Chittagong generate the water supply for many southern communities, including the city of Chittagong.

8.3.6 Linking biodiversity products, markets, business and private sector:

In cases where local livelihoods depend to a significant extent on products derived from natural resources, especially wild resources, sustainable management of those resources has conservation benefits and ensure sustainable livelihoods. Most such examples involve NTFPs, used for food, medicinal purposes, or for the production of household goods such as furniture. An appropriate legal and policy environment can provide significant opportunities for communities to sustain their livelihoods while conserving biodiversity. In one example from China, multinational pharmaceutical companies and national research academies have cooperated in bioprospecting in forest Protected Areas, thus generating financial returns used for conservation.

Increasingly, credit and venture capital funds are being established to stimulate these types of biodiversity business and investment, and fiscal instruments such as tax exemptions or subsidies to new product and market development are also used. For example, "biodiversity-friendly" products can command a premium price if sold in markets where consumers demand such standards. Examples are Banana Amiga, a "green seal" given by a consortium of US and Costa Rica NGOs, Cafe Monteverde, a partnership for sustainable coffee production between Montana Coffee Traders, The Nature Conservancy and the Monteverde Co-operative of Costa Rica coffee farmers, and vegetable ivory - a material for buttons and jewellery harvested sustainably in rainforest buffer zones in South America by indigenous people in conjunction with Conservation International. Similar opportunities should exist in Bangladesh, where many livelihoods depend on natural resources, and products are increasingly sold to markets (mostly overseas) which demand high environmental standards.

Another mode of private sector engagement is through altruistic contributions, especially from those industries located in rural areas. For example, a consortium of eight timber and mining companies contribute annually towards the management of Kutai National Park in East Kalimantan, Indonesia. Similarly, the Bafgh Iron More Company in Iran supports measures to conserve the Asiatic cheetah, as one of the few remaining populations exists in close proximity to the mine.

8.3.7 Other international financial instruments

One alternative to traditional donor support is the so-called “debt-for-nature” arrangement. This involves donors purchasing part of the external debt owed by most developing countries at a discount, with the proceeds being used for conservation interventions. The United States has been a strong advocate of such a mechanism, and the Worldwide Fund for Nature (WWF) has pioneered many such examples in countries such as Bolivia, Madagascar, and the Philippines. Debt-for-Nature swaps are not easy to formulate, but certainly represent a mechanism that should be considered in the case of Bangladesh.

Several sources of international private finance are available as direct grants for biodiversity conservation activities. This includes private endowments and foundations, sponsorship from international and multinational corporations, as well as voluntary donations. For example, the British Petroleum, a large UK-based multinational petroleum and energy company, operates a global "Conservation Programme" which makes grants available for environmental research and studies. Vietnam has benefited from three such grants to protected area research: an inventory of the bats of Cuc Phuong National Park, a survey of Tonkin Snub Nosed Monkeys in several northern provinces, and an analysis of the distribution, habitat and status of bats in Bach Ma National Park.

8.3.8 Trust funds

Various types of funds have been created for biodiversity conservation. Perhaps the best example is from Bhutan, where a trust fund established in part with financial support from the GEF has now far exceeded its initial capitalization target. Another example, the Mongolian Environmental Trust Fund, illustrates some of the problems of trust fund establishment, as it has proven very difficult to secure sufficient domestic and international contributions to reach a viable level of capitalization. The Government of Vietnam has been working to establish a Conservation Fund for Special Use Forests, with support from GEF. The structure and operational principles of the Fund are to support protected area management while improving incomes for local communities.

8.4 Relevance to Bangladesh

Though the above examples and case studies demonstrate the possible ways countries may be able to raise resources to pay for implementing the NBSAPs, not all of the above options can be used effectively in Bangladesh. The advantages and disadvantages of some of these are explained here in order to assist policy makers in deciding which mechanisms best suit the country.

- ***Increasing public budget allocations:*** The close relationship between conservation and social and economic development in Bangladesh means that there should be substantial opportunities to benefit from government funding by linking the two issues. However, commitment is required

from all relevant ministries. The Ministries of Finance and Establishment can support the implementation options identified by the 'Apex Body'.

- ***Domestic fiscal instruments:*** Taxes on water, timber, agricultural land, railway, road and air transport are all possible. However, an important policy constraint is that currently all such revenues accrue to the central exchequer, and are likely to be used for other purposes. Other countries have circumvented such a constraint by privatizing revenue collection and investment, but this requires a different, but just as complex policy change.
- ***Payment for environmental services:*** As mentioned previously, there should be potential in Bangladesh to benefit from payments for environmental services, but there is a need for an analysis of such opportunities.
- ***Linking biodiversity, markets and business:*** There is a great potential for raising additional financial resources by linking sustainable management to market development, as has already been done in the case of some NTFPs. Some protected areas already cater for recreation, and the potential for additional income through ecotourism should exist at some sites. Experiences in other countries indicate that only with substantial levels of international ecotourism can revenues be adequate for investment in conservation, so ecotourism requires suitable tourism policies and infrastructure.
- ***Debt-for- Nature Swaps and Trust Funds:*** These instruments should be investigated, although the institutional and individual capacities for management of such complex instruments need to be established first.

8.5 Recommendations

It is clear that there are many options available to raise resources to implement the NBSAP in Bangladesh. The following actions are proposed:

Short-term:

It is important to estimate the costs of implementing the NBSAP and arrange to have them reflected in the annual budgets of the government agencies and plans of donors. In particular, the need for public investment into conservation should be highlighted and justified in terms of its contributions to socio-economic development and poverty reduction. Development efforts by donor agencies should consider the elements of NBSAP and provide linkages, where possible. It is important to note that biodiversity is the cornerstone of poverty reduction as well as sustainable development.

Medium-term:

The options on taxes and levies can be assessed for their feasibility and the national policies and regulations supporting this need to be put in place within the next 2-3 years.

Long-term:

Issues of sustainable market linkages, support from private sector on issues of environmental services and additional budget allocations specifically to address issues of establishing a trust fund should be explored, in addition to looking into the options of debt-for-nature swaps.

Table 8.1: Summary of the NBSAP Financing Mechanisms

Financing mechanisms	NBSAP Cost Categories										Details and use of financing mechanisms
	Establishment & running of institutions	Capacity building & training	Development of policy & legal mechanisms	Infrastructure (museum, botanical garden, etc)	Communication, education & awareness	Research & studies	Field projects (<i>in situ</i> conservation activities)	Ecotourism & sustainable resource use	Community involvement & benefits	Promotion of sectoral responsibility	
Public Budget Allocations	●	●	●	●	●	●	●	●	●	●	Increased capital and recurrent budget allocations, to conservation activities in both environment and “production” sectors. Provides core budget support to NBSAP and to capitalising trust fund.
Foreign Donors	●	●	●	●	●	●	●	●	●	●	Variety of project and programme aid from bilateral, multilateral, NGO sources; GEF (e.g. Enabling Activities, Capacity Development Initiative). Provides core budget support to NBSAP and to capitalising trust fund.
Corporate & Private Sponsorship				●	●	●	●	●		●	Variety of private foundations (e.g. MacArthur, Ford) and corporate sponsorship (e.g. Shell, BP). Latter could be targeted to branded “products” (e.g. communications, infrastructure, research projects, and businesses) and to industrial and sectoral activities.
Domestic Economic Instruments			●					●	●	●	Includes identifying perverse incentives and disincentives (e.g. low royalties, unsupportive subsidies), extending existing incentives (e.g. allowing preferential treatment of agricultural sector to include biodiversity), supportive economic instruments for new financing mechanisms (e.g. credit and venture capital, tax inducements on biodiversity business).
Payment for Environmental Services								●	●	●	Extending existing catchment service payments (e.g. to other hydropower scheme, industrial water users and commercial irrigation), investigating new payments (e.g. carbon offsets for afforestation and reforestation). Can provide community incentives and promote sectoral involvement.
Markets & Business				●			●	●	●	●	Promotion of business development and charges in ecotourism, NTFP enterprises (e.g. value-added, fair trade), eco-agriculture (e.g. eco-labelling, organic production) sectors. Can provide community incentives and promote sectoral involvement.
Debt Swap/ Trust Fund	●	●	●	●	●	●	●	●	●	●	Bilateral or three-way debt-for-nature swap could be used to capitalise endowment/sinking fund for biodiversity, in addition to initial government and donor injection of funds.

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GLOSSARY OF TERMS

Accession: A sample of crop variety collected at a specific location and time; may be of any size.

Agrobiodiversity: It refers to the aspect of biodiversity for agricultural development. It pertains to the plant and animal resources that have been subject to selection, modification, and adaptation to generations of people to serve best their growing and changing need for survival.

Avifauna: The birds, which live naturally in a certain area.

Alien species: (Non – native, non – indigenous, foreign, exotic) A species occurring outside of its natural range and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, games or propagule of such species that might survive and subsequently reproduce.

Anthropogenic: A situation that occurs because of, or is influenced by, the activities of humans.

Baor: An ox-bow lake; dead arms of rivers.

Beel: A perennial water body in the *haor* or in the river's flood plain.

Biodiversity (= biological diversity): The definition given by article 2 of the CBD is '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 ecosystem'. A simpler definition is the total range of the variety of life on earth or any given part of it.

Biodiversity hotspot: A term introduced to describe a location that features an exceptional concentration of species with exceptional levels of endemism and faces exceptional degrees of threat.

Biogeography: The scientific study of the geographic distribution of organisms.

Biopiracy: Biological theft, illegal collection of indigenous plants by corporations who patent them for their own use.

Bioresources (= Biological resources): Those components of biodiversity of direct, indirect, or potential use to humanity.

Biosafety: The state of being certain that adverse effects will not be caused by any biological agents under defined conditions. The Cartagena Protocol specially focuses on transboundary movement of any living modified organism resulting from modern biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity, setting out for consideration, in particular,

Biosphere reserve: An area of terrestrial or costal/ marine ecosystem, or a combination thereof, which is internationally recognized within the framework of UNESCO's programme on Man and Biosphere (MAB).

Biotechnology: The technological applications that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific purposes.

Buffer zone: The region bordering a protected area where special management measures are undertaken to enhance the conservation values of the protected area.

Biological reference points: Indicators or signposts against which the status of a stock can be judged. Reference points can be either desirable targets (target reference points) or minimum biologically acceptable limits (limit reference points)

Bio – regions: Areas defined by a combination of biological, social and geographic criteria rather than geopolitical considerations generally, a system of related interconnected ecosystems.

Carrying capacity: The population that an area will support without undergoing environmental degradation.

Clearing house mechanism: The term "clearing-house" originally referred to a financial establishment where checks and bills are exchanged among member banks so that only the net balances need to be settled in cash. Today, its meaning has been extended to include any agency that brings together seekers and providers of goods, services or information, thus matching demand with supply.

Community (Human): A social group of any size whose members reside in a specific locality.

Co-management: The sharing of authority, responsibility and benefits between government and local communities in the management of natural resources.

Conservation: The management of human use of the biosphere so that it may yield the greatest sustainable benefit to current generations while maintaining its potential to meet the needs and aspirations of future generation. Thus conservation is positive, embracing preservation, maintenance, sustainable utilization, restoration and enhancement of the natural environment.

Conservation of biodiversity: This covers human actions ranging from totally preserving any component of biodiversity to using biological resources provided that such use is within sustainable limits and does not cause erosion of biological diversity.

Cryo- preservation: A method of preserving living tissue by freeze – drying.

Demographic: Pertaining to the science of vital and social statistics as of the births, deaths, marriage etc in human population.

Ecological indicator: A characteristic of an ecosystem that is related to or derived from, a measure of biotic or a biotic variable that can provide quantitative information on ecological structure and function. An indicator can contribute to a measure of integrity and sustainability.

Ecologically Critical areas (ECAs): An ecosystem reached to a critical degradation of environment is termed as ECA when declared by the government of Bangladesh under the provision of Environment Conservation Act 1995.

Economic incentives: Economic measures such as reductions in import duties for some products, directed at encouraging a certain course of action by individuals or business.

Economic instruments: Taxes, duties, interest rates and other economic incentives or disincentives used to influence actions by individuals or business. E.g. user pay principal, tradable permits, export quotas etc.

Ecological valuation: In the context of this plan economic valuation refers to valuation by attaching monetary values to biological diversity. Such valuation does not take into consideration moral and ethical principals and values, which seek to protect biological diversity for the sake of protection.

Economic value: Defined in strict economic terms as aggregate willingness – to - pay in terms of money for the stream of services expected from an ecosystem. The full economic value of an ecosystem

expressed in absolute terms would be the sum of each person's willingness to pay for each service generated by each ecosystem function.

Ecosystem: An ecosystem is a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit.

Ecosystem diversity: Refers to variety and frequency of different ecosystems.

Ecosystem management: An ecological approach to natural resource management to assure productive, healthy ecosystem by blending social, economic, physical and biological needs and values.

Ecosystem services: The beneficial outcomes for the natural environment or for people that result from ecosystem function. Some examples of ecosystem services are support of the food chain, harvesting of animals or plants, clean water or scenic views.

Ecotone: A transition area between two divergent but trophically related habitats.

Ecotourism: Travel undertaken to experience sites or regions of unique natural or ecological quality or the provision of services to facilitate such travel.

Edaphic: Environmental conditions that are determined by the physical, chemical and biological characteristics of the soil.

Empower local communities: Refers to the enhancement of the assets and capabilities of diverse individuals and groups to engage and influence economic and social institutions and to increase the accountability of public institutions. It is a participatory process which places transfer of decision making responsibility and the resources to act into the hands of those who will benefit

Endangered species: A species facing very high risk of extinction of the wild in the near future.

Endemic: Restricted to specified region of locality.

Endowment fund: A fund that spends only the income from its capital, preserving the capital itself as a permanent asset.

Environmental indicator: A measurement, statistics or value that provides a proximate gauge of evidence of the effects of environmental management programmes or of the state or condition of the environment.

Environmental Impact Assessment (EIA): A method of analysis, which attempt to predict the likely repercussions of a proposed major development upon the social and physical environment of the surrounding areas.

Estuaries: A semi – closed coastal body of water, which has a free connection with the sea and within which seawater is immeasurably diluted by freshwater derived from land drainage.

Ethnobiology: Study of the way plants animals and micro – humans use organisms.

Ethnobotany: The study of the relationship between people and plant in the broadest sense. It requires a multidisciplinary approach incorporation anthropology and ethnology, botany linguistic and in some cases economics, pharmacology, medicine and agronomy.

Exclusive Economic Zone (EEZ): Part of the offshore area of a country where the country has exclusive rights in respect of all economic resources of the water column, underlying seabed and subsoil.

Exotic / Introduced species: A species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities (including exotic organism, genetically modified organisms and Translocated species).

Ex-situ conservation: The conservation of components of biodiversity outside their natural habitat.

Flagship species: Species that appeal to the public and have other features that make them suitable for communicating conservation concerns. The protection of an "flagship species" protects a wide range of co-existing species in the same habitat, which may be lesser known and difficult to protect otherwise (sometimes also synonymous with 'indicator species', 'umbrella species', and 'keystone species').

Flood plains: A nearly flat plain along the course of a stream or river that is naturally subject to flooding.

Gene bank: A facility established for the ex situ conservation of individuals (seeds), tissues, or reproductive cells of plants or animals.

Germplasm: The protoplasm of germ cells containing the units of heredity, the chromosomes and gene.

Genetic diversity: Refers to the frequency and diversity of different genes and /or genomes. The array of genetic traits that exists within a population, which enables it to adapt to changing conditions.

Genetic material: Any material of plant, animal, microbial or other origin containing functional unit of heredity.

Genetic pool: Total amount of genetic material within a freely interbreeding population at a given time.

Genetic resources: Genetic material of actual or potential value.

Geographical Information System (GIS): A computer mapping system that links databases of geographically – based information to maps that display the information.

Goal: General statement of outcome sought.

Grassroots: People or society at a local level rather than at the center of major political activity.

Habitat: The place or type of site where an organism or population naturally occurs.

Haor: A bowl-shaped naturally depressed water basin.

Home gardens/ homesteads: A traditional system of perennial cropping that uses a range of economically valuable plant species producing fruits, species, medicinal products, timber, etc. It offers a highly diversified and economically viable form of land use found around a house.

Hotspot: An area rich in total number of species or numbers of a particular kind or category of species.

In – situ conservation: Means the conservation of ecosystems and natural habitats, and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

Indicator: An indicator is a quantitative measure (i.e. distance from a goal, target, threshold, and benchmark) against which some aspects of policy performance can be assessed.

Intellectual property rights: A right enabling an inventor to exclude imitator from the market for a limited time.

Invasive alien species: An alien species whose introduction and/ or spread threaten biological diversity.

Inventory: A detailed, complete list.

Jhum: A farm land under shifting cultivation or slash and burn system of cultivation.

Jhumia: A farmer who practices shifting cultivation.

Keystone species: Species that have a major effect on other species in the community. Loss of such species from an ecosystem results in an excessively large change in the ecosystem processes. These activities are critical to the structure of the community in which they live.

Littoral zone: Shallow water region with light penetrating to the bottom, tropically occupied by rooted plants.

Livelihood: A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.

Mangroves: Salt – tolerant, woody, and seed – bearing plants ranging in size from small shrubs to all trees.

Monetary valuation: An economic method that is often used to quantify non-market values in monetary terms in order to quantify the benefits (or costs) of an environmental policy.

Natural resource account: Accounts for state and quality of the environment and the natural resource base by deducting from national accounts such as GDP various aspects of environmental degradation such as the value of pollution abatement and control expenditures, the cost of environmental damage and the depletion of natural resources. Natural resource accounts strive to determine the costs of depleting natural resources and damage to the environment.

Non-compliance: Environmental non – compliance means to be out of strict compliance with an environmental law, regulation, or other regulatory condition imposed on an operation via a license, approval, consent, environmental, impact assessment or other regulatory process.

Objective: A statement about what is to be achieved in relation to a goal. Includes a time frame, target or the resources to be used in relation to an outcome.

Performance indicators: Diagnostic tools that can be used to regulatory review achievement on projects and programs.

Pests: Organisms capable of causing material damage. They consume agricultural products or destroy their marketability or cause human disease or discomfort.

Policy: Course of action adopted by government, party, organization, or individual.

Property right: The condition of ownership of an asset, the right to own, use and sell. The right to use or consume something or trade the right way in return of something else.

Protected Area: An area of land (and /or a sea) especially dedicated to the protection and maintenance of biological diversity and of natural and cultural resources and managed through legal or other effective means.

Public sector: Everything that is publicly owned and controlled including government (National, Provincial and Local) state owned companies, public schools etc.

Quarantine: Official confinement of regulated articles for observation and research or for further inception, testing or treatment.

Ramsar site: A site designed as a wetland of international importance under the convention of Wetlands of International Importance especially as Waterfowl Habitat.

Red Data Book: Catalogues published by IUCN The World Conservation Union, or by national authorities listing species, which are rare, or in danger of becoming extinct globally or nationally.

Recovery plan: A document that serves as a guide for activities to be undertaken by the government or private entities in helping to recover and conserve endangered or threatened species.

Seed bank: A facility designed for ex situ conservation of individual plant species and varieties through seed prevention and storage.

Socio- economic Impact Assessment: A technique that estimates the impacts of management scenario on income and employment within specific communities, regions, or the province and identifies and assesses demographic local government and community concerns.

Species diversity: The number and variety of species existing in a given area.

Stakeholders: A large group of individuals and group of individuals including governmental and non-governmental institutions, traditional communities, universities, research institutions, development agencies, banks, donors, etc. with an interest or claim (whether stated or implied) which has the potential of being impacted by or having an impact on a given development. Stakeholder groups that have direct indirect “stake” can be at the household, community, local, regional, national or international level.

Sustainable development: Development that meets the need and aspiration of the current generation without compromising the ability of future generations to meet their needs.

Sustainable use: The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

Taxon (pl. taxa): The classification units to which individuals or sets of species are assigned.

Threatened species: Species that are often genetically impoverished of low fecundity dependent on patchy or unpredictable resources extremely variable in population density, persecuted or otherwise prone to extinction in human – dominated landscapes.

Traditional knowledge (TK): The term traditional knowledge or local knowledge or indigenous knowledge is used to refer to that knowledge, which is generated or developed and transmitted by the communities over time, in an effort to cope with their own agro-ecological and socioeconomic environments.

Valuation: This is a method for determining the importance of environmental consequences of economic activity that are not taken into account in market transaction.

World Heritage Site: A site designed under the 1972 Convention of the Protection of the World Cultural and Natural Heritage.

Annex - 1

PRIORITY ACTIONS

Top Priority

1. Document existing ecosystem, species and genetic diversity of the country, including their status, occurrence and abundance. (Strategy 1, Short Term)
2. Develop a village-based inventory and ecological descriptors of fauna and flora, including their indigenous and traditional uses and associated knowledge systems. (Strategy 1, Short Term)
3. Identify role of biodiversity goods and services, and value in economic terms for sustainable livelihood and poverty eradication as indicated in various national policy documents (e.g. PRSP, MDGs, NAPA, NAP etc.) and integration in national development planning. (Strategy 1, Short Term and Strategy 16, Long Term)
4. Promote and enhance a dynamic system of *ex-situ* and *in-situ* biodiversity conservation and establish national gene bank and natural history museum. (Strategy 2, Long Term and Strategy 1, Medium Term)
5. Enhance national taxonomic capacities for identification of the fauna and flora. (Strategy 1, Short Term)
6. Undertake environmental, health, social and economic impact studies on use of Genetically Modified Organisms and Invasive Alien Species, and develop national management plans and regulatory measures for their control and eradication. (Strategy 4, Long Term)
7. Develop and implement national Access and Benefit Sharing (ABS) regime on genetic resources including molecular characterization. (Strategy 5, Short Term)

Second Priority

8. Finalize 'Biodiversity and Community Knowledge Protection Act' addressing IPR issues that are responsive to local and national needs. (Strategy 12, Short Term)
9. Establish an 'Apex Body' for coordination and implementation of NBSAP with institutional setup. (Strategy 8, Short Term)
10. Promote capacity of stakeholders for biodiversity conservation through environmental education and awareness programme. (Strategy 6, Short Term)
11. Develop action plans to promote co-management of Protected Areas and biodiversity hotspots in different ecosystems including wetland, forests through local government and community initiative. (Strategy 9, Medium Term)
12. Develop proper understanding and appropriate programme on urban ecology and homestead ecology in the context of lifestyles, livelihood and biodiversity. (Strategy 2, Long Term)
13. Locate and establish the origin of biodiversity developing technological and knowledge capacity to deal at phenotypic, genotypic, molecular and allelic level.
14. Develop sustainable management options and regulatory practices for terrestrial and aquatic (including coastal and marine) biodiversity with special emphasis on

protection and conservation of indigenous and endemic species of Bangladesh as they may be impacted by climate change, desertification, floods and other natural calamities. (Strategy 2, Medium Term)

15. Restore and promote key habitats that ensure ecosystem integrity, function and connectivity (corridors, migratory flyways of birds, fish passes, etc). (Strategy 9, Short Term)
16. Review and strengthen the legal and policy regimes for conservation and sustainable and equitable use of biological resources. (Strategy 12, Short Term)
17. Support research institutions working on implementation action of NBSAP. (Strategy 11, Long Term)
18. Integrate biodiversity concerns into EIA, SIA and SEA. (Strategy 2, Short Term)
19. Support regeneration and reintroduction programmes for threatened and extinct species (locally and nationally as appropriate) of fauna and flora ensuring native genetic stocks are maintained. (Strategy 2, Short Term)
20. Develop practices for sustainable management of watershed, and coastal and marine resources. (Strategy 10, Medium Term and Long Term)

Third Priority

21. Ensure positive incentive measures for biodiversity conservation and eliminate 'perverse incentive'. (Strategy 11, Medium Term)
22. Integrate biodiversity conservation in all relevant sectoral policies and action plans including ecosystem based resource management. (Strategy 6, Short Term)
23. Regulate natural shrimp PL collection and intensive shrimp cultivation to minimize adverse impact on coastal biodiversity. (Strategy 2, Short Term)
24. Strengthen biological management and control of pests and ban on use of all kinds of harmful chemicals and biocides. (Strategy 2, Short Term)
25. Support sustainable agricultural (crops, fisheries, livestock, forests, etc.) practices by providing incentives to farmers, fishers, livestock keepers, indigenous community etc. and promote research on agro-biodiversity and ecosystem approach. (Strategy 15, Long Term)
26. Strengthen institutional and individual capacities at the local and national level to deal with issues of negotiation as well as implementation of CBD. (Strategy 16, Medium Term)

ANNEX - 2

LIST OF ACRONYMS AND ABBREVIATIONS

BARI: Bangladesh Agricultural Research Institute
BFRI (Fish): Bangladesh Fisheries Research Institute
BFRI (Forest): Bangladesh Forest Research Institute
BLRI: Bangladesh Livestock Research Institute
BNH: Bangladesh National Herbarium
BP: British Petroleum
CBD: Convention on Biological Diversity
CHT: Chittagong Hill Tracts
CITES: Convention on International Trade in Endangered Species of Fauna and Flora
CoP: Conference of Parties
DNA: Deoxyribose Nucleic Acid
DoE: Department of Environment
ECA: Ecologically Critical Areas
ECA: Environment Conservation Act, 1995
ECR: Environment Conservation Rules, 1997
EIA: Environmental Impact Assessment
FAO: Food and Agriculture Organization
FD: Forest Department
GDP: Gross Domestic Product
GEF: Global Environment Facility
GIS: Geographic Information System
GMO: Genetically Modified Organisms
GoB: Government of Bangladesh
HYV: High Yielding Varieties
IAS: Invasive Alien Species
ICTP: International Conventions, Treaties and Protocols
IPM: Integrated Pest Management
IPR: Intellectual Property Rights
IUCN: The World Conservation Union
LCO: Local Community Organizations
LGRD: Local Government Rural Development
LME: Large Marine Ecosystem
LMO: Living Modified Organism
M& R: Monitoring and Reporting

MDG: Millenium Development Goals
MEA: Multilateral Environmental Agreements
MoEF: Ministry of Environment and Forests
MoFL: Ministry of Fisheries and Livestock
NAPA: National Adaptation Programmes of Action
NBSAP: National Biodiversity Strategy and Action Plan
NCS: National Conservation Strategy
NCSIP: National Conservation Strategy Implementation Phase
NCSA: National Capacity Self-Assessment
NEMAP: National Environmental Management Action Plan
NGOs: Non-Government Organizations
NTFPs: Non Timber Forest Products
PA: Protected Area
PDU – ICZMP: Programme Development Unit – Inter coastal Zone management Plan
PGRFA: Plant Genetic Resources for Agriculture
PRSP: Poverty Reduction Strategy Papers
SAARC: South Asian Association for Regional Cooperation
SEA: Socio- Economic Assessment
SEMP: Sustainable Environment Management Programme
ToT: Training of Trainers
TRIPS: Trade Related Intellectual Property Rights
UBINIG: Unnayan Bikalper Nitinirdharoni Gobeshona (Policy Research for Development Alternative)
UNCCD: United Nations Convention to Combat Desertification
UNCED: United Nations Conference on Environment and Development
UNDP: United Nations Development Programme
UNFCCC: United Nations Framework Convention on Climate Change
USAID: United States Agency for International Development
WEHAB: Water, Energy, Health, Agriculture and Biodiversity
WSSD: World Summit on Sustainable Development
WTO: World Trade Organization

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