NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN OF BANGLADESH 2016-2021

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

NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN OF BANGLADESH 2016-2021

(NBSAP 2016-2021)

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

Message

It is my great pleasure to know that the updated National Biodiversity Strategy and Action Plan or NBSAP 2016-2021 is going to be published. This document is a guiding framework for biodiversity conservation, ensuring sustainable use of its components along with fair and equitable sharing of benefits arising out of utilization of genetic resources.

Bangladesh enjoys a very rich diversity of flora and fauna in a wider range of ecosystems. The economy of the country and the people are heavily dependent on the biological resources for their lives and livelihoods. Our cultural heritage, rural lifestyles and traditional healthcare have long been attached to the services provided by the biodiversity. To ensure our rich biodiversity be conserved and used sustainably, we need to follow the updated NBSAP that reflects well thought of actions and strategies of implementation. The NBSAP as a whole could serve as a guiding document to everyone who is involved in management of country's biodiversity.

Being a developing nation, like any other such countries of the world, expansion of intensive agriculture, industrialization, rapid urbanization and rural infrastructure development caused severe stress on the habitats of biodiversity. The threats of irreversible loss of biodiversity have drawn international attention and that led to institutionalize the Convention on Biological Diversity (CBD). As a party to the CBD, Bangladesh is very keen towards conservation and sustainable use of biological diversity for her present and future generations. Updating National Biodiversity Strategy and Action Plan (NBSAP) in line with Aichi Biodiversity Targets signifies our commitments to the cause of biodiversity.

The activities identified in the updated NBSAP should be taken into account by all the stakeholders because NBSAP implementation would directly help to attain relevant targets of the Sustainable Development Goals (SDGs). Because NBSAP implementation has been included as an issue in the 7th Five Year Plan, the activities of NBSAP could be taken as the titles or components of development projects on biodiversity and natural resources management. The core strategy of NBSAP implementation would be lying in ensuring strong partnership and collaboration among the GOs, NGOs and development partners, the private sector, academia and other exponent of the civil society.

I express my sincere thanks to the Global Environment Facility (GEF) for the generous support to develop updated NBSAP and appreciate the endeavor taken by the Department of Environment for publishing the report for all the stakeholders.

I wish NBSAP would go a long way to keep Bangladesh prosperous with biodiversity.

(Anwar Hossain Manju, MP)

Deputy Minister
Ministry of Environment and Forests
Government of the People's Republic of Bangladesh

Message

It is indeed a great pleasure to circulate the Updated National Biodiversity Strategy and Action Plan (NBSAP). While Government of Bangladesh is working towards achieving sustainable development goals (SDGs) and moving ahead with the 2nd phase of Vision 2021, the 7th Five Year Plan (2016-2021), the updated NBSAP could play a great role as both the SDGs and the 7th Five Year Plan has got the impetus on biodiversity. Biodiversity conservation and sustainable use is an obligation for all of us because it is inserted under 'fundamental principles of state policy' of the Constitution of the People's Republic of Bangladesh. The section 18A of the constitution with the heading 'protection and improvement of environment and biodiversity' states that *the State shall endeavor to protect and improve the environment and to preserve and safeguard the natural resources, bio-diversity, wetlands, forests and wildlife for the present and future citizens.* Accordingly, we are fully committed to manage the country's rich biodiversity with the spirit of Constitution and that of the Convention on Biological Diversity to which Bangladesh is a party.

Burgeoning pressure of population and development activities are posing real threats to the conservation and sustainable use of biodiversity. It is not possible to stop loss of biodiversity unless all the development ministries and agencies work together to take up the challenge. The National Biodiversity Strategy and Action Plan (NBSAP) is a key step towards combining the efforts of all the actors working on biodiversity. We are proud to the achievements that the country has made in conservation of biodiversity during the past decades. There are examples of success stories in conservation in the area of community-based management of forests and wetlands resources.

I would like to take the opportunity to thank all our development partners for their supports and local communities for their efforts to conserve and sustainably use the country's biodiversity. We look forward to even stronger cooperation and collaboration among the national and international stakeholders towards implementation of NBSAP. The Ministry of Environment and Forests will do everything possible to take the lead in coordinating implementation of the strategies and priority actions included in this document.

I am confident that implementation of NBSAP will get momentum towards ensuring sustainable development in the country.

(Abdullah Al- Islam Jakob, MP)

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

Foreword

It is our immense pleasure to note that we are publishing updated NBSAP which has been developed towards contributing to our commitments as a party to the Convention on Biological Diversity. To fulfill the objectives of the convention, Bangladesh has so far taken a number of initiatives including development of first generation NBSAP in 2004. The updated or second generation NBSAP has been prepared taking the essence of biodiversity strategic planning 2011-2020 or Aichi Biodiversity Targets. It is always a challenging task to translate the global targets into national ones and the Department of Environment has made it possible through the process of wider consultation which resulted in publication of updated NBSAP. The document contains the key actions needed for conservation and sustainable use of the country's biodiversity, as well as ensuring fair and equitable sharing of benefits arising out of utilization of genetic resources.

The NBSAP 2016-2021 included 50 activities under the 20 headline targets for biodiversity conservation. Towards implementation of updated NBSAP, mainstreaming of biodiversity into sectoral and cross-sectoral development activities remains very important. Furthermore, biodiversity should be integrated into the relevant policies, rules-regulations of various development-oriented ministries. Valuation of goods and services of the ecosystems should be accomplished that would lead us towards integration of the values into the national accounting system. The updated NBSAP reinforced raising awareness among the people, documentation of traditional knowledge and practices, technology transfer and resource mobilization as important aspects towards ensuring biodiversity conservation and sustainable use. The identified tasks will be implemented in collaboration and partnership with all the relevant stakeholders. While the role of the government will be pivotal in harnessing resources mobilization, we would draw attention of the development partners to enhance their engagement to this end. I am optimistic that updated NBSAP would be implemented with the approach of result based management.

The development of updated NBSAP would have never been possible without active engagement of stakeholders and contributors who helped to enrich the document in various forms. Our appreciation goes to the Department of Environment and the project team to accomplish the NBSAP. Our gratitude goes to the Global Environment Facility for the generous support to develop such an important national document.

In the end, I wish NBSAP would go a long way towards achieving the SDGs and to achieve the broader targets that the country would be developed with enriched biodiversity and healthy ecosystems.

Dr. Kamal Uddin Ahmed

Director General
Department of Environment
Government of the People's Republic of Bangladesh

Preface

It is our great pleasure to publish the updated National Biodiversity Strategy and Action Plan (NBSAP), a guiding document for ensuring conservation and sustainable use of the country's biodiversity. The revised NBSAP has been developed in the light of CBD Strategic planning 2011-2020 (Aichi Biodiversity Targets). The elements of the document have gone through a consultative process with the active participation of the stakeholders.

The document contains important aspects like economic valuation of biodiversity, the national targets of biodiversity until 2021, capacity needs for implementation of NBSAP, monitoring implementation of NBSAP, those are laying foundation for taking-up development projects and programs. It takes into consideration of the priority needs in terms of conservation, sustainable use of its components and equitable sharing of benefits. The document provides recommendation for the mainstreaming of biodiversity into relevant sector and cross-sectoral policies and legislative framework. Because NBSAP implementation is important in terms of achieving the 7th Five Year Plan and that of SDGs, the document would guide us a lot in shaping our development initiatives on biodiversity.

I believe that the NBSAP will serve as valuable documents for the policy-makers, government and non-government officials, planners, as well as business community working on the biodiversity in the country. I wish broader participation and engagement of all government and non-government organizations, development partners, local communities and ethnic groups to implement the NBSAP.

I would like to thank Mohammed Solaiman Haider, the Project Director of the Updating and Mainstreaming of National Biodiversity Strategy and Action Plan for taking the strenuous work to accomplish the document. Thanks are also due to the individuals and consultants who provided their efforts to the report.

I would also express my great appreciation to the Global Environment Facility for the generous support and all the stakeholders who contributed to the process of the development of the document.

(Md. Raisul Alam Mondal)

Director (Planning)
Department of Environment and
Project Director
Updating and Mainstreaming of NBSAP

Acknowledgement

The updating of NBSAP could have never been possible without the gracious support of the Global Environment Facility and the GEFsec Task Team Leader, Yoko Watanabe who always led us to reach here. I would like to offer thanks to the colleagues who helped a lot from Washington DC, Chennai, Delhi and Dhaka office of World Bank and GEFsec to ensure disbursement for the operation of the development project. The updated NBSAP has been developed through a series of consultations at national and divisional level with the involvement of stakeholders including representatives of relevant Ministries, Departments, NGOs, academia and development partners. On behalf of the Department of Environment, Ministry of Environment and Forests, I would like to offer heartfelt thanks to the distinguished researchers, authors, experts and representatives who have actively participated and contributed to these events. I express my sincere gratitude to Dr. Kamal Uddin Ahmed, Secretary, Ministry of Environment and Forests, whose presence in the workshops and valuable suggestions gave us way forwards for finalizing the document. My thanks are also due to Mr. Md. Raisul Alam Mondal, Director General, Department of Environment who provided continuous guidance to furnish the task.

I would like to offer thanks to all the experts who contributed in various forms to develop the document. The contribution of IUCN Bangladesh as firm consultant helped the process with the development of various elements of the draft. Thank also goes to the individual consultants who helped the Project Director in organizing the draft are: Mr. Anisuzzaman, Dr. M. Jabed Hossain and Mr. Mohammad Samsur Rahman.

I am also thankful to Prof. Dr. Md. Imdadul Hoque, Prof. Dr. Md. Oliur Rhman, Prof. Dr. M Niamul Naser (University of Dhaka), Prof. Dr. Saleh Ahmed Khan (Jhagangirnagar University), Mr. Md. Tariqul Islam and Begum Fatema Tuz Zohora (Bangladesh Forest Department), Dr. Sarder Md. Nasir Uddin (Bangladesh National Herbarium), Dr. Md. Amzad Hossain and Dr. Md. Tariqul Islam (BARI), Dr Md. Khalequzaman (BRRI), Md. Motaleb H. Sarker (CEGIS), Dr. S.M.A Rashid (CARINAM Bangladesh) for their valuable inputs to the report. I would like to express my gratitude to the participants who provided valuable inputs at divisional and national level consultations. Thanks go to the MOEF Additional Secretary (Environment), Mr. Nurul Karim, Additional Secretary (Development), Mr. Abdullah Al Mohsin Chowdhury and the Deputy Secretary, Ms. Khorsheda Yasmeen and the DoE Director (NRM), Dr Sultan Ahmed and Assistant Director, Mst. Papia Sultana, for their support in facilitating the consultation workshops, as well as, organizing the draft document. Last but not the least, finalizing the document took away plenty of time after the office hours, during the weekends and holidays for that I'm grateful to the family members who endured a lot of trouble to work at home.

Mohammed Solaiman Haider
Director (Planning)
Department of Environment and
Project Director Updating and Mainstreaming of NBSAP

Abbreviations

Acronyms	Elaborations
3R	Reduction, Re-use and Re-cycling
ADB	Asian Development Bank
ADP	Annual Development Program
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BBS	Bangladesh Bureau of Statistics
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BCCTF	Bangladesh Climate Change Trust Fund
BDT	Bangladeshi Taka (Currency)
BFD	Bangladesh Forest Department
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BINA	Bangladesh Institute of Nuclear Agriculture
BJRI	Bangladesh Jute Research Institute
BKMEA	Bangladesh Knitwear Manufacturers and Exporters Association
BLRI	Bangladesh Livestock Research Institute
BNH	Bangladesh National Herbarium
BRRI	Bangladesh Rice Research Institute
BPATC	Bangladesh Public Admistration Training Centre
BSRI	Bangladesh Suger crops Research Institute
CBA-ECA	Community Based Adaptation in Ecologically Critical Areas
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CCCI	Chittagong Chamber of Commerce and Industry
CEGIS	Center for Environmental and Geographic Information Services
CHM	Clearing House Mechanism
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
COP	Conference of the Parties
CSR	Corporate Social Responsibility
CETP	Common Effluent Treatment Plant
CWBMP	Coastal and Wetland Biodiversity Management Project
DAE	Department of Agriculture Extension
DCCI	Dhaka Chamber of Commerce and Industry
DNA	Deoxyribonucleic Acid
DoE	Department of Environment
DoF	Department of Fisheries
ECA	Ecologically Critical Area
ETP	Effluent Treatment Plant
EIA	Environmental Impact Assessment
FBCCI	The Federation of Bangladesh Chambers of Commerce and Industry
FRA	Forest Resources Assessment
GBM	Ganges-Brahmaputra-Meghna
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information System
GMO	Genetically Modified Organism
HYV	High Yielding Varieties
ICTP	International Conventions Treaties And Protocols
IAS	Invasive Alien Species
INGO	International Non-Government Organization
IPM	Integrated Pest Management

Acronyms	Elaborations
IUCN	International Union for Conservation of Nature
MoA	Ministry of Agriculture
MoC	Ministry of Commerce
MoCAT	Ministry of Civil Aviation and Tourism
MoCHT	Ministry of Chittagong Hill Tract Affairs
MoE	Ministry of Education
MoEF	Ministry of Environment and Forests
MoF	Ministry of Finance
MoFL	Ministry of Fisheries and Livestock
MoH	Ministry of Home Affairs
MoI	Ministry of Information
MoInd	Ministry of Industries
MoL	Ministry of Land
MoLGRD	Ministry of Local Government and Rural Development
MoLJP	Ministry of Law, Justice and Parliamentary Affairs
MoP	Ministry of Planning
MoP&ME	Ministry of Primary& Mass Education
MoR	Ministry of Religious Affairs
MoS	Ministry of Shipping
MoWR	Ministry of Water Resources
NAPA	National Adaptation Program of Action
NBSAP	National Biodiversity Strategy and Action Plan
NCTB	National Curriculum & Textbook Board
NGO	Non-Government Organization
NARS	National Agricultural Research System
NSAPR	National Strategy of Accelerated Poverty Reduction
NAPD	National Academy for Planning and Development
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
PA	Protected Area
PRSP	Poverty Reduction Strategy Papers
RS	Remote Sensing
SCP	Sustainable Consumption and Production
SDGs	Sustainable Development Goals
SRCWP	Strengthening Regional Co- operation for Wildlife Protection
TEEB	The Economics of Ecosystem and Biodiversity
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
WARPO	Water Resources Planning Organization
WASA	Water Supply & Sewerage Authority

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Executive Summary

National Biodiversity Strategy and Action Plan (NBSAP) is the basic instrument for implementing the Convention on Biological Diversity at the national level. The NBSAP 2016-2021 has been prepared in order to fulfill the commitment of Bangladesh towards implementing the three objectives of Convention on Biological Diversity (CBD): conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The first generation NBSAP developed in 2004 took into consideration of the issues of implementation of 2010 Biodiversity Targets. The updated NBSAP has been prepared in the line with CBD strategic planning 2011-2020 (Aichi Biodiversity Targets). Bangladesh signed the CBD (Convention on Biological Diversity) in 1992 and ratified it in 1994. Being a party to the CBD, Bangladesh is globally committed to fulfill the objectives of the convention. Development and updating of NBSAP signifies the commitment of the Government of Bangladesh. Bangladesh has its 4th national report in 2010 and 5th national report in 2015.

The updated NBSAP has been developed as per the decision taken in the 10th meeting of the Conference of Parties (COP 10) to implement Aichi Biodiversity Targets. The main chapters contained in the NBSAP are: Status of Biodiversity loss in Bangladesh, Importance of Biodiversity, Mainstreaming of Biodiversity and NBSAP, National Targets and Activities towards Implementing NBSAP, Capacity Development for Implementation of NBSAP, Resource Mobilization towards Implementation of NBSAP, Coordination and Monitoring and Reporting of NBSAP. The document has been prepared through wider consultations ensuring participation of relevant stakeholders.

The first chapter of the document briefly describes the background and rationale with the process of development of updating NBSAP. The country context in relation to the richness of Biodiversity is highlighted here. The chapter also looked at the achievements, lessons learnt and gaps of earlier NBSAP and it has been revealed that various activities, projects or programs were taken after the formulation of NBSAP in 2004 are very much complimentary to implement NBSAP.

The second chapter focuses on the trends of loss and degradation of biodiversity in Bangladesh. Although there is no updated and systematic study results available on the loss of diversity of species in Bangladesh, it is apparent that population of many species has declined. Threats to the rich diversity of flora and fauna are rising as there are trends of degradation in various habitats and ecosystems. For example, in the case of forest biodiversity, plantation forest area has increased while the coverage of the natural forest has declined over the years. Similarly, wetlands of the country are under tremendous pressure of degradation resulting in decreased ecosystem goods and services. In the coastal region, salinity affected area has increased due to sea level rise and disasters of climate change. Population pressure along with their burgeoning demand triggered unplanned industrialization and urbanization that led to habitat destruction call for urgent actions to halt further loss of biodiversity. To curve the situation, the efforts so far taken are not adequate to prevent the further loss of biodiversity. We need to consider the contribution or the value of the ecosystem goods and services to the gross domestic product or the economy of the country and take every step towards maintaining these goods and services.

Chapter three presents importance of biodiversity in the life and livelihood of the people of Bangladesh. Agricultural biodiversity or agriculture sector contributes 17.22% of the total GDP where 45.6% labor force is engaged. The contribution of forest and related services to GDP is about 1.43%. Fisheries sectors contribute 3.30% to the GDP in 2013-2014 fiscal year in current prices and 3.69% in

constant price (at 2005-2006 base year). The sub-sector contributes 23% of gross agricultural products and 5.71% to the total export earnings. A recent valuation study concluded that the Sundarban generates US$ 456 to US$ 1192 per ha per year worth of ecosystem services. The contribution of livestock to GDP is 2.5%. Bangladesh's tourism industry directly contributed around taka 2.23 trillion (2.1%) to the country's GDP in 2013 which implies immense potential of ecotourism in Bangladesh. In 2014, direct, indirect and induced contributions of tourism to GDP were 2.3%, 1.3% and 0.9% respectively, generating 1.8% of total employment in the country.

The roles of ecosystem in human well being have never been taken into account in economic terms. Like, the coastal ecosystems prevent storm, cyclone and severe natural calamities like tsunami. Wetland ecosystems retain huge water during floods. Forest ecosystems maintain temperature regulating Co_2 concentration in the atmosphere. As part of updating NBSAP of Bangladesh, economic valuation was done for the services provided by the major ecosystems namely the Sundarbans, the wetlands and hill forests. The study assessed a total of 50 services from these ecosystems and calculated the contribution to the GDP of the services of hill forest, wetland and mangrove ecosystems equivalent to 9.2% to 33.3%, implying significant role of ecosystems in the human well being of the country.

Chapter four discusses about the mainstreaming of biodiversity and NBSAP. Mainstreaming is very important for ensuring conservation of biodiversity and sustainable use of its components at the individual, institutional and systemic level. The insertion of 'Biodiversity' into the constitution of Bangladesh signifies the commitment of the government to protect and conserve biodiversity and environment for the wellbeing of the people living now and the generations to come. Biodiversity conservation and sustainable use should be integrated into sectoral and cross-sectoral policies, legislations, as well as national development plans. Analysis of existing national policies and regulations those are supportive to implement NBSAP reveals that we still need to work on insertion of the very terms like conservation, sustainable use, equitable sharing of benefits and above all, integrating the values of biodiversity in many of these documents. Updated NBSAP proposes to engage all the stakeholders in the process of implementation of NBSAP. It also encourages involving private sector, business people, NGOs, local community, women and youth forces in the activities of implementing NBSAP. Towards ensuring long-term sustainability of the projects, development ministries or agencies implementing development works have to consider the implications of biodiversity loss in their initiatives.

Chapter five highlights national targets, activities and indicators for monitoring achievement towards implementing NBSAP. Towards contributing to the global targets (Aichi Biodiversity Targets) and implementation of NBSAP, 20 national targets have been proposed to be taken into action during the fiscal year 2015-2016 to 2020-2021. The 20 national targets are as follows:

1. By 2021, relevant stakeholders will be aware on the value of biodiversity and play an active role in ensuring sustainable use
2. By 2021, Assessment of valuation of goods and services of major ecosystems will be furnished towards integration into national accounting system
3. By 2021, Studies on the impacts of incentives or subsidies on biodiversity, as well as development of policy roadmaps for phasing out of incentives or subsidies harmful to biodiversity will be completed towards mainstreaming the relevant ministry for implementation of the policy roadmap

4. By 2021, Policy on Sustainable and Consumption Production (SCP) to maintain safe ecological limit of natural resources of major ecosystems will be furnished and disseminate the policy to all the stakeholders will be done towards implementation
5. By 2021, studies on the rate of habitat loss will be furnished towards promoting implementation of land use policy and enforcement of relevant legislations on conservation of natural habitats
6. By 2021, stock assessment of fish, invertebrate stocks and aquatic plants will be undertaken keeping in mind the safe ecological limit and awareness raising of the stakeholders will be enhanced so that aquatic biodiversity will be managed and harvested sustainably, legally taking into account of ecosystem based approach towards avoidance of overfishing and conservation of threatened species and vulnerable ecosystems
7. By 2021, development of Integrated Management Plan will be completed for areas under agriculture, aquaculture and forestry towards ensuring conservation and sustainable use of biodiversity
8. By 2021, study on impact of pollution and excess nutrient on functioning of major ecosystems will be conducted and enforcement drive for controlling pollution will be strengthened.
9. By 2021, study on the impact of IAS will be furnished, regulations towards control of IAS will be developed and capacities at the port-of-entries will be enhanced to regulate IAS
10. By 2021, multiple pressure on coral associated island (St. Martin) and Sundarban mangrove ecosystem will be reduced through implementation of management plan of the ecosystems.
11. By 2021, Bangladesh's 3% area under terrestrial ecosystem (forests), 3% area under inland wetlands and coastal ecosystems and 5% of total marine area will come under PAs or ECAs with development and implementation of management plan for these areas
12. By 2021, the extinction of known threatened species will be prevented and their conservation status, particularly of those most in decline, has been improved and sustained
13. By 2021, capacity of *in-situ* and *ex-situ* conservation facilities will be strengthened to conserve the genetic diversity of cultivated plants, indigenous livestock and poultry resources
14. By 2021, develop and implement restoration plan for degraded wetlands and rivers taking into account the needs of vulnerable people and local communities
15. By 2021, initiate implementation of restoration plan for degraded ecosystems, especially, forest lands and wetlands for addressing climate change mitigation, adaptation and combating desertification
16. By 2016, Bangladesh Biological Diversity Act addressing the issues of ABS will be finalized and the instrument of ratification for the Nagoya Protocol on ABS will be submitted to the secretariat of CBD
17. By 2016, Bangladesh will develop, adopt and update NBSAP and commence implementation of the document in an effective and participatory manner
18. By 2021, traditional knowledge, innovations and practices of local communities or ethnic groups will be recognized and documented
19. By 2021, Agencies responsible for Biodiversity and Natural Resources Management will be adopting modern information technology like GIS and RS and information on biodiversity will be shared through Clearing House Mechanism (CHM)
20. By 2017, financial resources will be mobilized towards accelerated implementation of targets and activities of updated NBSAP

Chapter six identified the needs for capacity building at individual, institutional and systemic level to achieve the targets under NBSAP. In order to attain the targets, capacity building is essential for various activities under NBSAP targets. In addition, application of technologies and mobilization of financial resources are equally important for the implementation of NBSAP. While some targets will

require use of modern technologies including DNA finger printing and use of GIS and Remote Sensing, other will need application of local and traditional knowledge.

Chapter seven focuses on the challenges of mobilization of financial resources to address biodiversity conservation and management issues. No stand-alone financial institutions or funding mechanism is in place to address biodiversity related development activities. Conservation activities are carried out sporadically by the country's Annual Development Plan (ADP), Non-development expenditures, Non-ADP program and development partner-driven activities. Though biodiversity issues were included in a number of previous five year plans including the latest one, the 7th five year plan, none of these plans adequately addressed financing requirements to ensure implementation of biodiversity activities or NBSAP as such. The seventh five year plan (2016-2021) included implementation of NBSAP as an issue, but again no clear budget allocation has been promised for this item.

An analysis on biodiversity specific projects taken during 2009-2015 shows that the highest resource allocation was found in forestry sub-sector (10464.3 million BDT) followed by fisheries, crop and livestock sub-sectors. In case of mixed projects, it was difficult to segregate the portion of money exclusively allocated for biodiversity conservation. It is evident that success of implementation of NBSAP will be dependent on mobilization of adequate financial resources for taking up the activities. An indicative budget estimated for all the activities to achieve the national targets of NBSAP stood as 18329.00 million BDT. Some possible sources of resources are direct core funding (Government of Bangladesh), non-core funding (Trust Fund, Jolmohal Leasing, Fish harvest), Indirect peripheral (Regional and Global Forum Fund, Scientific and development initiatives and Carbon trading), Development Partners (Grant, Aid, Loan), private sector (CSR, Donation), INGO Research Grant and Green tax, etc.

Chapter eight describes mechanisms for coordination among stakeholders as well as monitoring and reporting of the activities for the effective implementation of NBSAP. MoEF will coordinate the implementation of the NBSAP with other Ministries/Divisions, as well as, government agencies, academic institutions, non-governmental organizations and communities taking part in the activities. National Biodiversity Committee under the MoEF will act as the apex body for coordination with relevant ministries/agencies towards implementation of NBSAP. Reporting on the progress of the implementation of the NBSAP will be done, periodically, by the Department of Environment. Bangladesh Biodiversity Clearing House Mechanism (CHM) will act as web-based platform to provide and receive updated information like the status of biodiversity and conservation initiatives. It will also contribute to the dissemination of biodiversity related information and to raise public awareness on biodiversity conservation. DOE will be administering the operation of the national CHM.

Mainstreaming of NBSAP in all the relevant sectors although is a continuous process that would be the prime work that needs immediate attention of the Ministry of Environment and Forests and the Department of Environment. There are enormous challenges ahead towards building financial and technical capacities of the implementing agencies, accomplishment of the valuation of goods and services of ecosystems and incorporation of the values into the national accounting system and monitoring of the activities towards achieving national targets. Despite of all these challenges, the revised NBSAP offers a great opportunity for the country to move forward halting the loss of biodiversity and keeping the country enriched with fresh water, staple crops, delicious fruits and grains, fisheries resources and fresh air around us. By implementing the targets within the timeframe, the country could contribute a lot to fulfill the vision of living in harmony with the nature by 2050.

1. Introduction

1.1 Country context

Bangladesh is located in the shore of the Bay of Bengal, stretches from 20°34' to 26°38' N and from 88°01' to 92°41' E. It has boundary with India to the West and North, India and Myanmar to the East and the Bay of Bengal to the South (Figure 1). The total area of the country is 147,570 sq km (BBS 2011), which is a delta of the Ganges-Brahmaputra-Meghna (GBM) basins, one of the largest river systems of the world. Moreover, with the longest unbroken sea-beach, the country has a total marine area of 118,813 sq km. The north-east and south-east portions of the country are hilly, with some altitude over 1,000 m above sea level. About 80% of the country is floodplain, 12% is hills, and 8% is terrace or uplifted blocks (BBS 2011).

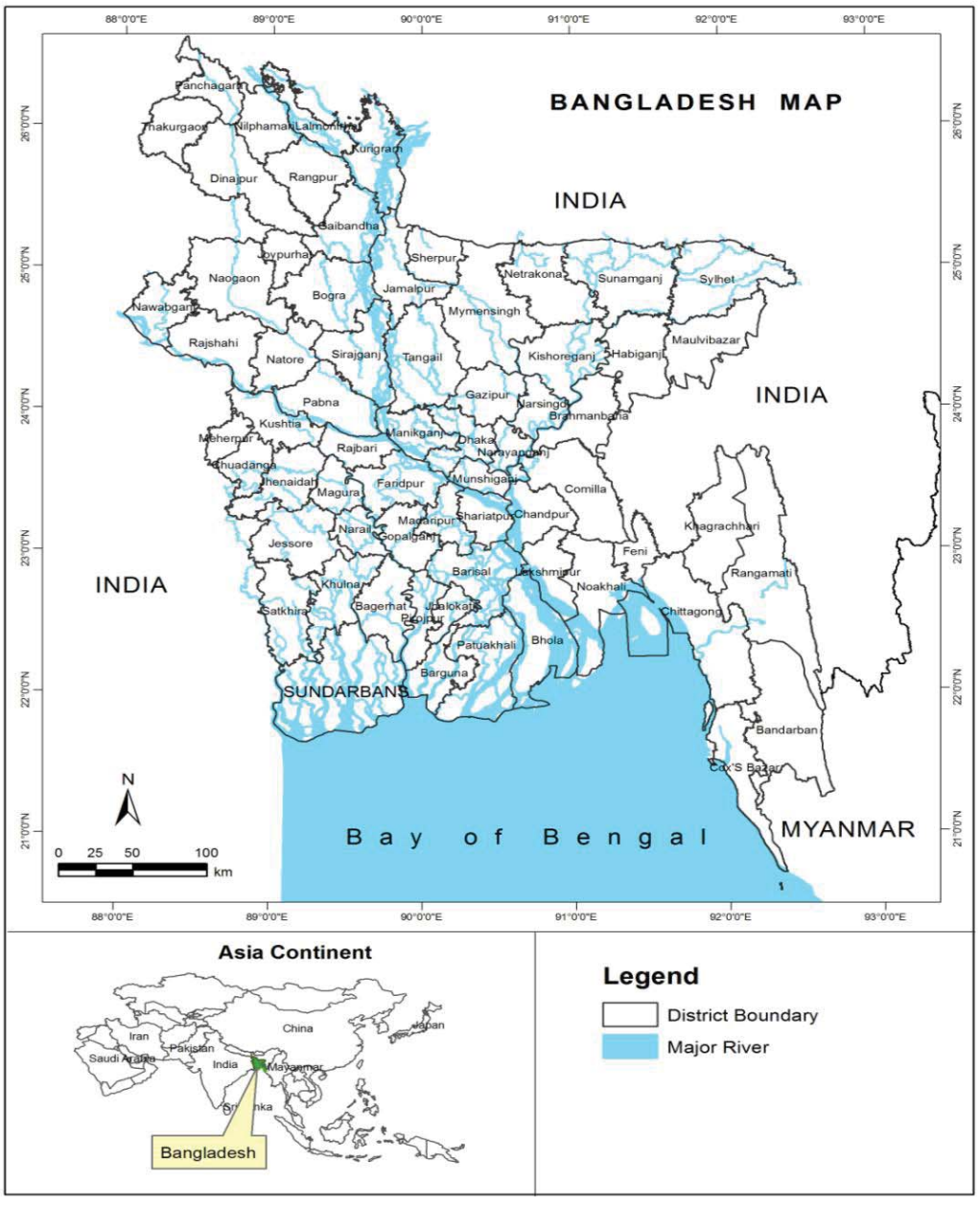


Figure 1 Location Map of Bangladesh in the South Asian Region (Source: CEGIS, 2016)

Geologically Bangladesh occupies a larger part of the Bengal Basin and the country is covered by tertiary folded sedimentary rocks (12%) in the north, north eastern and eastern parts; uplifted Pleistocene residuum (8%) in the north western, mid northern and eastern parts; and Holocene deposits (80%) consisting of unconsolidated sand, silt and clay. Bangladesh has been divided as thirty agro-ecological zones on the basis of physiography, soil properties, soil salinity, depth and duration of flooding which are relevant for land use and for the assessment of agricultural potential.
According to the census done in 2011, the total population of Bangladesh is 14,97,72,364 with the density of 1,015 per sq km (BBS, 2012). The country is ethnically homogeneous, and its name derives from the Bengali ethno-linguistic group which comprises 98% of the population. The Chittagong Hill Tracts (CHTs), Sylhet, Mymensingh and North Bengal regions are home to diverse ethnic peoples. The country has 45 ethnic groups living in various parts (Banglapedia, 2015).

Bangladesh enjoys the sub-tropical monsoon climate regime characterized by high temperatures, heavy rainfall, and excess humidity with marked seasonal variations. According to the report prepared by Bangladesh Meteorological Department (BMD) in 2012, the mean annual temperature of the country is about 25ºC, with extremes as low as 28ºC and as high as 45ºC. Rainfall data from 1950-2011 shows that average annual precipitation over the country is 2,428 mm; of the total rainfall, 71% occurs during the monsoon.

Bangladesh is very rich in biodiversity although it was much enriched earlier. Due to its unique geographic location, climatic condition and large seasonal variability, diverse ecosystems are naturally created that support rich biodiversity. The various ecosystems found in the country include hills, forests (Evergreen and Semi-evergreen forests, Dry-deciduous and Moist deciduous forests), Grasslands, Reedlands, floodplains, rivers, low-lying islands (Charlands), Ox-bow lakes (*Baors*), River-back swamps *(Haors*), open woodlands (Village groves), low-lying deep depressions (*Beels*), ponds, canals, ditches, estuary, coastal mudflats, coastal islands, mangrove swamps, coral-bearing island and marine ecosystems. The ecosystems of Bangladesh are broadly clustered as (a) Terrestrial, (b) Inland Water, and (c) Coastal and Marine. Blessed with diversity in habitats, the country supports a rich biodiversity. The Encyclopedia of Flora and Fauna of Bangladesh (2007-2009) recorded 3,611 taxa of angiosperms from the territory of Bangladesh. It has been noted that, between June 2009 and June 2013, 64 angiosperm species were recorded from the country and 8 were described as new to science (Irfanullah, 2013). In addition to that, Bangladesh National Herbarium (BNH) reported 50 angiosperm species as new records for the country (Ara and Khan, 2015). Thus, the total number of angiosperm species identified so far in Bangladesh is 3,733.

Bangladesh harbors rich faunal diversity in its wide range of ecosystems. A comparison of faunal diversity of Bangladesh with that of the world showed tremendous diversity in the small geographical area of the country with at least 5,000 arthropod, 475 marine fish, 267 fresh water fish, 479 mollusk, 650 birds, 154 reptiles, and 128 mammal species (DoE, 2015). Moreover, as inventorying goes on, the list of species might continue to increase.

This biodiversity provides human being with the basic needs of foods, medicines, cloths and shelters as well as livable environment for existence. However, although once very rich in biodiversity, the country has been facing various threats to its biodiversity. Given this scenarios, Bangladesh has to conserve and safeguard its biodiversity for the betterment of its citizens.

1.2 Background of development of NBSAP:

Bangladesh became signatory and party to the Convention on Biological Diversity (CBD) in 1992 and in 1994, respectively. To fulfill the obligation of the CBD, Bangladesh prepared NBSAP, an implementation tool of the convention, in 2004 in line with 2010 Biodiversity Targets. The progress of first generation NBSAP was reviewed in 2010 with the submission of Fourth National Report, as well as, Fifth National Report in 2015. The revised NBSAP has been developed in line with Biodiversity Strategic Planning 2011-2020 (Aichi Biodiversity Targets).

Box -1 Convention on Biological Diversity (CBD) and its Background

The Earth's biological resources are vital to humanity's economic and social development. Biological diversity is a global asset of tremendous value to present and future generations. At the same time the threat to species and ecosystems has never been so great as it is today. Species extinction caused by human activities continues at an alarming rate. To curb the situation UNEP convened the Ad Hoc Working Group of Experts on Biological Diversity in November 1988 to explore the need for an international convention on biological diversity. In May 1989 an Ad Hoc Working Group of Technical and Legal Experts was constituted to prepare an international legal instrument for the conservation and sustainable use of biological diversity. The experts were to take into account "the need to share costs and benefits between developed and developing countries" as well as "ways and means to support innovation by local people". By February 1991, the Ad Hoc Working Group had become known as the Intergovernmental Negotiating Committee. Its work culminated on 22 May 1992 with the Nairobi Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity. The Convention was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit"). It remained open for signature until 4 June 1993 by which time it had received 168 signatures. The Convention entered into force on 29 December 1993 which was 90 days after the 30th ratification. Presently, CBD has got 196 parties. Article 6 of the Convention on General Measures for Conservation and Sustainable Use states that each Contracting Party shall, in accordance with its particular conditions and capabilities:

- 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
- 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.

The Convention on Biological Diversity was inspired by the world community's growing commitment to sustainable development. It represents a dramatic step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources.

1.3 Progress of implementation of first generation NBSAP

Since its development in the year 2004, a number of activities have been taken toward implementation NBSAP. During 2004-2015, a number of development programs and projects have been taken those contributed to towards implementation of various targets of NBSAP. Some of the notable progresses made during this period are summarized as follows:

i. Integration of Biodiversity into the Constitution, Acts, Rules and Planning documents

Issues of environment and biodiversity conservation have been inserted into the constitution of Bangladesh (Article 18A) implying that the every citizen of the country is responsible for conservation of environment and biodiversity for the betterment of the people of the country. Bangladesh Environment Policy, 1992 has been updated incorporating the diverse issues of ecosystem conservation.

Box-2 The strategies outlined in the NBSAP, 2004

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

Biodiversity conservation was included in PRSP (2003-2009), and NSAPR (2009-2011). Vision 2021 (Sixth and Seventh five year plans during 2011-2021) explicitly highlighted the conservation issue of biodiversity. Bangladesh Environment Conservation Act 1995 has been amended in 2010 with much more on biodiversity conservation through protection of wetland and hilly areas. Bangladesh Biosafety Rules, 2012 has been enacted to protect biodiversity from the threats of the introduction of genetically modified organisms. Bangladesh Wildlife (Conservation and Security) Act, 2012 has been enacted. Bangladesh Biological Diversity Act has been approved by the Cabinet of the Government and the Act is waiting for the approval by the national parliament.

ii. Increase of Area under conservation

Bangladesh government has enhanced conservation activities through declaring and managing various areas of biodiversity importance as Protected Areas (PAs), Ecologically Critical Areas (ECAs),

Botanical Gardens, Safari Parks and Eco-Parks and Fish Sanctuaries. Of the total 40 PAs, 24 have been declared during the period starting from 2004 to 2015. Out of this 24 PAs, 23 is terrestrial or inland PAs (total area is about 36,127 ha) and the rest one is Marine Protected Area (MPA) that is about 1,73,800 ha.

During 2004 to 2015, a total of 5 ECAs (9099 ha) has been declared. The Coastal and Wetland Biodiversity Management Project (CWBMP) was taken to institutionalize a participatory management system for the conservation and sustainable use of biodiversity in four ECAs, namely, Cox's Bazar-Teknaf peninsula, St. Martin Island, Sonadia Island and Hakaluki Haor during 2004-2011. The CWBMP is followed by 'Community Based Adaptation of ECAs through Biodiversity Conservation and Social Protection (CBA-ECA)' project during 2011 to 2015. A number of fish sanctuaries have been established towards protection of mother fish. For increasing reproduction and growth, fishing of *Hilsha* is banned for certain period of the year towards ensuring undisturbed spawning and avoidance of the catch of juvenile fish. Co-management approach has been introduced in some of the PAs and ECAs.

iii. Documentation of flora and fauna

A total of 28 volumes of the *Encyclopedia of Flora and Fauna of Bangladesh* (2007-2009) were published by the Asiatic Society of Bangladesh with the financial support of the MoEF. This included taxa from lower groups like bacteria and fungi to higher groups of plants and from protozoa to mammals, so far recorded in Bangladesh.

iv. Updating Red list of flora and fauna

Bangladesh National Herbarium (BNH) has published Volume 1 of Red Data Book of threatened vascular plants of Bangladesh that included 106 threatened species in 2001. BNH has published the Volume 2 of Red Data Book of threatened vascular plants of Bangladesh that include 120 threatened species in 2013. Now the updating of the Red-list of animals is underway through the Strengthening Regional Cooperation for Wildlife Protection (SRCWP) project of the Forest Department.

1.4 Lessons learnt from the first generation NBSAP

The following points could shed a bit light of the lessons learnt on implementation gap of the NBSAP, 2004:

i. ***Institutionalize NBSAP***

NBSAP implementation yet to go a long way to take the institutionalized shape. Although, NBSAP should be considered as guiding principle for the conservation of biodiversity of the country, a very good number of actions taken towards biodiversity conservation, without due attention to the NBSAP.

ii. Mainstreaming of NBSAP

Integration of NBSAP into relevant sectoral and cross-sectoral plans, programs, projects, policies did not progress at a desired level. Mainstreaming has to go a long way to conserve biodiversity and ensure sustainable use.

iii. Capacity building among the stakeholders

Capacity enhancement at individual, institutional and systemic levels in the country to implement NBSAP has not been considered.

iv. Participation of the stakeholders in NBSAP implementation
Participation of the stakeholders to implement NBSAP has not been scaled-up to the level where all the actors are playing their expected role.

v. Weaker level of coordination
Coordination, collaboration and cooperation with relevant government and non-government sectors, academia and industries in implementing NBSAP is still lagging behind.

vi. Weaker level of international collaboration
International collaboration in order to enhance technical and financial support from other parties and development partner has to be re-energized to implement NBSAP

vii. ***No institutional mechanism for continuous monitoring and review of the progress NBSAP implementation***
Implementation progress of NBSAP has only been discussed during development of national reports. To maximize the outcome of NBSAP implementation, a half yearly review of progress should be considered by the MOEF through National Committee on Biodiversity.

viii. Resource mobilization did not take place at an optimum level
Adequate financial resource to implement NBSAP was not mobilized covering all the strategies comprehensively.

1.5 Necessity of updating NBSAP

Being a party to the CBD, Bangladesh is globally committed to implement the obligations under the convention and decision taken by the Conference of the Parties (COP)

There are continuous threats on the precious biodiversity due to many factors including population pressure, urbanization, industrialization and global climate change. However, the conservation efforts implemented henceforth is not enough to halt the rapid loss of biodiversity. NBSAP has not yet been fully mainstreamed into the relevant sectoral and cross-sectoral policies and plans of the country. The value of ecosystem derived goods and services of the country has not yet been integrated into the national accounting system. The gap of knowledge and information on the biological resources or the natural capital is another striking area where the country needs energised efforts.

As there are changes in various dimensions with regards to biodiversity and its conservation, it is necessary to revisit the NBSAP time to time and update the document in the line with the latest developments, laps and gaps. Unless the NBSAP is fully integrated into the development planning process and mainstreamed at the policy level, a paradigm shift towards conservation of biodiversity would not take place. With the pace of latest global developments, Bangladesh has to update NBSAP with the CBD Strategic Plan 2011-2020 (Aichi Biodiversity Targets) that has been adopted in COP-10 of the Convention on Bilogical Diversity in 2010.

1.6 Process of development of updated NBSAP

The NBSAP has been updated through a series of consultations with stakeholders from relevant government, non-government agencies, civil societies, academia, print and electronic media at divisional and national level workshops. The process also involved thorough review by the relevant experts. Suggestions and comments given by the members of the steering committee were also taken into consideration while preparing the document. The process of development of updated NBSAP is shown in the Figure 2.

Figure 2 Process of updating NBSAP

Consultation on setting National Biodiversity Targets at Chameli Conference Room, Department Environment

Divisional consultation at Chittagong on setting Biodiversity Targets

Consultation workshop at LGED-RDEC, Dhaka on developing Targets, Indicators and Strategy of updated

2. Trends of Biodiversity Loss in Bangladesh

2.1 Degradation of ecosystems

Rich biodiversity of Bangladesh has been facing huge pressure like any other developing country. Degradation of ecosystems and erosion of species and genetic diversity could be visualized in various part of the country, if we compare the present status of resources with that of what we have had only 3-4 decades back.

Cultivation in hilly areas of Rangamati that was once a natural forest

Degradation of Forests

A decreasing trend in the natural forest area of Bangladesh has been observed since 1980s (Figure 3).

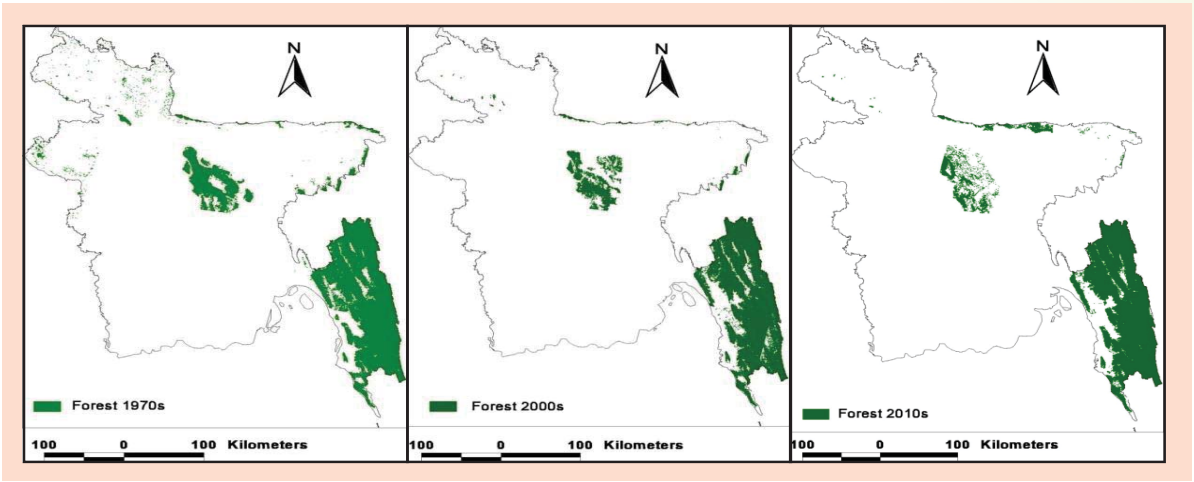


Figure 3 Forest land cover maps of Bangladesh produced by using Landsat MSS 1976 (left panel) and Landsat TM 2000 (middle panel) and Landsat TM 2010 (right panel) Source: SRDI, 2013.

FAO (2015) reported a gradual decline in forest area over the period 1990 to 2015. In 1990, the total forest area was 1494,000 ha and in 2015 it became 1429,000 ha (Figure 4).

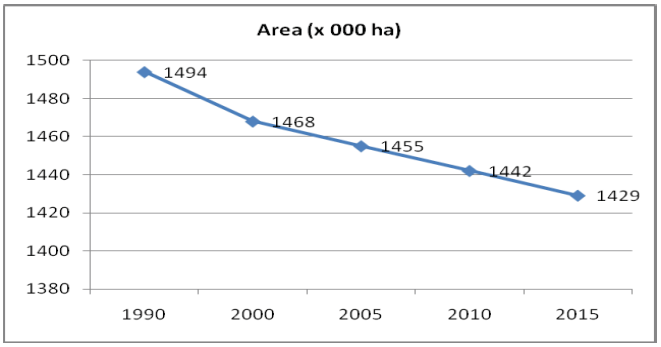


Figure 4 Changes in forest area during 1990 to 2015 (Source: FAO, 2015)

On the basis of analysis of Landsat MSS/TM/ETM satellite imageries of 1976,

2000 and 2010, SRDI reported that the mangrove forest coverage has been decreased over the years. It has been stated that mangrove coverage was 452444 ha i.e. 3.12% of the total area of Bangladesh in 1976. The study revealed that the area has slightly been increased (1431 ha annually) and become 3.35% in 2000 and thereafter decreased significantly to 3.03% in 2010 and annually decreased by 4534 ha. It was estimated that the annual rate of increasing mangrove area was 0.01% during the period 1976 to 2000 that is attributed to mangrove plantation of 132000 ha coastal land along the shore. As per the analysis, during 2000-2010, mangrove coverage decreased at the rate of 0.032%, although the overall rate of such decrease was 0.003% from 1976 to 2010 (SRDI, 2013). However, to the total land area of mangrove has not been decreased as FD is increasing mangrove plantation every year.

Vegetation composition has been reported to be changed in the various forest ecosystems. Tree density in the Sundarban mangrove forests has also been observed to be decreased during the period 1959 to 1996 due to increased salinity. A total of 296 growing stock per ha in 1959 was reduced to 180 by1983 and to 144 (48.65%) by 1996 (Aziz and Paul, 2015)

It is observed that natural forest (Sundarban forest and Kassalong Hill forests) area has been decreased although plantation forest (Rubber Plantation and Coastal Afforestation) area is increased (Figure.5). Natural forest depletion caused habitat destruction of many wild animals, as well as, many species of plants.

Figure 5 Changes in area of some selected forests in Bangladesh over time (Source: FAO, 2015)

Landuse change has altered the vegetation in the *Sal* forests of Bangladesh (Hossain et al. 2009). Plant species diversity in the converted land has been found to be significantly lower than that in the relatively undisturbed natural *Sal* forest stands**.** Due to changes in the land use pattern in the forests, below ground soil decomposer community has also been changed.

Pineapple cultivation in Sal forest

Acacia plantation in Madhupur Sal forest

Degradation of Inland Water Ecosystems

Throughout the country, the wetlands are decreasing, due mainly to anthropogenic activities like unplanned expansion of housing and settlements, industrial installations and construction of road networks. Many rivers, canals, ponds or ditches which have been supporting the biodiversity and their habitats are degraded because of clogging of channels through silting up and encroachment by filling-up. Degradation status of wetlands could be realized from an analysis of CEGIS taking Landsat2 MSS Satellite image of 3 January 1977, Landsat5 TM satellite images of 1999 and Landsat5 TM satellite images of 2010 for the three landcover classes (Figures 6 & 7). The study

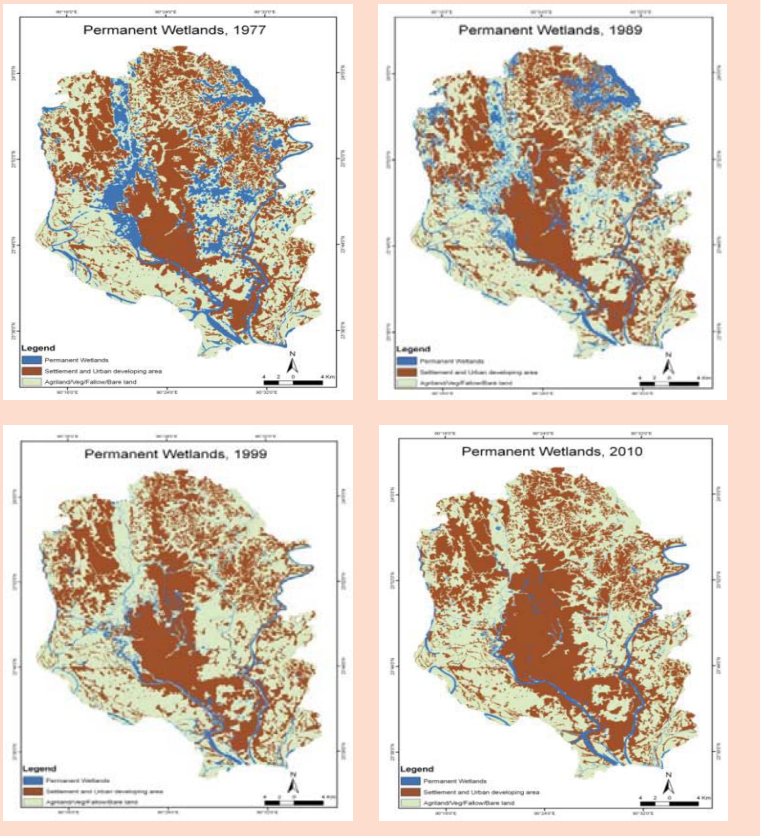


Figure 6 Map showing the permanent wetlands, settlements, waterbodies and major rivers of Bangladesh during 1997 to 2010 (source: CEGIS-WARPO, 2012).

found that the area of landcover class of perennial wetlands was 20503 ha in 1977; the same has been reduced to 5520 ha in 2010. It denotes a reduction of 73% of wetlands occurred within the period of 1977 to 2010. The landcover class of settlement and urban developed area was 54864 ha in 1977 which has been increased to 68144 ha in 2010 that denotes an increase of 24% of settlement and urban developed area within the period of 1977 to 2010. The landcover class of agriculture land, vegetation, fallow and bare land was 68708 ha in 1977 which has been increased to 70417 ha in 2010 which denotes an increase of 2.48% of agriculture land from 1977 to 2010 (CEGIS, 2012). The study clearly indicates that pressure on wetlands ecosystems is dramatically increasing.

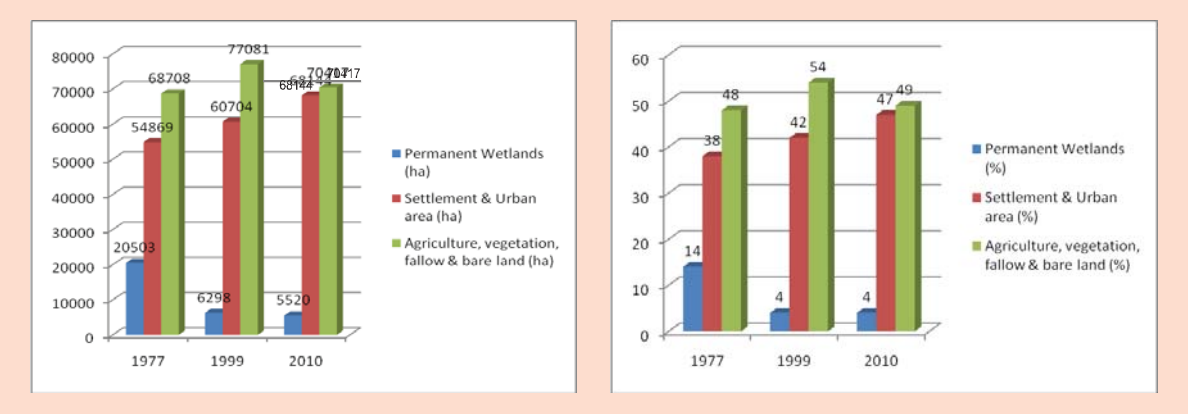


Figure 7 Changes in land classes during 1977 to 2010 through 1999 in Bangladesh (Source: CEGIS-WARPO, 2012).

Water quality, very important for supporting biodiversity, has been deteriorating in various river ecosystems due to industrial or municipal wastes or effluents. Water quality of the rivers in the close vicinity of the capital city Dhaka: the Buriganga, the Shitalakhya and the Turag were assessed during the dry and wet season for the year 2014 that is presented in the Table 1. Parameters of river water in comparison to the Bangladesh standards for fisheries indicate the degradation of habitat for aquatic biodiversity during dry season.

Sewage of Dhaka city polluting the river Buriganga

Table 1: Water Quality of Selected Rivers in dry season (Nov- May) and Wet Season (June- October) for 2014.

Name of River	DO (mg/l)		BOD(mg/l)		PH	
	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season
Buriganga	0.61	2.58	24.97	10.29	7.24	7.27
Sitalakhya	0.66	3.86	16.8	6.64	7.19	7.43
Turag River	0.69	2.75	35.44	7.21	7.67	7.37
Bangladesh Standards of surface water for fisheries	6.5-8.5		6.5-8.5		≤6 mg/l	

Source: DoE, 2014

Degradation of lands in various Agro-ecosystems

Agricultural lands in Bangladesh are facing various degradations like over utilization, land use change, construction of unplanned infrastructures, injudicious use of fertilizers and pesticides. BARC (1999) reported several factors causing land degradation that include soil erosion, wind erosion, soil fertility decline, water logging, salinization, pan formation, acidification, lowering of water table, active floodplain, deforestation, etc. Table 2 shows various factors with the coverage of the land degradation affected area in various intensities. Excess use of agrochemicals such as fertilizers, pesticides, herbicides and insecticides causes degradation of soil quality. Study revealed that tobacco cultivation also has negative impacts on water and soil quality, as well as biodiversity (Kutub and Falgunee 2015).

Table 2: Different types of land degradation and their extent in Bangladesh

Types of degradation	Affected area (million ha)			Total area (million ha)	% National area
	Light	Moderate	Strong		
Water erosion	0.1	0.3	1.3	1.7	12
River bank erosion	-	-	-	1.7	12
Soil fertility decline	3.8	4.2	-	8.0	54
Organic matter depletion	1.9	1.6	4.0	7.5	51
Waterlogging	0.7	-	-	0.7	5
Salinization	0.6	0.3	-	0.9	6
Plough pan	-	1.0	-	1.0	7
Acidification	2.74	3.70	0.25	6.69	
Deforestation	-	1.5	-	1.5	10
Total	7.1	11.2	5.3	23.6	

Source: After Hossain, 2007.

Brick manufacturing have been taking away the fertile agricultural soils of Bangladesh. Khan et al. (2007) conducted a study to evaluate the effects of brick making on soil fertility. It has been reported that soil collected for brick burning has altered soil nutrient status, physical and chemical properties. Although use fuelwood in brick burning was prohibited, yet the homestead trees like date palm had been used in brick kilns resulted in reduction of these trees in rural agro-ecosystems.

Withdrawal of the Ganges water in the upstream during the dry season has triggered draw-down of water table leads to land degradation in the northern and western part of the country. The Sundarban Mangrove Ecosystem is facing degradation as salinity is aggravating due to reduced recharge or flow of fresh water from the upstream.

Degradation in the Coastal and Marine Ecosystem

Coastal and Marine Ecosystem in Bangladesh is facing pressures from sea-level rise and climate change induced disasters exacerbated with localized interventions in some areas. Because of these drivers of changes, natural resources of the coastal zones are depleting. Density of the mangrove plants in some areas

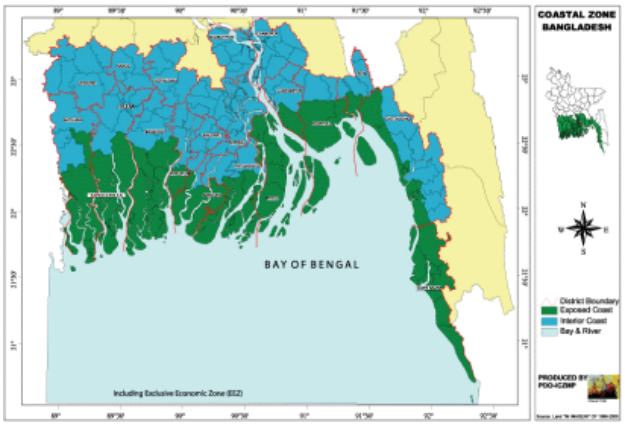


Figure 8 Coastal zones of Bangladesh

Shrimp farming in Satkhira district area.

of Sundarban has been reported to be thinned. Depletion of the Chakaria Sundarban has been shown in several studies. Miah et al. (2010) reported that 18,000 ha Chakaria Sundarban of Cox's Bazar has been encroached for the expansion of brackish water shrimp farming during the period from 1975 to 1999. Study furnished by Rahman and Hossain (2015) has shown that major changes in land use occurred in this area during 1984 to 1994. Mangrove forest cover was almost cleared in 1994. They reported that during 1973-2012 deforestation of the mangrove took place and salt farming increased from 2% to 23% in 2012, it leads to shrink of agricultural land from 36% in 1974 to 7% in 2012 (Rahman and Hossain, 2015).

Shrimp culture by using salt water is causing degradation of coastal ecosystem. Hydrological regime and agricultural patterns are being affected by the shrimp cultivation in this region. Landcover of shrimp farming has increased remarkably over the last decades and is still increasing (Figure 9). Before 1980, shrimp aquaculture area was only 20,000 ha, in 30 years it expanded 10 fold and that rose to 217,877 ha (Karim, 1986 and DoF, 2008b). During the last 30 years, shrimp production (Figure 9) from aquaculture has increased more than five fold, from 14773mt in 1986-87 to 86840mt in the fiscal year 2006-07 (DoF, 2008b).

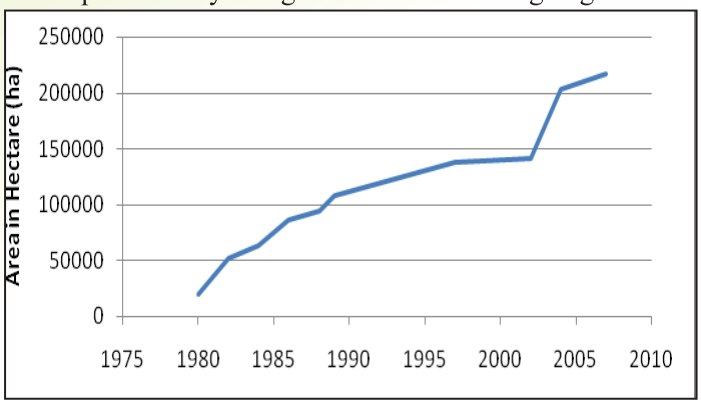


Figure 9 Trend in expansion of shrimp areas in Bangladesh (Karim, 1986 and DoF, 2008b)

As per SRDI (2010), salt affected area in Bangladesh increased over the time; 0.833 million ha, 1.021 million ha and 1.056 million ha in 1973, 2000 and 2009, respectively. During the period from 2000 to 2009, about 0.035 million ha (3.5%) salt affected area increased. During the last 36 years (1973-2009), the salt affected area became 0.223 million ha (26.7%) indicating the trend of reduced fertility of soil for the agriculture in the coastal zone (Figure 10). Coastal Ecosystem of Bangladesh is threatened by various interventions like

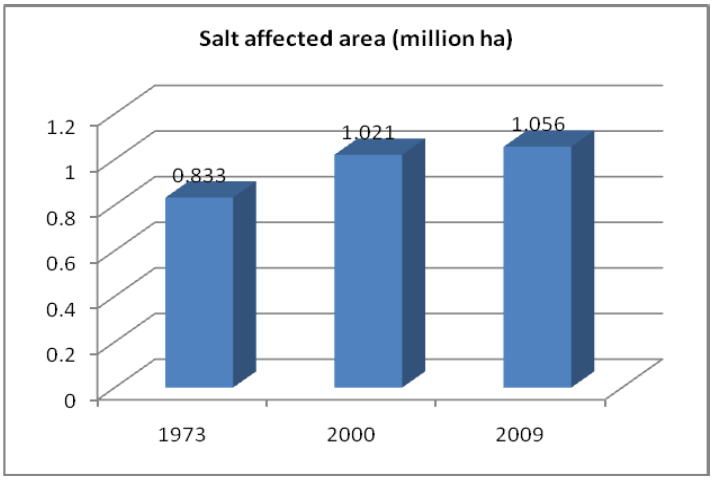


Figure 10 Salt affected areas from 1973 to 2009 (SRDI 2010)

shipping and ship-breaking those are producing oil-spills, bilge and ballast water. Coastal environment is being polluted by the oil spills from various sources of oil company terminals, dry docks, refineries, port operations and ship-breaking activities.

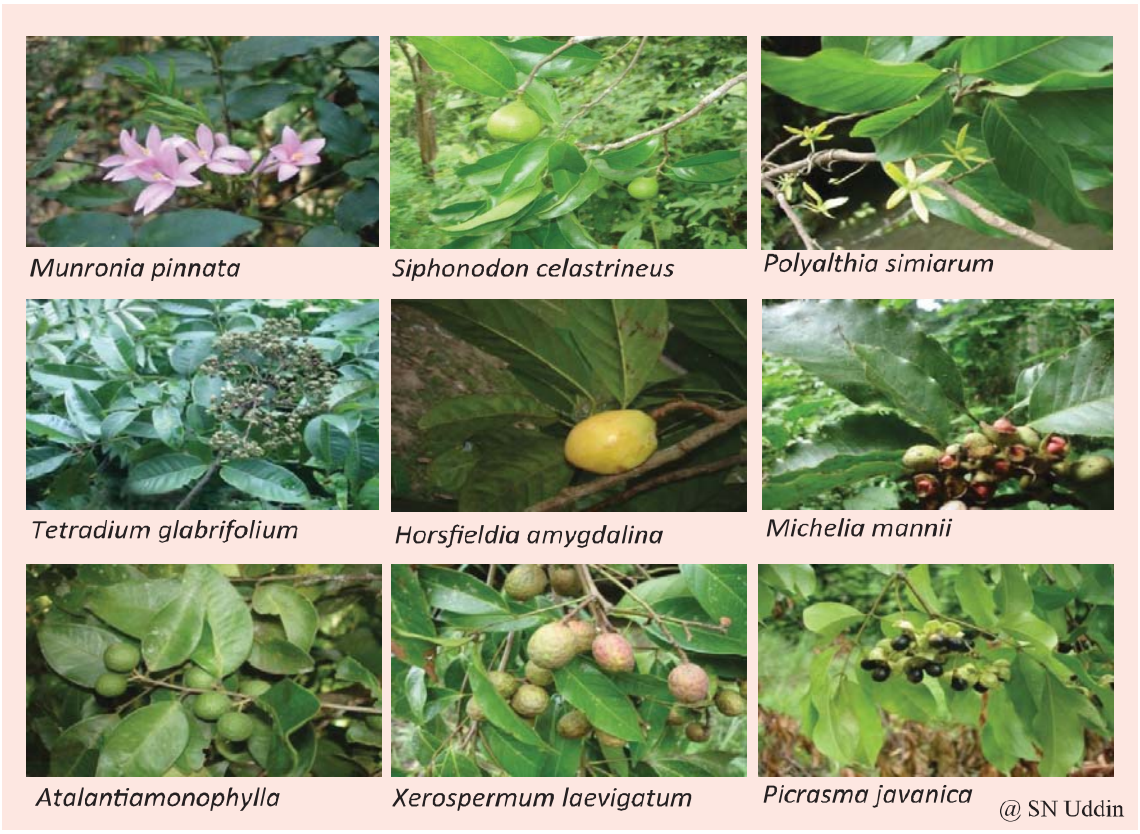
Degradation of Homestead vegetation

Once upon a time, the homesteads in Bangladesh were abundant in indigenous species plant and wildlife. Now-a-days, indigenous trees are still there but it is believed that some trees are rarely found in the homesteads. Wildlife like foxes, various wild cats, otters, snakes, lizards and monitor lizards are not seen in abundance in the homesteads. Due to population pressure, expansion of settlement, change in human behavior, human-animal conflict, revenge killing of wild animals, clear cutting of bushes, filling-up of ditches, ponds and canals these animals has become rare in many places.

2.2 Depletion of species diversity

Depletion of Floral Diversity

The common understanding is that floral diversity in Bangladesh has been declining. A quite large number of plants are identified as threatened in Bangladesh. Out of the total vascular plant species (3,813), 30 were critically endangered, 127 endangered and 329 vulnerable (Irfanullah, 2011). Among the various groups, Pteridophytes were most threatened accounting 18.46% followed by Monocotyledones (18.42%).The first and the second volumes of *Red Data Book of Vascular Plants of Bangladesh* includes 120 and 106 species, respectively, as threatened as per of IUCN criteria of Red List categories and assessment process (Ara et al., 2013). Although there is no detailed information on the loss of plant species diversify, it appears from the literature that about 225 vascular plant species (Annex1 Table 1) those were reported about 50 to 100 years ago, are not found now-a-days in the territory of Bangladesh (Uddin SN 2016, personal communication).



Some Red-Listed plant species in Bangladesh.

Depletion of Faunal Diversity

A declining trend in the population of various faunal species is reported by various studies. About 23% of vertebrates found in Bangladesh are facing different level of threats (Feeroz, 2014). IUCN (2000) reported that 57% of reptiles and 36% of mammals are under threats. IUCN (2000) reported a total of 388 bird species in Bangladesh of which 19 are Critically Endangered, 18 are Threatened Endangered 4 are Vulnerable Of the birds that have extinct from Bangladesh, only one species (Pink-headed Duck) has already become globally extinct. Invertebrate population and diversity in the country is also reducing because gradual depletion of habitat. An updating of the Red list assessment is in the final stage by the IUCN under SRCWP project that assessed 1,619 species and categorized 390 as threatened species: 56 are Critically Endangered (CR), 181 are Endangered (EN), 153 are Vulnerable (VU) and 31 species have been classified as Regionally Extinct (RE). The assessment also listed 278 species as 'Data Deficient'. The latest assessment figured it out that a large number of species have recently undergone rapid decline (IUCN 2016, personal communication).

A survey conducted by the Fish Museum and Biodiversity Centre (FMBC) of Bangladesh Agricultural University during 2000-2013 reported that more than 100 riverine fishes are presently under threats and 25 fish species are not observed for more than last 20 years indicating the possibility of their extinctions from the waterbodies of the country (DoE 2015). As per earlier Red list assessment a total of 14 faunal species those were recorded once upon a time in the territory of Bangladesh have no longer any stable population (Table 3). To be noted that the total number of this locally extinct species will be increased as the latest Red list will be published.

Table 3 Faunal species those no longer have any stable population in Bangladesh territory.

Local/English name	Scientific name	Available until
1. Tripped Hyena	*Hyaena hyaena*	– until 19th century
2. Grey Wolf	*Canis lupus*	– until 1940s
3. Swamp Deer	*Cervus duvaucelii*	– until 1950s
4. Blackbuck	*Antilope cervicapra*	– end of 19th century
5. Nilgai	*Boselaphus tragocamelus*	– until 1940s
6. Gaur	*Bos gaurus*	– until 1970s
7. Banteng	Bos javanicus	– until 1930s
8. Wild Water Buffalo	*Bubalus arnee*	– until early 1940s
9. Sumatran Rhinoceros	*Dicerorhinus sumatrensis*	– until 1880s
10. Javan Rhinoceros	*Rhinoceros sondaicus*	– until 1908
11. Indian Rhinoceros	*Rhinoceros unicornis*	– until end of 19th century
12. Common Peafowl	*Pavo cristatus*	– until early 1980s
13. Pink-headed Duck	*Rhodonessa caryophyllacea*	– until early 20th century
14. Marsh Crocodile	*Crocodylus palustris*	– until 1950s

Source: BFD website, 2016

2.3 Erosion of genetic diversity

Genetic diversity of different crops and cereals are declining. Over the years, excessive exploitation, illegal trade and introducing alien invasive species has threatened many local species. The loss of genetic diversity within species is occurring even faster than species extinction. Indigenous crop plants are being not cultivated widely and HYVs are replacing the local cultivars or indigenous crops. The available evidences, however, indicate that human activities are eroding the prevalent biological resources and greatly reducing the biodiversity. For instance, once upon a time there were about 10,000 rice varieties in Bangladesh, now a days only about 25 varieties are being cultivated (DoE, 2010). Based on the visual observation, collections and different research activities of BARI, 19 landraces species and 47 crops species (Annex: Table 2 and 3) have been identified as threatened (BARI 2016, Personal Communication).

Threatened crop species of Bangladesh

2.4 Threats to biodiversity in Bangladesh

The rich biodiversity of Bangladesh is under various kinds of threats. The main threats to the species, genetic and ecosystem diversity in Bangladesh are summarized in Table 5. The main threats include landuse change, habitat destruction, over-exploitation, introduction of HYVs in agriculture, use of agrochemicals, invasive alien species (IAS), human-wildlife conflicts, pollution, urbanization, industrialization, unplanned plantation, hill cutting and above all, climate change. These direct threats are related to the indirect threats such as socio-economic condition like population pressure, level of awareness and lack of substantial information about the management and law enforcement.

Harun-ur-Rashid et al. (2013-14) evaluated 75 medicinal plant species under the family Apocynaceae and Vitacease and found 28 species to be threatened mainly due to over exploitation and habitat destruction. Genetic diversity is threatened by cultivation of HYV, monoculture practices, use of agrochemicals, and above all, loss of indigenous knowledge. Intensity of cropping in the agricultural land is increasing day after day; in 2001-2002 area under single cropping was 2.87 million ha and that of triple cropping was 1.02 million ha while those in the year 2010-2011 were 2.24 million ha and 1.49 million ha, respectively (Figure 11). Such increased cropping will result into rapid depletion of nutrients in soil. However, in the agricultural systems, threats mainly include increased intensity of cropping, nutrient depletion, agro-chemicals and so on.

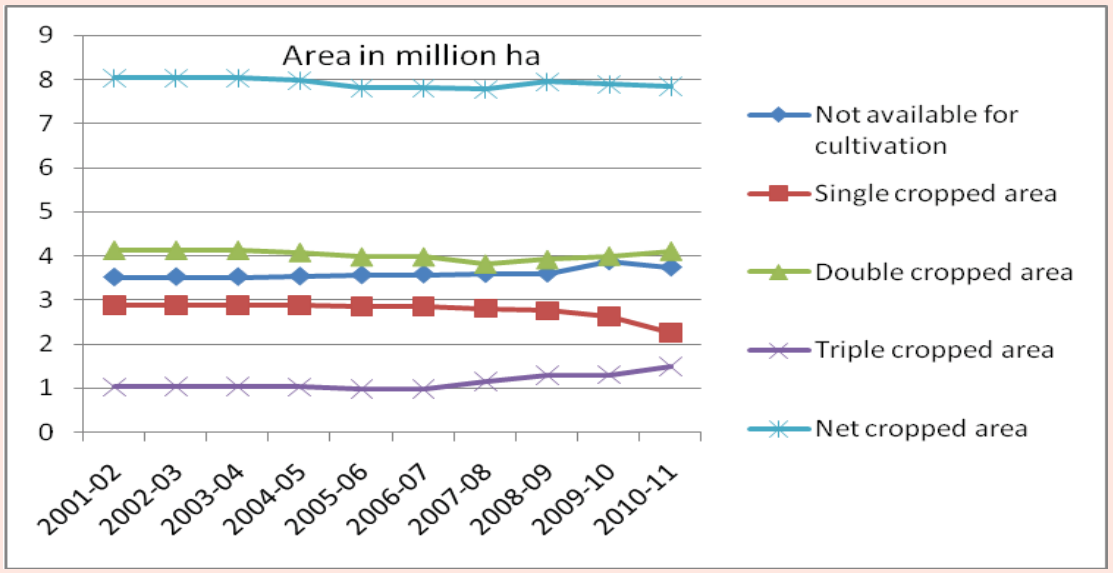


Figure 11 Intensity of crop cultivation in Bangladesh from 2001-02 to 2011 (area in million ha)

Increased use of chemical fertilizers namely urea, TSP (Triple Super Phosphate) and SSP (Single Super Phosphate) is required to meet the growing demand intensive crop cultivation that is posing threats to the sustainability of the soil quality in the country (Figure 12 & 13). Net increase of pesticides use in Bangladesh (Figure14) is degrading the soil quality and agro-biodiversity. Cultivation of unsuitable crops (e.g. tobacco) has also been contributing to the degradation of agricultural soil. Chemical fertilizers of different types are used that contain some hazardous substances and heavy metals such as Pb, Cd, As, Sb, Hg, Ni and Cr which may enter the food chain through uptake by plants.

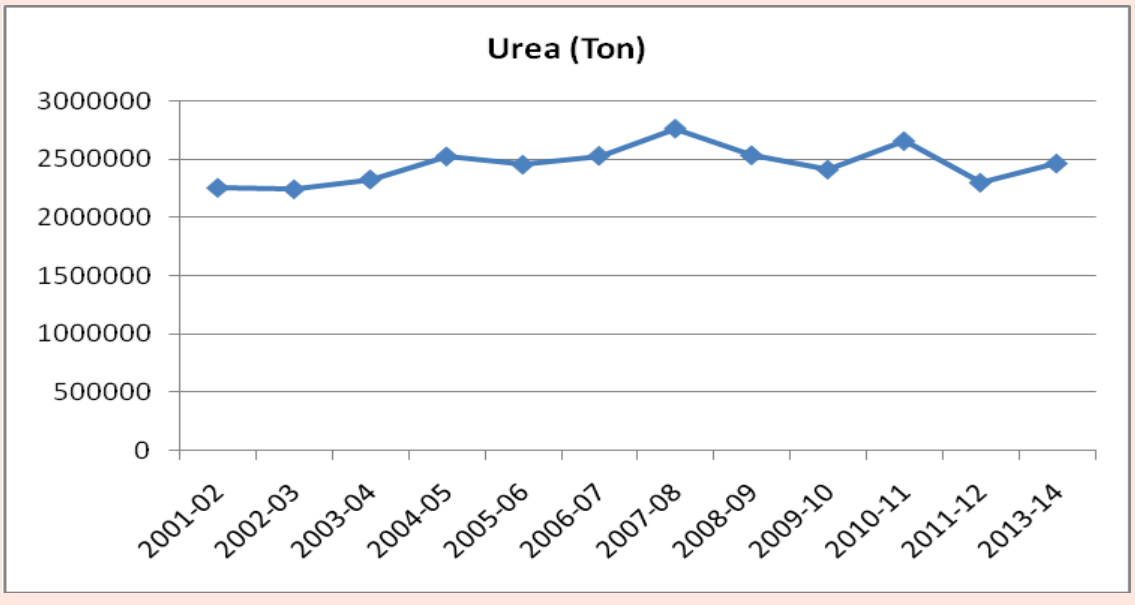


Figure 12 Yearly sale of urea fertilizer in Bangladesh (Source: BBS, 2014)

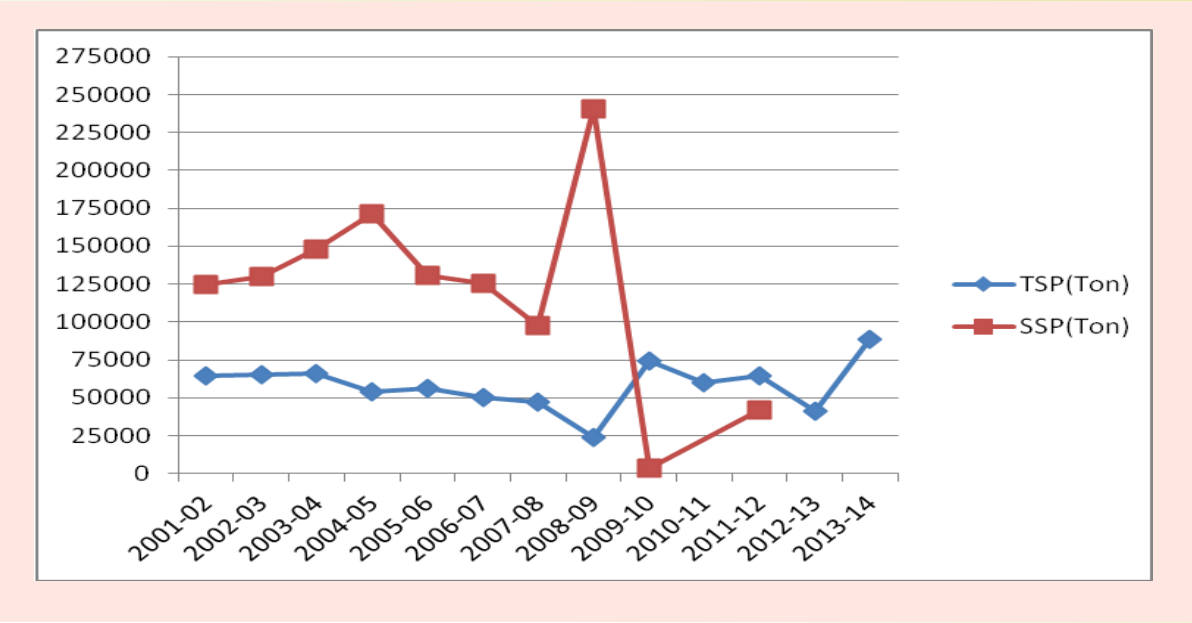


Figure 13 Yearly sale of TSP and SSP fertilizer in Bangladesh (Source: BBS, 2014)

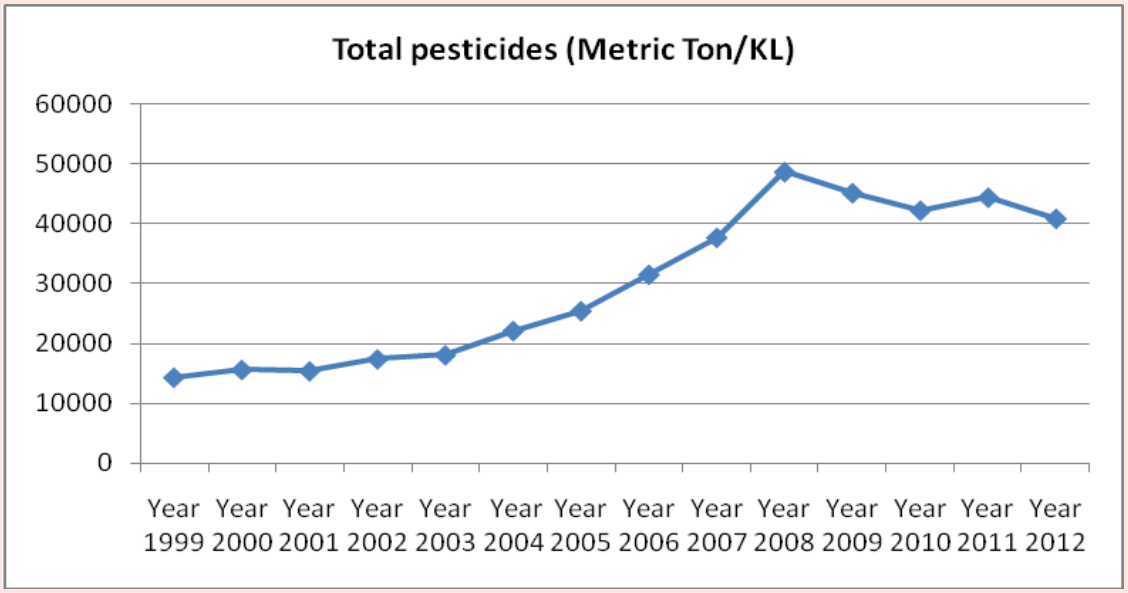


Figure: 14 Yearly sales of pesticides in Bangladesh during 1999 to 2012 (Source: BBS, 2014)

The problem of increased salinity has become a great threat to the biodiversity mostly in the southern part of the country (Figure 15). The anticipated global climate change related effects are likely to complicate the existing problems of salinity in coastal areas. The consequences of climate change include sea level rise that leads to intrusion of salinity into new area, cyclones, changes in rainfall patterns, diseases etc. those are the threats to both natural and man-made ecosystems. It is predicted that sea level will rise up to 20 cm, 50 cm, and 100 cm by the year 2020, 2050 and 2100 and in the year 2100, about 17.5% of the total area of the country will go under water (Figure 15). Salinity is gradually increasing from the south to the northern regions of the country (Figure 15) which might be related to both sea level rises as well as decreased flow of fresh water from the upstream to the

downstream of the rivers in the country. Over the years, average number of cyclones per year has increased (Figure 16). The onslaught of climate change has already started changing the life forms or behavior various species that if continues will have serious adverse impacts on the ecosystems.

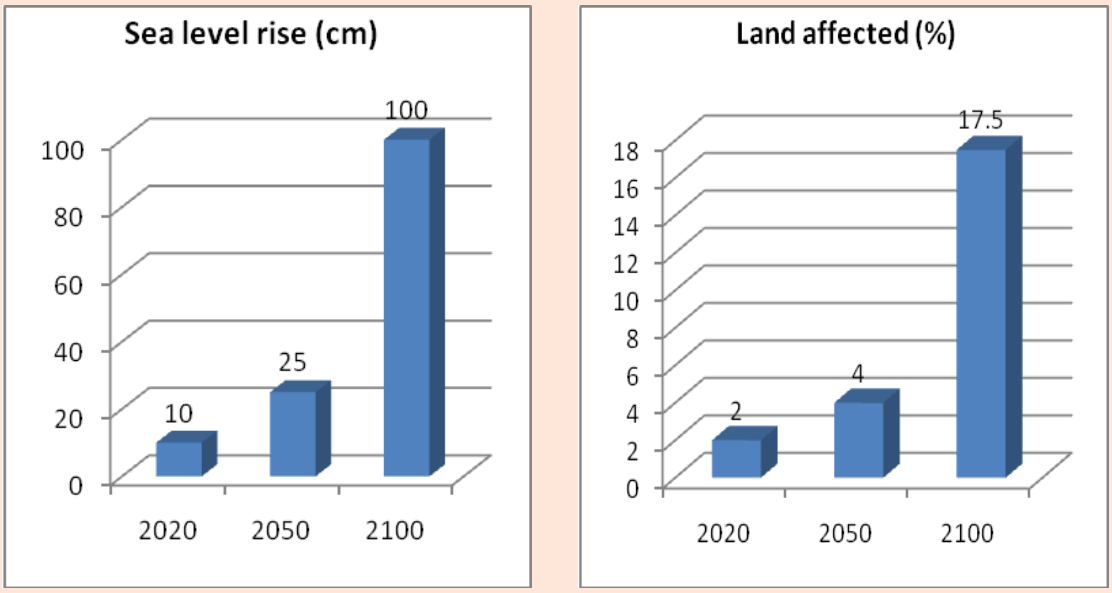


Figure 15 Predicted sea level rise and its effects on land mass of Bangladesh.
(Source: Mahmuduzzaman et al. 2014)

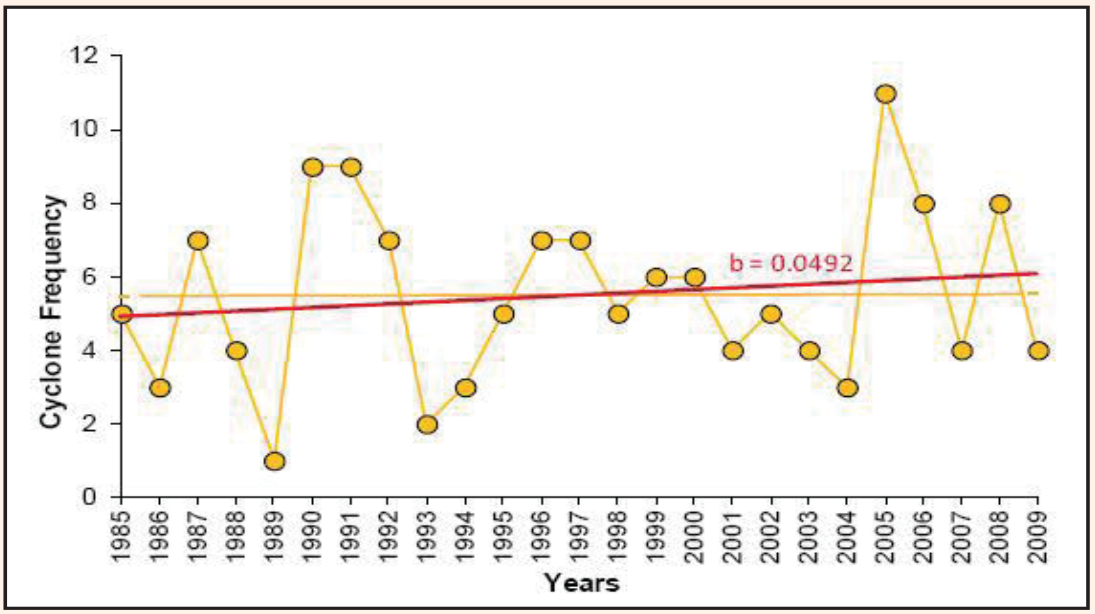


Figure 16 Annual frequency and trends of tropical cyclone activity in the Bay of Bengal from 1985 to 2009 (Source: Chowdhury et al., 2012).

Threats to the natural ecosystems (forests, wetlands, estuaries, etc.) are ever-increasing due to unplanned urbanization, industrialization, as well as, climatic disasters. Strong cyclones and tidal surges affect human settlements as well as, natural vegetation in the coastal areas. There are studies that reported damage of the natural vegetation of Sundarbans as affected by cyclone like *Sidr* in 2007 (Hossain and Begum 2011). Estuarine ecosystems are prone to the threats of river erosion, as well as accretion (MES 2001).

Effects of Sidr on the vegetation of Sundarbans forest

Table 4: Threats to biodiversity of Bangladesh

Component of Biodiversity	Threats
Species diversity	Habitat destruction, invasive alien species, human-wildlife conflicts, pollution, over exploitation, use of agrochemicals (e.g. chemical fertilizers, pesticides, insecticides, herbicides etc) etc.
Genetic diversity	Cultivation of HYV, monoculture practices, use of agrochemicals (e.g. chemical fertilizers, pesticides, insecticides, herbicides etc) etc.
Madhupur Sal forest	Land use change, over-exploitation, Illegal cutting, weak encroachment, expansion of agriculture, poaching, human settlement, grazing, pollution, etc
Hill forest	Horticultural practices, *Jhum Cultivation* (Shifting cultivation), tobacco cultivation, rubber plantation, mass settlement, hill cutting, construction of Infrastructures, etc
Sundarban Mangrove forest	Habitat destruction, over-exploitation, extraction of poles for fixing fishing nets, poaching (during 2010-2015, 8 tigers were reported to be killed), poison fishing, invasive alien species (a total of 23 alien species has been reported), uncontrolled tourism, top-dying disease, poor regeneration, shrimp farming, illegal forest cutting, natural disasters, pollution, climate change consequences like increased salinity and sea level rise
Agroecosystem	Loss of agricultural land, high yielding varieties, fertilizer, pesticides, increased salinity, increased intensity of cropping, tobacco cultivation, brick field, river bank erosion, soil fertility, arsenic pollution, organic matter depletion, water logging, use of top soil in brick manufacturing, climate change, etc
Homestead vegetation	Expansion of settlements, construction of infrastructures, etc.
Floodplain	Changes in hydrological regime, salinity intrusion, agrochemicals, industrial pollution, etc.
River	Reduced upstream flow, siltation, salinity intrusion, sea level rise, increased evaporation rate, soil erosion, water pollution, increased rainfall during monsoon, water scarcity during dry season, un-planned sand collection from the river etc.
Beels, Haors and Baors	Over-exploitation, destructive fishing practices, water pollution, construction of infrastructures (e.g. roads, bridges, culverts), etc.
Coastal and Marine ecosystem	Cyclones, storm surges, tsunami, floods, earthquakes, climate change, siltation, pollution, water logging, arsenic contamination, oil spill etc
Estuarine ecosystem	Erosion, accretion, pollution, siltation, oil spill, climate change, etc

Source: NBSAP Team

Box 3 Invasive Alien Plant Species in Bangladesh

Invasive alien species (IAS) are becoming a global problem causing harm to the economy as well as to the biodiversity of the local area. These species compete with and suppress the survival of the native species. In Bangladesh, following species are found as IAS: *Eichhornia crassipes* (Kachuri pana), *Eupatorium ordoratum* (Ayapan), *Mikania cordata* (Assam lota), *Croton bonplandianum* (Bonkhira), *Lantana camara* (Kasundi), *Ageratum conyzoides* (Goat weed, ghag), *Atylosia scarabaeoides* (wild kulthi), *Commelina oblique* (Jotakansira), *Convolvulus arvensis*, *Evolvulus nummularius* (Bhuiokra), *Hyptis suaveolens* (Bon topma), *Ipomea carnea* (Dholkalmi), *Ludwigia adscendens* (Keshordham) and *Mimosa pudica* (Lajjaboti). Recently, *Parthenium hysterophorus L.* has become the most serious IAS in Bangladesh (Source: Hossain and Pasha, 2001; SN Uddin, 2016, personal communication)

2.5 Consequence of biodiversity loss

The biodiversity loss has negative effects on several aspects on human well-beings. Biodiversity has a huge impact on business and industry. The United Nations estimates that annual global economic losses due to deforestation and land degradation alone were between $2 trillion and $4.5 trillion in 2008. If we continue to use our resources in an unsustainable way, it will jeopardize our future.

i. On Human Well-being

Human beings, all over the world, depend on biodiversity for their livings. People who farm, fish, or create crafts or furniture from natural sources will be in danger of losing their livelihoods if the species they depend on begin to decline. In some cases this is paradoxical, since overfishing and overhunting contribute to the very rapid loss that will eventually make the fishers and hunters unable to support themselves. Biodiversity loss has negative effects on several aspects of human well-being including food security, resilience to natural disasters, energy security, and access to clean water and raw materials. It also affects human health, social relations and freedom of choice.

Biodiversity loss can directly affect human health and nutrition if ecosystem services are no longer adequate to meet the basic needs. Significant medical and pharmacological discoveries are made through greater understanding of the earth's biodiversity. Loss in biodiversity may limit discovery of potential treatments for many diseases and health problems. The variety of foods that we consume will be significantly reduced which may ultimately lead to poorer health as well.

ii. On cultural values

Biodiversity is a part of daily life of human being and their culture. Natural beauty will vanish and future generations may never be in a position to appreciate the nature's wonders. Many people around the world value various ecosystem components in their religious and spiritual belief systems. If biodiversity is lost it will affect culture and quality of life.

iii. Increased natural calamities

Loss of biodiversity may intensify natural disasters world-wide. Forest degradation triggers shift in rainfall pattern, land degradation and hydrological regime. Coastal communities are vulnerable to the effects of the natural disasters. Removal and conversion of wetlands worldwide have worsened conditions during floods.

iv. Impact on ecosystem functioning

Ecosystem functions are related to the biodiversity (Bardgett 2005). Biodiversity loss may negatively affect ecosystem through leading to fewer utilized niches, stronger competition, and lower process rates thus affecting ecosystem functioning negatively. Positive interactions between species, such as facilitation, have the potential to be of great importance for ecosystem functioning. Forests become weaker, disintegrate and lose their capacity to absorb CO_2 leading to more global warming and other climate change problems.

3. Importance of Biodiversity

3.1 Importance of ecosystem goods and services in the life and livelihood of the people

The life and livelihoods of the people of Bangladesh is largely dependent on the various goods and services provided by the ecosystems. The basic needs of our daily life such as food, shelter, clothes and medicines are directly offered by the ecosystems upon which our existence is dependent. Economic, social and cultural life of Bangladesh is closely linked with the goods and services of ecosystems. In this chapter, we highlight the importance of these services in terms of economic contribution to the country, as well as depict a glimpse of economic valuation of services provided by some selected ecosystems such as hilly forests, mangrove forests and wetland ecosystems, to consider conservation of biodiversity as our basic responsibility in order to sustain our living.

BOX – 4 Goods and services provided by ecosystems

There are four distinct types of goods and services of ecosystem on which human life is dependent. These are categorized as: (i) provisioning services (e.g. food, shelter, fiber, fuel, fresh water, medicine, etc.), (ii) supporting services (e.g. primary production, habitat provision, nutrient cycling, atmospheric oxygen production, soil formation and retention, etc.), (iii) regulating services (e.g. pollination, seed dispersal, regulating water cycle, climate regulation, creation of microclimate, control of flooding, pest and disease regulation and water purification, etc.), (iv) cultural services (e.g. spiritual values, recreation and aesthetic values and knowledge systems). The cultural services like religious, educational and entertainment services of nature that we relish like tourism, research, pilgrimages to natural sites, etc. While all these services are very important and essential for our living, many of these services are free-gift of nature and are not valued by us while taking day-to-day economic and social decisions. Finally, the supporting services of nature like habitat control, pollination, etc allows us to survive in perpetuity. Without these services, our social and economic life would have been in a difficult condition.

Of the world's food supply, 90% comes from a mere 20 of plant species. Not only food supply, At least 40% of the world's economy and 80% of the needs of the poor are derived from the biological resources. Plant vegetation reduces global warming by sequestering atmospheric carbon, wetlands filter pollutants from water, bacteria and fungi break-down organic material and fertilize the soil and maintain nutrient cycling. Medicinal plants are used for preparation of many lifesaving drugs such as penicillin, aspirin, taxol, quinine, etc. In a nutshell, biodiversity is the cornerstone of our existence on Earth.

3.1.1 Contribution of Agricultural Biodiversity and Agriculture

Agriculture is the major largest producing sector of the economy and it contributes about 15.89% (at current price) of the total GDP but it also employs 45.6% of labour force engaged in this sector (BBS, 2013-14) in Bangladesh. Biodiversity underpins the agriculture productivity. The agricultural sector is heavily dependent on soil fertility which is based not only on the soil physico-chemical properties but also on the soil biological communities i.e. diversity of microorganism. Moreover, soil biodiversity underpins the agriculture productivity. Agricultural biodiversity includes all components of biodiversity – at genetic, species and ecosystem levels – that are relevant to food and agriculture and support the ecosystems in which agriculture occurs. In addition, agricultural productivity is dependent on rainfall, water availability, and temperature. These are essential ingredient of nature. Therefore, its

maintenance is essential for the production of food and other agricultural goods and the benefits they provide to humanity, including food security, nutrition and livelihoods. Moreover,

Groundnut field

Paddy field @ M Z Hossain

3.1.2 Contribution of Fisheries and Fish Biodiversity

Fishing and fish culture activities are related to both socio-economy and traditional culture of the peoples of Bangladesh. This sub-sector plays a vital role in the country's economy through employment generation, protein supply and foreign currency earning and eventually poverty alleviation. Fisheries, contributed nearly 3.30% to the GDP in 2013-2014 fiscal year in current prices and 3.69% in constant price (as per 2005-2006 base year) in Bangladesh (BBS,2014).Bangladesh is in 4thposition among other countries of the world in capturing fish from inland waters (FAO 2014).

However, the sub-sector contributes 23% of gross agriculture products and 2.01% to the total export earnings (BBS, 2012-13).It accounts for about 63% of animal protein intake in the diet of the people of Bangladesh (DoF, 2005). The fisheries sector provides full-time employment to an estimated 1.2 million fishermen and an additional 17.1 million people, i.e. more than 11% of total population is directly or indirectly dependent on fisheries sub-sector (DoF, 2014).Another 10% poor and middle class people are engaged in part-time fishing, aquaculture, fish seed production and collection of shrimp and prawn seed, fish handling, processing and marketing, net making, and input supply.

Besides the traditional fishing, culture fishing has

Traditional fishing

Traditional fishing net

Fish Sanctuary

involved another 10% poor and middle class people in part-time fishing, aquaculture, fish seed production and collection of shrimp and prawn seed, fish handling, processing and marketing, net making, and input supply

3.1.3 Contribution of Livestock and Poultry

The livestock and poultry sub-sector is another important sector that employs a large number of people and is the major source of protein in our diet. The sector provides employment and livelihood opportunities particularly for rural poor and functionally landless people many of whom regard livestock as a main livelihood option. The contribution of animal farming to GDP is 2.07% at current price (BBS, 2014) and the overall trend of the livestock in Bangladesh has also been increasing. Moreover, milk, meat and eggs how increasing trend of yearly production (DoE 2015).

3.1.4 Contribution of Forestry

Forests have a widely realized contribution to human well-being. Besides providing timber and other on-Timber Forest Products (NTFPs) for human consumption, forests also provide cultural values, like education and aesthetic beauty, which are realized through research and tourism, respectively. It is comparatively easier to estimate the value of goods, for example, the worth of a forest in terms of total timber it has, but not the ecosystem services or cultural services it offers. Some attempts have, however, been made. The direct contribution of forest and related services to GDP is about 1.43% (BBS, 2014). In their report by Haque and Aich (2014), they have estimated both direct and indirect values of Sundarban ecosystems. They have found that while the direct value of Sundarban forests is only $1.39 per hectare, Sundarban ecosystem generates between 456$ to 1192$ when other ecosystem services are included. According to their estimates, Sundarban forests contribute between US$273 million to US$714 million per year to the Bangladesh economy. Their study shows that important of estimating values of ecosystem services in order to ensure that the nature is conserved for the welfare of human being.

3.1.5 Contribution of the Nature's Aesthetic values and Nature-based tourism

Around the country, the number of eco-tourists travelling to enjoy the beauty of nature and various cultures are increasing. Cox's Bazar, St. Martin's Island, the Chittagong Hill Tracts, the Sundarban mangrove forests and other protected areas are the prime sites visited by the tourists. Kuakuta which is situated in such a place from where both sun-set and sun-rise are seen is attracting tourist. Choudhury (2013) reported that, between 1 July 2010 and 30 June 2011, 207,930 tourists visited the Sundarban alone, whereby the Government earned revenue of Taka 8.622 million. According to the WTTC, Bangladesh's tourism industry directly contributed around Taka 2.23 trillion (2.1%) to the country's GDP in 2013 (WTTC, 2014), implying immense potential of ecotourism in Bangladesh. In 2014, direct, indirect and induced contributions of tourism to GDP were 2.3%, 1.3% and 0.9%, respectively; whereas generating 1.8% of total employment in the country. These figures remained more or less the same since 2010 (WTTC, 2014).

Ratargul swamp forest, Sylhet

Sundarban mangrove forest

Inani beach, Cox's BazarKaptai lake, Rangamati

Kaptai lake, Rangamati

Photograph on Nature Base tourism/Eco-tourism

In addition to nature-based tourism, forests, hills, haors and rivers of Bangladesh are intricately linked to the cultural diversity of Bangladesh. It has been able to nurture many ethnic communities of Bangladesh and also provided a spiritual harmony to them. Furthermore, the nature and its diversity have also played in important role in supporting our folklores and folk music.

3.1.6 Cultural values of biodiversity

Biodiversity components significantly bear cultural, religious and spiritual values. These are often a part and parcel of the daily life of human being. In the rural areas, there are village fairs, cultural programme and *Haat* (village markets) that take place usually under the big trees, mostly Banyan (*Ficus benghalensis*). The Hindu communities in Bangladesh are seen to do worships using plants like *Tulsi* (*Ocimum sanctum*). Emblem of elephants, tigers, and snakes are seen to be used as a ritual of the people of various religious beliefs.

BOX- 5 *Medicinal plants*

Medicinal plants serve as lifesaving wealth. A large number of people in the country are solely dependent on Ayurvedic treatment for maintaining their health. Medicinal plants are useful to human well-being and considered as a national wealth. About 747 plants with therapeutic value has been identified as reported by Yusuf *et al.* (2000; in Motaleb *et al.*, 2013). In Bangladesh, there are about 297 Unani, 204 Ayurvedic and 77 Homeopathic drug manufacturing industries where the medicinal plants are extensively used in both raw and semi-processed forms of medicine in various pharmaceutical dose formulations. These plants also serve as important raw materials for many modern medicinal preparations. The market value of drugs produced by these industries from medicinal plants is about BDT 3 billion. Besides, village *Kobiraj*, street vendors and indigenous people also use a large number of medicinal plants for the treatment of various diseases. Motaleb *et al.* (2013) reported that this practice reflects rich traditional heritage and that it plays a significant role in the general welfare of the upland communities of the CHTs.

Sarpagandha (*Rauwolfia sarpentina)*

Aloe Vera

3.2 Valuation of Ecosystems

Economic valuation of ecosystems is relevant for taking the importance of ecosystems into the national accounting systems. However, reports on economic valuation on the ecosystems in Bangladesh are not yet available. In this report, economic valuation of three ecosystems has been done as an assessment of values of ecosystem services to understand the contribution of different ecosystem services to the economy of Bangladesh. This estimation has been done using secondary data for the mangrove, wetland and hill forests of Bangladesh. This valuation is based on the estimates of ecosystem services from other studies. Ecosystem services that are valued in this study include the mangrove, wetland and hill forest ecosystems of Bangladesh. In this method, we used a general list of ecosystem services from these ecosystems and verified those using FGDs from the fields. The services that are listed for such ecosystems are shown in Table 5.

Table 5: Ecosystem services from hill forest, wetland and mangrove ecosystems

Sl	Provisioning	Sl	Regulatory	Sl	Cultural
1	Agricultural Production	1	Climate Benefits	1	Aesthetics Information
2	Sand and pebble mining	2	Habitat Services (spawning and breeding grounds)	2	Inspiration for Culture and Art
3	Compost Collection	3	Air Quality Regulation	3	Protection of Threatened species
4	Fish Cultivation/Culture/Farming	4	Animal Habitat Support	4	Religious services
5	Fish Harvest	5	Aquatic Habitat Other than Fish Support	5	Research and education
6	Food Harvest	6	Biodiversity Protection	6	Tourism
7	Fuel	7	Biological Control		
8	Other inland harvests	8	Climate Regulation (Carbon Sink)		
9	Other aquatic harvests	9	Coastal Area protection from Tidal waves and storm		
10	Horticultural Products	10	Fish Habitat support		
11	*Jhum* cultivation	11	Flash Flood		
12	Livelihood Support	12	Flood Control/Drought		
13	Medicinal Resources	13	Ground water recharge and discharge		
14	Ornamental Resource	14	Land degradation		
15	Rearing/Livestock Fattening	15	Migratory Bird Support		
16	Transportation services	16	Pollination		
17	Water Usage/Consumption	17	Precipitation		
18	Timber	18	Siltation and Productivity increase		
19	Wood Harvest Timber	19	Soil Erosion		
		20	Soil Formation		
		21	Wave induced damage protection		
		22	Storm protection / Coastal Protection		
		23	Swamp forest support		
		24	Waste Assimilation		
		25	Water Regulation		

Source: Extracted from TEEB, 2010

Study on economic valuation using benefit transfer method reveals that the services of hill forest, wetland and mangrove ecosystems generate a value equivalent of 9.2% to 33.3% of GDP of Bangladesh. The wide range of variation found in this study represents a limitation of this approach. Improvement in this estimate is only possible using primary data where values of ecosystem services can be estimated directly. At the same time, this value should not be construed as the value of all ecosystem services of Bangladesh because this study included only mangrove, hills and wetland ecosystems. The values generated by the coastal ecosystems, the riverine ecosystems, the floodplains,

the Barind Tracts, and other ecosystems (like marine, islands and chars) of Bangladesh are not included in this study.

The study finds that hilly ecosystem generates services that are worth between 4.3 and 8.2 percent of GDP (Table 6). Similarly, that of the wetland ecosystem (haors and beels) is worth between 1 and 16 percent of GDP and that of mangrove is between 4 and 9 percent of GDP. The study further reveals that regulatory services of the three ecosystems are quite important and it is equivalent of 1.5 to 14.9% of GDP. This means that in case of deterioration of the conditions of such eco-systems, the impact on the economy will be much higher and so the cost of deterioration on the economy could be, as high as, 15% of the current GDP. On the other hand, marketed and traded provisional services of the ecosystems are already included in the GDP calculations (since GDP includes values of fishery, agriculture, forest products, etc.).

It is also evident from the findings that the values (in monetary units) vary significantly from as low as 9% to as high as 33% of GDP from the three ecosystems studied here. This high range of variation should be reduced through primary valuation studies in order to ensure that contribution of ecosystems in the economy is understood clearly and can be used to protect these ecosystems. In addition, values found in this study suggest that value of regulatory and cultural services of the ecosystems are as much as the provisional services. Therefore, it is important that such values shall be estimated to understand the real impact of the existence of ecosystems of Bangladesh. Moreover, the values of the mangrove ecosystems did not include protection services of the mangroves from cyclones and other natural disasters in the coastal areas. This is because no such study exists on any large mangrove ecosystems. The values of which, if included, would have increased the monetary value of the mangrove ecosystem.

Table 6 Economic valuation of hilly forest, wetlands and mangrove ecosystems of Bangladesh

Name of the Ecosystem	Category of Services	Estimated Economic Value Per Hectare USD		Land Area in Thousand Hectare	Total Economic Value In Million USD per year		Total Value as Percentage of GDP	
		Max	Min		Max	Min	Max	Min
Hilly Forest	Provisional Services (without Timber)	9,422	9,403		6,360	6,347	3.7%	3.7%
	Provisional Services(Timber)	567	567		382	382	0.2%	0.2%
	Regulatory Services	11,070	970		7,472	654	4.3%	0.4%
	Cultural Services	-	-					
Hilly Forest Total		*21,059*	*10,939*	*675*	*14,214*	*7,384*	*8.2%*	*4.2%*
Wetland ecosystem	Provisional Services (without Timber)	13,858	2,307		11,086	1,846	6.4%	1.1%
	Provisional Services (Timber)	1	1		1	1	0.0%	0.0%
	Regulatory Services	20,402	2,733		16,322	2,187	9.4%	1.3%
	Cultural Services	175	175		140	140	0.1%	0.1%
Wetland Total		*34,436*	*5,217*	*800*	*27,549*	*1,525*	*15.9%*	*0.9%*
Coastal	Provisional	13,574	2,022		1,819	271	1.0%	0.2%

Name of the Ecosystem	Category of Services	Estimated Economic Value Per Hectare USD		Land Area in Thousand Hectare	Total Economic Value In Million USD per year		Total Value as Percentage of GDP	
		Max	Min		Max	Min	Max	Min
Mangrove Ecosystem	Services (without Timber)							
	Provisional Services (Timber)	1,270	1,270		170	170	0.1%	0.1%
	Regulatory Services	15,171	1,619		2,033	217	1.2%	0.1%
	Cultural Services	89,850	46,968		12,040	6,294	6.9%	3.6%
Coastal Mangrove Ecosystem Total		*119,865*	*51,879*	*134*	*16,062*	*6,952*	*9.2%*	*4.0%*
Total Value of Ecosystems		**175,360**	**68,035**		**57,825**	**15,860**	**33.3%**	**9.1%**

3.3 Way forward

The valuation study has revealed that ecosystems of Bangladesh contribute significantly towards the national income of the country. There are three major services: provisioning services, regulatory services and cultural services of the ecosystems. Of these, only the traded provisional services are currently accounted in the national accounting systems. The regulatory services of an ecosystem are the foundation of many provisioning services. Depletion or deterioration of such services will ultimately weaken the productive foundation of the economy.

Therefore, Bangladesh should plan to undertake a comprehensive assessment of the values of ecosystem services and integrate them in the national accounting system. This has also been suggested in the 7 FYP document of the Government of Bangladesh (p443).

Given the limitation of resources, a gradual approach towards completing the values of all ecosystem services could be the option to move ahead. Therefore, the recommendations are:

1. Regulatory services of mangroves shall be studied in details, particularly; values for protection against cyclones and storm surges shall be studied using longitudinal data.
2. The services of the all other forests in terms of regulating the weather and hydrological cycles are important for maintenance of the productive capacity of the areas surrounding the region. There was no major study from Bangladesh on these resources. This should be part of the future initiatives for research.
3. Ecosystem services of the wetlands of Bangladesh is different from that of other countries largely because of the unique characteristics of the haors and beels in terms of retention of early rain water and providing habitat services for fresh fish and other aquatic animals. There is no study similar to such ecosystem and so the values reported here is probably an underestimation. Research on valuing such services shall be undertaken in order to find the values of this unique wetlands ecosystems.
4. Since Bangladesh is located at the bottom of three major river basins (Ganges, Brahmaputra and Meghna), the lattice of rivers and creeks provides a respite for floods to its millions of inhabitants along these basins. These rivers and creeks not only carry a large volume of silt but also allow drainages of huge amount of water coming through the GBM basins. The

rivers, creeks, estuaries, and the flood plains of Bangladesh, therefore, protects livelihood of millions of people living in these basins from floods. Depletion of capacity of these rivers by reclaiming land and by encroachment or by reducing water flow will significantly affect the economic activities in these basins. Valuation of these services should be done using primary surveys.

5. The coastal and marine resources of Bangladesh have potential for tourism and other economic activities and provide habitat services for many marine animals. This has not been valued and requires special attentions in order to capture the contribution of our coastlines.

6. Finally, values of ecosystem services derived from these studies above can be used towards estimating the sustainable GDP or green GDP of Bangladesh.

4. Mainstreaming of Biodiversity and NBSAP

Mainstreaming of biodiversity is very important towards ensuring intregation of biodiversity conservation and sustainable use of biodiversity in both sectoral and cross-sectoral plans such as sustainable development, climate change adaptation and mitigation, trade and international cooperation, and in sector-specific plans such as agriculture, fisheries, forestry, mining, energy, tourism, transport and others will be facilitating a lot in terms of achieving the NBSAP targets. Mainstreaming biodiversity into sectoral and cross sectoral policy plan and development activities is, important for achieving the sustainability of the implementation of NBSAP.

Mainstreaming aims to integration biodiversity elements into related legislation, policies, plans, programmes such as national development plans, enhancing awareness efforts, understanding the values of biodiversity and considering these values in policy making and integrate into national accounting system and strengthen biodiversity related education and research. The CBD has emphasized the need for mainstreaming biodiversity into national and local development and poverty reduction strategies, most recently in its new Strategic Plan for Biodiversity (2011-2020).

This chapter discusses ways of mainstreaming biodiversity at individual, institutional and systemic levels across sectoral and cross-sectoral plans, policies and development activities in Bangladesh. Existing national policies have been analyzed to identify the legal strength supportive to implement NBSAP as well as the gaps where further legal actions are needed to strengthen activities related to biodiversity conservation.

4.1 Mainstreaming at individual level

Mainstreaming biodiversity at individual level is important for implementing NBSAP. People at all walks of life should be self-motivated towards conservation of biodiversity. Awareness among the citizens of the country could be created through education curriculum from elementary school to higher study level. They should also be aware of the values of goods and services provided by the ecosystems. Mainstreaming at individual level could be achieved with the following activities.

4.1.1 Raising awareness among the citizens

Raising awareness on the importance of biodiversity targeting various sections of the citizens is the vital task to be accomplished to achieve the goals of individual mainstreaming. People should be aware of the role of biodiversity in the economy, livelihood and overall national development. Awareness program on the occasion of World Environment Day, International Day for Biodiversity, World Wetlands Day, World Wildlife Day, World Migratory Birds Day; World Ocean Day, International Tiger Day, World Water Day, International Day of Forest, National Fish Week, *Jhatka* Conservation Week, National Pollinator Week, International Vulture Awareness Day, National Agriculture Day, National Tree Fair, National Agriculture Fair etc. should be designed in such a way that a large population could get the message on the importance of biodiversity. A list of such occasions with specific date and the declaring agency has been shown in Table 7.

Observed World Environment Day & National Tree Plantation Campaign 2015

Table 7 Some Important Biodiversity Related Days for enhancing awareness

Name of Day	Declared by	Date
World Wetlands Day	Ramsar Secretariat	2 February
International Day of Forests	United Nations	21 March
World Water Day	United Nations	22 March
Earth Day	Earth day Initiative, New York	22 April
International Biodiversity Day	United Nations, CBD Secretariat	22 May
World Environment Day	UNEP	5 June
World Ocean Day	United Nations	8 June
International Tiger Day	The Global Tiger Recovery Program (GTRP)	29 July
World Elephant Day	Canadian filmmaker Patricia Sims along with Elephant Reintroduction Foundation founded this day.	12 August
International Vulture Awareness Day	Birds of Prey Programme in South Africa and the Hawk Conservancy trust in England	The first Saturday in September each year
International Ozone Day	United Nations	16 September
World Rivers Day	Mark Angelo, founder of World Rivers day	The last Sunday in September
Wildlife Conservation Day	US Department of State	4 December

4.1.2 Ensure participation of women in biodiversity conservation

Traditionally, rural women in Bangladesh are involved in crop cultivation, harvesting, seed preservation, kitchen gardening, plantation, cattle and poultry rearing, aquatulture etc. those are related to conservation of biodiversity (Table 8). The traditional knowledge of preserving local species of agro-biodiversity is being maintained by the women generation-after-generation. Bangladesh has recognized the role of women in national development. Participation of women have been ensured in formulation of NBSAP. Implementation of activities under NBSAP will be taking care of engagement of women towards ensuring the inclusive development with equitable benefit to the women. Sixth Five Year Plan (2011-2015) and Seventh Five Year Plan (2016-2021) have considered women participation and empowerment that will guide the implementing agencies to take development project with the component of women development under NBSAP activities. Women could be play a substantial role in ensuring conservation and sustainable use of Biodiversity. The women in the rural areas should be offered with adequate training, education-awareness as well as means of alternate livelihood activities so that they become the safeguard of Biodiversity. Village Conservation Group or Community Conservation Groups to be formed under various rules-regulations should be ensured women participation

Table 8 Women's Traditional activities related to biodiversity conservation in Bangladesh

Fields of work	Activities
Crop cultivation	Cultivation, harvesting, seed preservation etc
Plantation	Roadside plantation, agro forestry, kitchen gardening etc
Sericulture	Rearing of cocoon and silk processing
Livestock and Poultry	Rearing, processing, production of fodder
Herbal medicine	Collection, treatment, processing etc
Aquaculture	Fish meal production, fishing, cage culture etc.
Fishing & Fry collection	Fishing, Fry collection, Fish and Fry selling

BOX -6 Community Based Biodiversity Conservation in ECAs (CBA-ECAs):

The Department of Environment, Government of Bangladesh implemented a project titled 'the Coastal and Wetland Biodiversity Management Project' (CWBMP) funded by UNDP-GEF to develop a participatory management system for the conservation and sustainable management of biodiversity of four ECAs namely Cox's Bazar-Teknaf peninsula, St. Martin Island, Sonadia island and Hakaluki Haor during 2004-2011. The project adopted a community based approach to conserve threatened resources of biodiversity involving local community, local government, and local administrations and other stakeholders. To continue the conservation initiatives taken under CWBMP and to introduce community-based adaptation mitigation to climate change in conservation actions, DoE 'Community Based Adaptation of ECAs through Biodiversity Conservation and Social Protection (CBA-ECA)' project supported by (BCCTF) and the Embassy of the Kingdom of the Netherlands through UNDP. The project has been implemented by during 2011 to 2015.

The project put special emphasis on diversification of livelihood options of the local communities, making them resilient to climate change and restoring the ecosystems they rely on. Some of the important climate change related activities of CBA-ECA project are: assessing community risks and vulnerability to climate change; enhancing communities' capacity for climate change adaptation and biodiversity conservation; introducing climate change adaptation and mitigation measures through agriculture and horticulture practice; conservation of mangrove and swamp; protection of human

settlements through plantation; and conducting research on climate change impacts and adaptations. Biodiversity conservation activities include wildlife conservation, establishment of fish sanctuary, and enforcement of relevant laws for protection of biodiversity and habitats. This project provided the local people with micro capital grants and training in order to create alternative income sources to reduce the vulnerability to climate change and reduce their dependency on natural resources.

It was observed that due to plantation in the Hoar area vegetation cover increased. Mangrove and swamp forests constituting bain, hijol, koroch, reed etc species also has been created in the project area. Some pictorials below describe the accomplishments of CBA-ECA.

Newly planted mangrove at Nuniachora, Cox's Bazar

Irrigation pump run by the solar power

Fish sanctuary at hakaluki hoar

Alternative livelihood generating activities

4.2 Mainstreaming at Institutional level

Sustainability of the biodiversity conservation programs will depend on how much it has been institutionalized at both government and non-government sectors. Following are the some points where there are scopes for mainstreaming biodiversity at institution level.

4.2.1 Mainstreaming of Government Organizations

The Ministry of Environment and Forests, the national focal point of CBD, is the coordinating ministry of protection of environment and biodiversity in the country. But the conservation and

sustainable use of biodiversity are the tasks dependent on other ministries which have got direct or indirect bearing with this particular issue of development paradigm including the Ministry of Agriculture, Ministry of Fisheries and Livestock, Ministry of Land, Ministry of LGRD, Ministry of Roads Transport and Bridge, Ministry of Water Resources, Ministry of Industry, Ministry of Power, Energy and Mineral Resources to be named a few. These ministries have significant role in terms of biodiversity conservation and sustainable use. Mainstreaming will only be meaningful once if these ministries consider the biodiversity and its importance in their development initiatives policies and programs. Towards ensuring appropriate mainstreaming the development ministries could establish, biodiversity cell has to be established with representation of the relevant officials in those ministries and agencies there under. Biodiversity cell in the ministries and agencies could ensure that projects, program and policies are in the line with the NBSAP as well as biodiversity rules and regulations.

Local government institutions like District Council (Zilla Parishad), Sub-district Council (Upazilla Parishad), Municipalities (Pourashova) and Union Council can play vital role in conservation of biodiversity by planning and implementing development activities like construction of roads, bridges, culverts, polders etc and also in creating awareness. Thus, the stakeholders at all these local level institutions can take part in conservation and safeguarding biodiversity and in monitoring and reporting conservation activities.

4.2.2 Engage Community based organization (CBOs), NGOs and Civil Society Organization (CSO) into biodiversity conservation

Local communities are recognized as the custodians of biodiversity conservation. Community leaders can play important role to convince local people towards conservation of biodiversity. NGOs and CBOs are implementing activities at the community level with participatory approach. They can play significant role through, awareness development activities mobilization of financial resources. The activities of CBOs, NGOs and community leaders also include, strengthening the capacity to implement programs; promoting networking opportunities among the organizations, community leaders and the mass people; assisting in promoting and documenting traditional knowledge, innovations and practices in biodiversity conservation, assisting the organizations and communities to formulate and implement projects on updated NBSAP and contributing human and financial resources to support biodiversity conservation programs. The Civil Society Organization (CSOs) may buy-in the willingness of the policy level to take up the biodiversity issue in the process of decision making.

4.2.3 Engage Private Sectors in biodiversity conservation and sustainable use

Private sectors can contribute in biodiversity conservation by investing in biodiversity-related opportunities. The business associations like FBCCI, DCCI, CCCI, BGMEA and BKMEA could ensure that cleaner production is practiced and environmental management system is implemented in the industries. Water intensive and liquid water generating industries should implement Zero-Discharge Policy of the Department of Environment. EIA conducted for obtaining environmental clearance in favor of the industries should rigorously assess the impact of the respective industry on biodiversity and ecosystem services. Individual industry and business bodies as a whole should take up project activities or programs on biodiversity conservation as part of their Corporate Social Responsibility (CSR).

4.3 Mainstreaming at systemic level

Various policies, legislations and strategies have already included biodiversity and natural resources management issues. Conservation of environment and biodiversity has been inserted in the National

Constitution as basic principle of state governance. The policies and rules- regulation of various development ministries should include or insert the elements of biodiversity.

4.3.1 Insertion of Biodiversity into the Constitution of Bangladesh

Biodiversity and Environment was not explicit in the Bangladesh Constitution, originally adopted in 1972 .Government of Bangladesh in the year 2011 took the initiative to amend the constitution inserting the text in Article 18A (Protection and improvement of environment and biodiversity) of the Constitution of the People's Republic of Bangladesh that describes environment and biodiversity conservation and development as one of the principle of state government. The article states: "The state shall endeavor to protect and improve the environment and preserve and safeguard the natural resources, biodiversity, wetlands, forests and wild life for the present and future citizens". As per constitutional obligation biodiversity conservation is the responsibility of every citizen of the country to uphold the constitution. All the government machineries should keep in mind the issue of conservation of environment and biodiversity in taking up any development undertakings.

4.3.2 Integration of biodiversity into sectoral and cross-sectoral policies

Biodiversity Conservation and sustainable use issues should be reverberated in all concerned policies of various development ministry of the government. It has been that the policies, rules-regulations implemented by offered ministries have still had to do a lot in terms of inserting text relevant to conservation of biodiversity.

An assessment on the state of integration of biodiversity into the various sectoral and cross-sectoral policies is given in Table 9. The table highlights the positive elements as well as gaps towards further work on mainstreaming biodiversity.

Table: 9 Analysis of sectoral and cross sectoral Policies Towards Integration of Biodiversity

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
1.	Ministry of Environment and Forests	Environment Policy 1992	Section 3 of this policy has a clear mention of biodiversity and its conservation as a cross cutting issue. Section 4 of this policy has suggested to follow the ICTPs and thereby incorporated the CBD.	The revised / updated revision of Bangladesh Environment Policy has explicit mention conservation of natural resources. By now (February 2016) the updating has been done and it is awaiting approval of the government.
2.	- Do-	Forest Policy 1994	Biodiversity has not been explicitly mentioned in this policy. None of the 29 statements of this policy has incorporated biodiversity.	The policy should be revised addressing conservation and sustainable use of forest biodiversity resources.
3.	Ministry of Agriculture	National Agricultural Policy 2013	Biodiversity conservation, sustainable use of land and water resources, IPM, integrated crop cultivation and collection, conservation and use of genetic resources has been emphasized is emphasized. Balanced use of fertilizer and popularize organic fertilizer has also been included in the policy.	Effective implementation of policies should be ensured
4.	- Do-	National Integrated Pest Management Policy (9^{th} draft) 2002	The policy has the emphasis on maintaining ecological balance; conservation of natural resources such as the soil, flora and fauna and ensure stability of agricultural production	The IPM policy should be revised and updated keeping in mind the intensive agriculture with HYVs, introduction of GMs crops and new knowledge on pest management with the course of climate change and other issues of management trace.
5.	- Do-	National Seed Policy 1993	2.6 To simplify procedures for effective observance of plant quarantine Section 8: Import of Seeds: 8.1 Except for appropriate plant quarantine	To ensure local seed security through conservation and sustainable use of agro-biodiversity. Trial before the introduction of alien seed.

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
			safeguards, restrictions on importation of seeds are to be eliminated. 8.1 Plant quarantine procedures will be made applicable to crop/plant species and not to specific varieties	
6.	Ministry of Fisheries and Livestock	National Fisheries Policy 1998	The 5th objective has mentioned about the maintenance of ecological balance and conservation of biodiversity. National Fisheries Strategy 2006 has been formulated, during policy revision this may be considered as well.	Though this policy has some sort of general coverage of biodiversity, it has no mention for resolving the common conflicts between the conservation of wetland ecosystems against the expansion of fish farms in those ecosystems. Clear policy statements on this issue are essential.
7.	- Do-	National Shrimp Policy 2014	Under item 2d of the policy it has stated to conserve biodiversity in shrimp cultivation area. Statement 5.3.5 of the policy has explicitly stated to prohibit deforestation of mangroves for shrimp farming, which may indirectly help conserve biodiversity	This policy is not strong enough to help "Biodiversity Conservation" under the powerful aggression of shrimp farming. Further, act or rule should be formulated to ensure biodiversity conservation.
8.	- Do-	National Livestock Development Policy 2007	Conservation and utilization program of potential indigenous breeds for subsistence farming would be developed.	It is necessary to include conservation of local livestock varieties.
9.	Ministry of Water Resources	National Water Policy 1999	Section 4.9 states that Fisheries and wildlife will receive due emphasis in water resources planning where social impact is high and water development plan will not interrupt for fish migration and breeding. It also mentioned that maintain perennial links of water bodies like baors, haors, beels, roadside	It should have a clear statement about the allocation of water for biodiversity conservation. It should have mention about the e-flow aspects. Ensure perennial links of water bodies like baors, haors, beels, roadside borrow pits, etc. with the rivers.

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
			borrow pits, etc with the rivers. It has indication on minimum stream flow and mention of preservation of the environment.	
10.	- Do-	Coastal Zone Policy 2005	It has incorporated the biodiversity aspects but under a complex umbrella of many sectors. It is a fact that the coastal areas have too many elements to look into, and a large number of national sectoral policies are in force in this zone. The identification of 19 districts as 'coast zone' is an appreciable outcome of this document.	A set of statements need to be developed, which will be incorporated in all the sectoral policies. This may be called "Obligatory Policy Need for the Coast Zone". A powerful 'coast zone committee' may be constituted by the government with the principle secretary as the chair, with relevant secretaries as members. It will be the responsibility of this committee to ensure that all the desired requirements (given in the "Obligatory Policy Need for the Coast Zone") are properly incorporated in the relevant sectoral policies
11.	Ministry of Shipping	National Shipping Policy, 2000	This policy included elements on environmental pollution control and environmental management but no explicit text on conservation of biodiversity and ecosystems.	Shipping routes should be clearly identified so that 'biodiversity hotspots', 'breeding or spawning ground' of aquatic animals could be avoided and preserved. The vessels should maintain the level of air pollution and noise pollution under control. Wastes like bilge and ballast water, human faecal waste should not be discharged to the waterways without treatment.
12.	Ministry of Land	Jolmohal (water-body) Management Policy 2009	This policy has mostly dealt with the leasing authorities of government and control on	This policy has no mention of biodiversity or biodiversity

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
		amended in 2012.	water bodies depending on its size. It has a mention of declare some of the government owned water bodies as fish "reserve". Section 35 of this policy has given an absolute authority to Land Ministry to decide on these issues.	conservation. Since the water bodies are important sites for rare biodiversity, a fresh policy outlook needs to be considered for the waterbodies of Bangladesh, superseding all the prevailing declarations. This new policy need to incorporate the conservation and sustainable use of aquatic biodiversity of the country.
13.	-Do-	Land Use Policy, 2001	It has mentioned about the conservation of forest land. It has suggested for land zoning and promulgation of a 'zoning law'. It stated that proper implementation of environment policy 1992 and forest policy 1994 will bring in overall improvement of the situation. It has however expressed concern over the decline of wetland in the country. It has suggested for afforestation, as well as settlements, on newly accreted lands. It has suggested developing a 'land data bank' as well.	There is no indication in the policy about the ecosystem based approach of landuse. To conserve biodiversity in a holistic manner, ecosystem approach should be incorporated in the land use policy guidelines.
14.	- Do-	Khas Land Settlement Policy 1995 and 1997	There are two sets of policies (used as rules) namely 'Agriculture Khas land management and settlement policy, 1997' and 'Non-Agriculture Khas land management and settlement policy 1995'. None of these has any consideration of biodiversity.	Biodiversity conservation issues should be addressed. Plantation and biodiversity conservation should be considered as conditions while leasing these Khas Lands.
15.	-Do-	Khas Land Settlement Policy for Hotel Motel 1998	It has no mention of biodiversity.	Khas lands those are 'biodiversity hotspots' and 'breeding or roosting grounds' of rare birds or other important

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
				animals should not be leased out. Plantation of indigenous species in the open space should be a condition while leasing for such purposes to enhance biodiversity.
16.	-Do-	Salt Mohal Management Policy 1999	It has no mention of biodiversity	Expansion of Salt Mohal area should be restricted. Policy should promote alternative modern salt production technology.
17.	Ministry of Industries	National Industrial Policy 2015	The policy addressed EIA and awareness before setting up industries or industrial projects. The policy emphasized to set-up environment friendly industries and encourage to follow 3R strategy; Reduction, Reuse, Recycling and setting up ETP and CETP in the operations industries or industrial estates. The policy did not have any direct mention of conservation of biodiversity and ecosystem services.	Conservation of biodiversity and ecosystem services should be incorporated in the policy
18.	Ministry of Commerce	Comprehensive Trade Policy Of Bangladesh (Draft Final, 15.09.14)	The section 2.6.4 mentions Trade, Environmental Protection and Climate Change where biodiversity conservation is not mentioned.	Biodiversity protection and conservation should be ensured in any trade related activities.
19.	- Do-	Export Policy Order 2015-2018	Section 8.6 stated that nobody could export wildlife or product from wildlife, trophy or incomplete trophy or plant or part of plant or product derived from plants mentioned in schedule 4); any routes other than emigration port where taxation is done, is allowed to	It is necessary to include in the policy that endangered species or other biodiversity related products such as fin of sharks should be banned.

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
			export without CITES certificate and license under the section 29 of wildlife (conservation and security) acts 2012. Section 8.16 banned all types of frogs/toads (alive or dead) and frog/toads legs to export.	
20.	- Do-	Import Policy Order 2015-2018	Import Policy restricted import of plants with the application of Plant Quarantine Act, 2011. GMO or LMO as human food importation would be possible with the application of biosafety guidelines. For animal food and feed, it written that declaration should be there that it does not contain any GMO. Import Policy Order also restricts the pesticides those are harmful to biodiversity.	Import Policy order should address the issues of Invasive Alien Species in a more stringent way. Pharmaceutical chemicals like diclofenac importation should be restricted to save the vulture population.
21.	Ministry of LGRD	National Rural Development Policy - 2001	In section 5.19 of the policy, 'Rural Environment Promotion' is highlighted where in its clause number 2, mentions about preserving ecological balance. However, there is no explicit mention of biodiversity conservation though it is directly linked to any objective towards preserving or conserving ecological balance.	This policy should address the inclusion of conservation of rural and urban biodiversity, explicitly.
22.	Ministry of Power, Energy and Mineral Resources	National Energy Policy 1995	The policy emphasizes to ensure environmentally sound sustainable energy development programs causing minimum damage to environment, not allowed any commercial mining and quarrying within the 3 Km of forest boundary, however between 3	Promotion of environment friendly technology like solar, biogas etc.

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
			and 10 Km of forest boundary mining and quarrying may be allowed only where EIA shows that there is no negative impact on forest. Carrying out Environmental Impact Assessment (including a consideration of social impact) should be made mandatory and constitute an integral part of any new energy development project.	
23.	Ministry of Education	National Education Policy 2010	Biodiversity issues are mentioned under the chapter of Agriculture.	Biodiversity conservation and sustainable use issues should be incorporated into the curriculum of secondary and higher secondary level to graduate courses.
24.	Ministry of Women and Child Affairs	National Women Development Policy 2014	In section 36 of the policy, women's contribution to natural resources' conservation is mentioned along with ensuring participation of women whereas; section 36.3 included encouraging women and providing them with equal opportunity in agriculture, fishery, animal husbandry and afforestation.	Inclusion of women's existing active role in biodiversity conservation should be included so that the real value of how societal culture and tradition; especially in the rural areas of the country, help the conservation of biodiversity. Additional attention could be given to capacity building measure of rural women to engage actively in biodiversity conservation both at the household and community-based levels and approaches respectively.
25.	Ministry of Tourism and Civil Aviation	National Tourism Policy 2010	The focus and objective of this policy is to improve socio-economic status; conserve environment and biodiversity with the engagement of local people. The section 5.6	To ensure ecotourism in all PAs and ECAs and attract private entrepreneurs.

Sl. No	Name of Ministry	Name of Policy	Biodiversity Elements/Gaps	Recommendation
			encourages developing eco-tourism by the relevant ministry.	
26.	Ministry of Road Transport and Bridge	No published policy found in the website of the ministry	There should be a policy emphasizing biodiversity conservation while constructing roads, highways and bridges	No specific policy in place that contains elements of biodiversity. However, the Roads and Highways Department prepared EIA guideline for Roads to consider the environmental issues.
27.	Ministry of CHTs Affairs	No published policy found in the website of the ministry	There should be a policy emphasizing biodiversity conservation while constructing accessibility and other infrastructure development activities in CHT	Biodiversity conservation issues should be emphasized in the development plan of CHTs.

BOX-7 Integrated Pest Management in Bangladesh

In Bangladesh, IPM activities started in 1981 with the introduction of the first phase of FAO's inter-country program (ICP) on IPM in rice crop. IPM has a broad-based approach founded on a sound ecological understanding towards producing and preserving different crops. Now-a-days, IPM has been considered globally as one of the best methods in this regard. It is hoped that the country's crop production and preservation system will be much developed through the implementation of National IPM Policy, which has been formulated with a view to get the full benefit of this unique method.

IPM demonstration among farmers

The use of harmful pesticides will be much reduced if the farmers practice IPM in their fields, which in turn, will enhance the production level and improve the environment and the public health. Proper implementation of this policy would increase the farm output that will raise the income level of vast majority of the country's farmers. Thus, extension of IPM will have positive impacts on the overall economy that will help reduce the country's poverty

4.3.3 Integration of Biodiversity into the Related Laws

A number of Act and Rules-Regulations have directly or indirectly included Biodiversity issues. Conducting Environmental Impact Assessment (EIA) has been made mandatory for the severe impact producing Red category industries and projects.

Box- 8 Biodiversity Conservation and Environmental Impact Assessment (EIA)

Conducting EIA is a decision making tool for awarding environmental clearance in favor of installation of industries or taking up development projects. Through the exercise of EIA, adverse impacts of the industries or project are identified and evaluated towards taking up appropriate mitigation measures and thus biodiversity loss can be minimized with adoption of preventive and compensation measures. According to Bangladesh Environment Conservation Act, 1995 (revised in 2010) section 20(2) and Environment Conservation Rules 1997, section 7(6), it is mandatory to conduct EIA and take mitigation measures before setting up of Red categories industries or projects. Ministry of Environment and Forests made a circular on 22 February 2015 informing the stakeholder that EIA and other forms of environmental study is mandatory before taking up and starting operation of the industries or development projects. The circular has been gazetted into the Bangladesh Gazette on 12 March 2015 with the instructions of the category of environmental study reports to be produced. The circular also highlighted the implementation of the measures like Environmental Management Plan, as well as Environmental Auditing to be performed in various phases of the industries or development projects. The circular made special emphasis on EIA and other sort of environmental studies for the investment projects taken by the government and prescribed to look at the efficacy of the EIA in various stages of the project. This kind of notification to enforce Environment Act and EIA will facilitate the mainstreaming of biodiversity a lot.

The Department of Environment under the Ministry of Environment and Forests has finalized "Bangladesh Biological Diversity Act" which is under the review to be approved by the National Parliament.

The domestic legislations which have got the elements of biodiversity have been illustrated in Table 10.

Table 10: Legislations of the Relevant Ministries Impacting on Biodiversity Conservation

Name of Ministry	Name of Acts/ Rules-regulations	Biodiversity Elements	Recommendation/ Insertion Proposed
Ministry of Environment and Forests	Bangladesh Environment Conservation Act 1995	The act covers conservation in all its meaning from lower to higher organisms of biodiversity through controlling pollution and ecosystem management.	Rigorous enforcement of the Act with the enhancement of the awareness is very vital to get maximum benefit of the Act.
-Do-	The Forest Act, 1927 (amendment in 2000)	Though there is no mention of biodiversity in a specific manner it has some implied provisions for the conservation of biodiversity.	Updation of the Act is required with particular reference to the ecosystem based approach of forest management.
-Do-	Wildlife (Conservation and Security) Act 2012	The Act has got the required provisions towards wildlife biodiversity conservation.	The Act needs to be widely publicized to make people more aware and needs effective enforcement upto the remote areas of the country
-Do-	Brick manufacturing and Kiln installation (Control) Act 2013	Biodiversity conservation has been covered in the preamble of the Act. The Act has the impetus on conservation of agri-land and promotion of energy-efficient brick manufacturing technologies that is essentially helping biodiversity	Brick manufacturing needs to be done keeping appropriate distance from the biodiversity hot-spots and conserved areas. More mechanization and industrial level production of brick is required to avoid the pressure on fertile but very scarce land of the country.
-Do	Draft Bangladesh Biological Diversity Act	Approved by the cabinet which is awaiting approval by the National Parliament. It covers all aspects of Biodiversity	The Act needs to be enacted and capacity building of the stakeholders would be very important to enforce the Act.
Ministry of Fisheries and Livestock	Protection and Conservation of Fish Act, 1950 (amendments in 1963, 1970, 1982,	The Act bans fish catches of specific sizes and durations for various species aiming at more production and conserving the brood fishes	The execution of the law is rare partly due to absence of the enforcement of the Act in the grass-root level and

Name of Ministry	Name of Acts/ Rules-regulations	Biodiversity Elements	Recommendation/ Insertion Proposed
	1995, 2002)		lack of awareness on the Act to the mass people
Ministry of Agriculture	Plant Quarantine Act, 2011	It has provisions to regulate carrying-in plants or plant products from abroad, and ensure sanitary and phyto-sanitary measures.	Stringent quarantine measures are to be in place at the port-of-entries with the enforcement of the Act.
Ministry of Water Resources	Bangladesh Water Act, 2013	The Act has the emphasis on formulation of the National Water Policy and National Water Resources Plan and Conserve Water Stress Area for, amongst others, use of water for balancing ecosystem, use of water for wild life, use of water for natural river flow and conservation of potable water sources like tanks and ponds; conservation of *Haor* (naturally created saucer shaped large shallow depression), *Baor* (stagnant ox-bow shaped lake) and lakes for seasonal birds to stay or to move safely and to keep their sanctuary safe.	The Act needs to be operationalized with regular functioning of National Water Resources Council and other committees, formulation /updating and implementation of National Water Policy and National Water Resources Plan with committed actions to be implemented by the Ministry of Water Resources on conservation of biodiversity dependent on water resources.
Ministry of Shipping	National River Protection Commission Act, 2013	The commission under this act is responsible to oversee the rivers and recommend the government to take appropriate measures towards addressing the river pollution, encroachment, maintaining ecological balance of the river system and sustainable management of river	The commission needs to operationalized with all kinds of logistics and infrastructural supports so that it could have enough ground to make policy decisions and recommendations to the government

4.3.4 Integration of biodiversity into national development plans

Towards mainstreaming, biodiversity conservation and sustainable use issues have to be taken into consideration in all the development plans, programs and projects. Bangladesh has shown a great deal of progress in terms of inclusion of Biodiversity issues into the development planning. Biodiversity could be traced from the Fourth Five Year Plan (1990 to 1995). The plan in its Objectives on Environmental Matters under page IX-3, para 9.9(d) stipulated that *we have to protect the biodiversity of the country by taking effective steps against salinity and desertification.*

In the Fifth Five Year Plan (1997 to 2002) under the caption 'Environment and Sustainable Development (p181), the document recognized that *it is necessary to preserve the variety of life, i.e. biodiversity*. The document also went on to state that *the preservation of biodiversity is both a matter of insurance and investment, necessary to sustain and improve agriculture, forestry, livestock and fisheries production systems in order to keep future options open as a buffer against harmful environmental changes and as a raw material for scientific and industrial innovations. Moreover, we*

must conserve biodiversity as a matter of survival. The variety of life helps make the earth fit for balanced enjoyment of life. It plays an important role in all major life support services, from maintaining the chemical balance of the earth and stabilising climate to protecting the watershed and renewing soil. Maintaining a nation's biodiversity is integral to maintaining its wealth. The Plan, therefore, attaches due weight to the development of our biological resources. The importance of species and ecosystems will be considered in the formulation of development policies and programmes. Institutions assigned responsibility for conserving biodiversity will be supported by necessary financial and organisational resources. The species and ecosystems on which our survival depends will be clearly identified and appropriate technology applied to make our survival worthy of human beings.

Biodiversity was considered in the PRSP (2003-2008) with the emphasis on conservation through:

- *Improve floral and faunal biodiversity*
- *Halt destruction of habitat and overexploitation of flora and fauna, and encroachment of the natural forests*
- *Document the state of floral and faunal biodiversity of the country by ecosystems*
- *Implement policies to protect biodiversity by involving local community*
- *Formulation and implementation of biodiversity policy;*
- *Implement NBSAP*
- *Develop Guidelines for ECAs and PAs*
- *Survey floral and faunal biodiversity in new PAs*
- *Introduce and promote local and indigenous varieties of fish stock*

NSAPR-2 (2009-2011) took biodiversity as an issue of sustainable environmental development. The NSAPR-2 highlighted critical issues relating to the natural environment including:

- *Agricultural land degradation and salinity*
- *Maintenance of the biodiversity that is under threat, in particular the overexploitation of forests and wetlands resources*
- *Management of public commons, protecting them from overexploitation and ensuring access to commons resources for the poor*
- *Promoting renewable rural energy sources and afforestation to meet the energy needs of the rural population in a sustainable way*
- *The impact of urbanization particularly with respect to land development and waste management; and*
- *Combating pollution particularly air pollution, water pollution and rural water and arsenic pollution*

PRSP stated that Government is committed to addressing environmental issues in its sector policies and programs. Environmental impact was considered important in the design and implementation of investment projects, with a requirement that environmental impact assessments are undertaken for larger investment projects. Priority would be given to the funding of policy initiatives and investments that address key environmental concerns. Initiatives to promote participatory approaches to the management of the natural environment and create greater awareness of environmental approaches would be promoted.

The Sixth Five Year Plan (2011-2015) also gave emphasis on biodiversity conservation in Chapter 8: Environment, Climate Change and Disaster Management. It noted that for sustained development it is necessary to:

- *Undertake watershed management and soil conservation activities*
- *Increase PA and ECA coverage*
- *Undertake watershed management activities*
- *Implement community based Jolmohal (water body of fisheries importance) management*
- *Enhance Afforestation program*
- *Undertake land zoning*
- *Promote Private and homestead plantation*
- *Promote ecotourism*
- *Promote Clean development mechanism and REDD*

Biodiversity conservation and sustainable use issues have vehemently come up with more focus on implementation of updated NBSAP in the Seventh Five Year Plan (2016-2021). It has been mentioned in the seventh plan as an issue under forestry and biodiversity (issue no. 14, p492) with the heading *Mainstreaming National Biodiversity Strategy and Action Plan (NBSAP).*

The Seventh Five Year Plan stated the biodiversity tasks to be implemented as follows:

- *Initiative will be undertaken to update NBSAP in line with the Aichi Biodiversity Targets and implement the NBSAP as global commitments as a party to the United Nations Convention on Biological Diversity and the Cartagena Protocol on Bio safety to CBD*
- *Biodiversity considerations will be integrated into related plans, programs and policies toward mainstreaming*
- *Bangladesh Biological Diversity Act will be enacted, as well as necessary rules will be framed*
- *Valuation of goods and services provided by ecosystem and biodiversity will be accomplished towards integration of the values into the national accounting system*
- *Awareness and education on biodiversity will be enhanced through taking up development initiatives*
- *Polluting the ecosystems from all sources will, wherever possible, be stopped or minimized*
- *Indigenous and Traditional Knowledge on Biodiversity will be documented*

4.3.5 Integration of value ecosystem goods and services into national accounting systems

The valuation of ecosystems is of important priority under the updated NBSAP and Seventh Five Year Plan (2015-2020). Economic valuation of ecosystem goods and services is very important for enhanced understanding about the importance of biodiversity among the policy makers, development planners, as well as the common people which will in turn help ensuring conservation and sustainable use of biodiversity. Economic valuation of the goods and services of the ecosystems should be reflected in the annual budget and allocation to Annual Development Plan. Bangladesh Bureau of Statistics (BBS) should enhance its capacity to assess the green GDP.

4.3.6 Integration of NBSAP with the Action Plans of other Rio Conventions

Bangladesh is party to all of the Rio Conventions: the UN Convention on Biological Diversity (CBD), the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention to Combat Desertification (UNCCD). The updated NBSAP developed to implement UNCBD has tremendous

relationship with action plans developed under the two other conventions: UNFCC and UNCCD. The table 11 shows the integration issues of NBSAP with the action plans of other two conventions.

Table 11 Proposed biodiversity issues action plans of with other Rio Convention

Sl No	Name of the Convention	Name of Action Plan/Program	Issues for Integration
1	UNCBD	National Biodiversity Strategy and Action Plan (NBSAP)	Biodiversity conservation and sustainable use will enhance climate change mitigation and adaptation, as well as it will help addressing desertification and land degradation. The updated NBSAP has taken the issues of ecosystem based adaptation and activities to address land degradation
2	UNFCCC	National Adaptation Program of Action (NAPA)	Adaptation projects identified in NAPA to address vulnerabilities of climate change under UNFCCC must seek for ecosystem-based approach and concerns of biodiversity conservation and sustainable use issues. NAPA included, amongst others, short and medium term titles of the projects related to biodiversity addressing the vulnerabilities to climate change. The NAPA projects should be designed and implemented in such a way so that mal-adaptation could be avoided.
3	UNCCD	National Action Programme (NAP) for combating desertification	NAP developed to address desertification and land degradation under UNCCD has also activities like identification of indigenous plants for the rehabilitation of degraded land and determine propagation methods of those plants, emphasis on restoration of wetlands, scientific and indigenous techniques to combat desertification and mitigate the effects of drought.

4.3.7: Implementation of NBSAP towards achieving Sustainable Development Goals:

The 17 Sustainable Development Goals (SDGs) for the period of 2016-2030 adopted by all member states of the United Nations in September 2015 set ambitious objectives across the three dimensions of sustainable development- economic development, social inclusion, and environmental sustainability, underpinned by good governance. The importance of biodiversity for the 2030 Agenda is directly recognized in SDG 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development) and SDG 15 (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss). A similar interdependence exists between biodiversity and SDG 13 (take urgent action to combat climate change and its impacts). Healthy ecosystems are the most important carbon sinks and biodiversity is essential for resilient livelihoods and maintaining ecosystem services under impacts of climate change. Implementation of National Biodiversity targets under the NBSAP can provide useful insight and support towards achieving more than half of all SDGs. The biodiversity-focused SDGs can make direct use of the data submitted under the CBD, making the case for aligned reporting frameworks to capitalize on CBD experience and avoid duplication of work. Other SDGs can benefit from significant synergies and co-benefits.

Understanding the relationships of NBSAP targets and Biodiversity related SDGs could be useful for mainstreaming biodiversity across the sectors and the relevant stakeholders. With the implementation of NBSAP targets, these will make tremendous impacts to achieve corresponding SDG targets.

Table: 12 Linkage between Sustainable Development Goals (SDG) targets and NBSAP targets

SDG Target related to Biodiversity	NBSAP Targets	Expected Achievement towards SDG implementation
14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific Information	11. By 2021, Bangladesh's 3% area under terrestrial ecosystem (forests), 3% area under inland wetlands and coastal ecosystems and 5% of total marine area will come under PAs or ECAs with development and implementation of management plan for these areas	If NBSAP target is implemented, it is expected that corresponding SDG target 14.5 will be achieved within 2020
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and dry lands, in line with obligations under international agreements	14. By 2021, develop and implement restoration plan for degraded wetlands and rivers taking into account the needs of vulnerable people and local communities	If NBSAP target is implemented, degraded ecosystem will be restored afterwards within the stipulated period of SDG by 2030 and corresponding SDG target will be achieved, significantly by that time.
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	7. By 2021, development of Integrated Management Plan will be completed for areas under agriculture, aquaculture and forestry towards ensuring conservation and sustainable use of biodiversity	If the NBSAP target is implemented, integrated management plan will be in place towards achieving the corresponding SDG target
15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	5. By 2021, studies on the rate of habitat loss will be furnished towards promoting implementation of land use policy and enforcement of relevant legislations on conservation of natural habitats	Once the NBSAP target is implemented, baseline of natural habitat loss will be identified which will be supportive towards development of management plan that will lead to achieve corresponding SDG target

SDG Target related to Biodiversity	NBSAP Targets	Expected Achievement towards SDG implementation
promote appropriate access to such resources, as internationally agreed	the Nagoya Protocol on ABS will be submitted to the secretariat of CBD	of progress towards achieving the corresponding SDG target
15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	9. By 2021, study on the impact of IAS will be furnished, regulations towards control of IAS will be developed and capacities at the port-of-entries will be enhanced to regulate IAS	If NBSAP target is implemented effective regulatory system will be developed to control the IAS towards implementation of corresponding SDG target.
15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts	2. By 2021, Assessment of valuation of goods and services of major ecosystems will be furnished towards integration into national accounting system	Biodiversity and ecosystem services provide "life support system" for human being, yet it is not accounted in the development plan, as well as National accounting system. If NBSAP target is implemented value of biodiversity will be included into National Plan as well as accounting system towards achieving corresponding SDG target.
15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems	20. By 2017, financial resources will be mobilized towards accelerated implementation of targets and activities of updated NBSAP	If NBSAP target is implemented financial flow from internal and external sources will be increased which will ensure conservation of biodiversity and sustainable use and thus it will lead to achieve corresponding of SDG target

4.3.8 Integration of Biodiversity into Educational System

Education system in the country could contribute a lot in terms of integrating courses of biodiversity issues, especially on importance of conservation, sustainable use, research and development addressing loss of genetic resources, threatened wildlife, opportunities of bio-prospecting and on the fate of biodiversity in the face of climate change and other man-made interventions. Academic institutions have to play vital role on building an environment and biodiversity sensitive generation who will lead the country in future.

Table 13: Integrating biodiversity into educational system

Types of Education	Activities
Formal Education	▪ Include valuation of goods and services of biodiversity and ecosystem into the course of secondary to higher level students ▪ Co-curricular activities including study tours/excursions, etc. on biodiversity ▪ Training programs for teachers at Teachers Training Institutes (TTIs) on environment and biodiversity ▪ Provision of research on biodiversity for the graduate and post graduate students
Non-Formal Education	▪ Education materials like video documentary to be documented and shown to audiences or visitors in the Zoos, Botanical Gardens, Museums and other places of tourist attraction ▪ Biodiversity focused documentary to be broadcast in the electronic and print media ▪ Mass notification to be published in print media ▪ Exhibition on economic value of Biodiversity ▪ Display boards showing do's and don'ts on biodiversity ▪ Promotion of ecotourism

BOX -9 Bangladesh's Attainment on Environment and Biodiversity Conservation

Bangladesh has achieved several prestigious awards over the years on conservation of environment and biodiversity for showcasing various conservation models or adaptation initiatives those have drawn attention of global community. Here are some of the notable attainments:

Champion of the Earth Award 2015: In recognition of Her Excellency, Hon'ble Prime Minister of the Government of the People's Republic of Bangladesh, Sheikh Hasina's accomplishments, she has won the Champion of the Earth Award of UNEP in 2015. She has become one of the winners of the United Nation's highest environmental accolade, in recognition of Bangladesh's far-reaching initiatives to address climate change. Prime Minister Sheikh Hasina has demonstrated leadership and vision in both making climate change an issue of national priority and advocating for an ambitious global response. As an early adopter and advocate of climate change adaptation policy, she continues to be an example to follow as world leaders seek to take action on climate change as part of the Sustainable Development Goals. The award cites the progressive Bangladesh Climate Change Strategy and Action Plan of 2009, which made Bangladesh the first developing country to frame such a coordinated action plan. Bangladesh is also the first country to set up its own Climate Change Trust Fund supported by nearly US$300 million of domestic resources from 2009-2012.

Hon'ble Prime Minister Sheikh Hasina of the Government of Bangladesh Receives the Champions of the Earth Award from UNEP Director General for Policy Leadership in 2015

Equator Award 2012: Chunati wildlife sanctuary co-management committee has secured Equator Award 2012 declared by United Nation.

Ongarri Mathai Award 2012: Encourage to local community and women for Biodiversity conservation and stop illegal cutting of tree at Taknaf wildlife sanctuary in Cox's Bazzar won by Khurshida Begum.

Earth care Award 2012: Ministry of Environment and Forests has secured this recognition under the project 'Community based adaptation to climate change. The project introduced integrated approach of plantation with fruits and fish culture.

Climate Award 2012: Shift settlement of 700 families for wildlife conservation at Madhupur forests in Tangail district by Bangladesh Forests Department.

UN Best Project Recognition 2012: Under the Community based adaptation to climate change' project participation of local communities in dyke plantation and creation of livelihood opportunities at Char Kukri-Mukri in Bhola district.

5. National Targets and Activities Towards Implementation of NBSAP

Towards achieving Biodiversity Targets at the global level, each country has to play a strong role at the national level. Considering the fact, updating process of NBSAP has gone through a series of consultations with relevant stakeholders at both divisional and national levels. A total of 20 National Targets with 50 activities has been set for the period from 2015-16 to 2020-21 (Table 15). Under each target, separate activities have been set to achieve the goals. These targets and activities have been articulated taking into consideration of the current status of biodiversity, the socio-economic condition, infrastructural setup and timeframe.

BOX -10 The Biodiversity Strategic Planning and Aichi Biodiversity Targets

The Biodiversity Strategic Planning 2011-2020 is comprised of a shared vision, a mission, strategic goals and 20 ambitious yet achievable targets, collectively known as the Aichi Biodiversity Targets. The Strategic Plan serves as a flexible framework for the establishment of national and regional targets and it promotes the coherent and effective implementation of the three objectives of the Convention on Biological Diversity. Biodiversity and ecosystems feature prominently in the 2030 Agenda of Sustainable Development. The two Sustainable Development Goals are directly related to biodiversity; Goals 14 and 15 provide extensive targets on marine and terrestrial biodiversity and ecosystems. Target 15.9 directly links biodiversity to the top priority of the 2030 Agenda - poverty eradication - by calling for the "integration of biodiversity and ecosystem values into national and local planning, development processes, poverty reduction strategies and accounts". For the details of the Aichi Biodiversity Targets, please visit https://www.cbd.int/doc/strategic-plan/2011-2020/Aichi-Targets-EN.pdf.

To follow up or monitor the progress of the implementation of targets and activities a set of indicators has been identified for each activity under the targets. Responsible ministries and departments of the Government, as well as associated organizations has also been identified considering the relevance and institutional capacity. National targets, activities and indicators are shown in the Table 14.

Table 14 National Targets, Activities, Implementation Strategies and responsible Organizations and Indicators

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society					
1. By 2021, relevant stakeholders will be aware on the value of biodiversity and play an active role in ensuring sustainable use	1. Celebrate national and international days related to biodiversity.	MoEF and its agencies: DoE and BFD will organize awareness raising events on these days, MoE, MoPME, MoI, MoA, MoFL, MoWR, MoC, NGO, MoLGRD will be invited to participate in these events	MoE, MoPME, MoI, MoA, MoFL, MoWR, MoC, MoLGRD, NGO	Level of perception among the stakeholder, Number of events, outreach materials and participants	500.00
	2. Include valuation of goods and services of biodiversity and ecosystem into the course of secondary to higher level students	DoE under MoEF will prepare text on values of ecosystem services and sustainable use of biodiversity in collaboration with MoE and MoPME	MoE	Values of biodiversity included in the textbook	100.00
	3. Make communities (viz. farmers, fishermen, ethnic group, people living in and around PAs/ECAs, *Para Kendra* (village centre) of the CHT etc,)	MoEF and its agencies: DoE and BFD will organize training and motivation programs at the community level	MoA, MoFL, CHTs Affairs, MoLGRD	Number of training, motivation programs and participants	100.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
	aware of conservation of biodiversity and how to ensure through, training and motivation programs				
	4. Conduct training program on biodiversity issues for the religious and community leaders and media persons and advocacy program for public representatives	MoEF and its agencies: DoE and BFD will organize training and advocacy programs in collaboration with MoRA (Islamic Foundation/Imam Training Institute and other religious institutes), MoSW (NGO Bureau) and local government institutions	MoRA, MoLGRD, MoI	Number of training/advocacy programs Number of people trained up	200.00
	5.Include biodiversity in the training modules of Government/Non-government training organizations/institutions	DoE under MoEF will prepare training module on biodiversity in collaboration with relevant ministries/ agency	All relevant Ministry	Biodiversity included in the training module	50.00
	6. Aware people through electronic and print media	DoE and BFD will prepare content of awareness materials on biodiversity and take initiative for publicity in the print and electronic media	MoI, Print and electronic media	Number of documentaries aired and air time Number of news/articles in print media	200.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
2. By 2021, Assessment of valuation of goods and services of major ecosystems will be furnished towards integration into national accounting system	1. Conduct study on valuation of goods and services of major ecosystem	DoE will take development project on valuation and implement it ensuring engagement of relevant actors or users of ecosystem goods and services.	MoEF, MoL, MoA, MoLF	Project document valuation study report	100.00
	2. Make proposal to the government to incorporate value of ecosystem goods and services in the green GDP calculation.	DoE will prepare proposal to MoEF with the result of valuation studies to be taken into account by the Ministry of Finance and Ministry of Planning.	MoF, MoP (BBS)	DoE proposal with Valuation study reports	50.00
3. By 2021, Studies on the impacts of incentives or subsidies on biodiversity, as well as development of policy roadmaps for phasing out of incentives or subsidies harmful to biodiversity will be completed towards mainstreaming the relevant ministry for implementation of the policy roadmap.	1. Conduct study on impacts of incentives or subsidies harmful to biodiversity.	DoE will take project to conduct study on impacts of incentives or subsidies on biodiversity ensuring engagement of MoA, NARS institutes, BARC, DAE, etc. to finalize the study report with policy roadmap towards phasing out of incentives and subsidies.	MoA, NARS, BARC, DAE	Project document Study report on impacts Document of Policy roadmap,	10.00
	2.Developed Policy Road map for phasing out of incentives or subsidies harmful to biodiversity	DoE will send study report and the Policy Roadmap to MoEF for implementation by Ministry of Agriculture	MoA	Proposal of MOEF to MOA for phasing-out of harmful subsidies or incentives	5.00
4. By 2021, Policy on Sustainable and Consumption Production (SCP) to maintain safe	1. Development of policy on sustainable consumption and production maintaining safe ecological limit of natural	DoE will take project on preparation of the policy on sustainable consumption and production maintaining safe ecological limit of natural resources of major ecosystems.	MoA, MoL, MoFL MoWR	Project document Policy document on	30.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
ecological limit of natural resources of major ecosystems will be furnished and disseminate the policy to all the stakeholders will be done towards implementation	resources of major ecosystems.	The preparation process would ensure participation of all the stakeholders from field level to national level.		sustainable production and consumption dissemination event.	
	2. Dissemination of the policy to the entire stakeholder towards implementation.	The prepared policy will be disseminated through launching event, as well as, distribution to the relevant ministries and organizations towards playing their role in implementation	MoA, MoL, MoFL MoWR		10.00
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use					
5. By 2021, studies on the rate of habitat loss will be furnished towards promoting implementation of land use policy and enforcement of relevant legislations on conservation of natural habitats	1. Conduct studies to assess the rate of loss of natural habitats	DoE will take project to conduct study to assess the rate of loss of natural habitats.	MoL, MoWRS MoA, MoCHTs Affairs	Project document study report on rate of loss of natural habitats	100.00
	2. Implement Land use Policy and Enforcement of relevant legislations for ensuring conservation of natural habitats	MoL in association with DoE will implement the land use policy; DoE, FD and DoF will conduct enforcement drive following the relevant legislation ensuring conservation of natural habitats.		Number of enforcement drive Compensation realized	50.00
6. By 2021, stock assessment of fish, invertebrate stocks and aquatic plants will be undertaken keeping in	1. Take development project to complete stock assessment on fish, invertebrate stocks and aquatic plants of marine areas and major inland wetland	DoF will take project to complete stock assessment on fish, invertebrate stocks and aquatic plants with safe ecological limit of marine areas and major inland wetland ecosystems.	MoL, MoWR	Project document Report on stock assessment	50.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
mind the safe ecological limit and awareness raising of the stakeholders will be enhanced so that aquatic biodiversity will be managed and harvested sustainably, legally taking into account of ecosystem based approach towards avoidance of overfishing and conservation of threatened species and vulnerable ecosystems.	ecosystems.				
	2. Develop sustainable harvesting guideline for fish, invertebrate stocks and aquatic plants in case of marine areas and inland wetland ecosystems.	DoF in association with DoE will take project to prepare sustainable harvesting guideline for fish, invertebrate stocks and aquatic plants through participation of all stakeholders.	MoWR	Project document Sustainable harvesting Guidelines for fish, invertebrate stocks and aquatic plants	20.00
	3. Prepare conservation management plan for major ecosystems in case of marine areas and inland wetland ecosystems towards avoiding overfishing and ensuring conservation of threatened species and vulnerable ecosystems	DoF in association with DoE will take project to Prepare conservation management plan for major ecosystems in case of marine areas and inland wetland ecosystems	MoWR	Project document Conservation Management Plan	30.00
	4. Dissemination of stock assessment report, sustainable	DoF in association with DoE will disseminate stock assessment report,	MoWR	Launching event awareness	20.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
	harvesting guideline and management plan among the stakeholders with other awareness materials.	sustainable harvesting guideline and management plan and other awareness materials		materials	
7. By 2021, development of Integrated Management Plan will be completed for areas under agriculture, aquaculture and forestry towards ensuring conservation and sustainable use of biodiversity	1. Taking up Development project towards preparation of integrated management plan for areas under agriculture, fisheries and forest for biodiversity conservation and sustainable use.	DoE will take project to develop integrated management plan with the participation of relevant stakeholder	MoA, BARC, DAE DoF, BFD	Project Document Integrated Management policy/ Plan	50.00
	2. Complete land zoning for important areas under agriculture, aquaculture and forestry	MOL will take development project to complete land zoning	MoEF, MoA, DoF, BFD	Project document land zoning document	300.00
	3.Dessimination of the plan among the stakeholder towards implementation	MOL will be disseminate the prepared plan through launching event, as well as, distribution to the relevant ministries and organizations	MoL, MoA, DoF, BFD	Launching events and availability of the awareness materials among the stakeholder	20.00
	4. Prepare GIS based maps showing forest, agriculture land, waterbodies or other	DoE will take project to prepare GIS based Database	BFD, MoA, MoWR, CEGIS	Database	50.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
	natural features				
8. By 2021, study on impact of pollution and excess nutrient on functioning of major ecosystems will be conducted and enforcement drive for controlling pollution will be strengthened.	1 Conduct study on impact of pollution and excess nutrient on functioning of major ecosystems	DoE will take project to conduct study on impact of pollution and excess nutrient on functioning of major ecosystems	MoA, MoInd	Project document, Study report	50.00
	4. Enhance enforcement drive for controlling of pollution.	DoE will drive enforcement for controlling of pollution	MoA, MoInd	Number of enforcement drive Compensation realized	100.00
9. By 2021, study on the impact of IAS will be furnished, regulations towards control of IAS will be developed and capacities at the port-of-entries will be enhanced to regulate IAS.	1. Conduct study on the impact of IAS on biodiversity	MoEF will take project to conduct study on the impact IAS ensuring relevant stakeholder	MoL, DoF	Project document Study Report.	10.00
	2. Develop guideline for controlling and combating the impact of IAS	DoE will take project to develop the guideline for controlling and combating the impact of IAS	BFD, DoF	Project document Guideline document	20.00
	3. Strengthening quarantine system at all port of entries of the country	MoA will take initiatives to ensure quarantine system at the port of entries	MoHome Affairs MoS, MoCAT	Functional quarantine system in place	100.00
	4. Develop management plan for treatment/control of ballast water to regulate IAS	DoE will take project to prepare management plan for treatment /control of ballast water to regulate IAS	MoS	Project document IAS Management plan	20.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
	5. Dissemination of the guideline and plan among the stakeholder towards implementation	DoE will ensure distribution of the documents to the relevant ministries and organizations.	BFD, DoF	No. of events to circulate the documents availability of the guideline and plan among the stakeholder	20.00
10. By 2021, multiple pressure on coral associated island (St. Martin) and Sundarban mangrove ecosystem will be reduced through implementation of management plan of the ecosystems.	1. Develop tourism guidelines	DoE will take project to prepare tourism guidelines with the collaboration of relevant stakeholder	MoCAT	Tourism guidelines	10.00
	2. Prepare or update management plan	DoE and BFD will take project to prepare or update management plan for respective areas	MoCAT	Project document Management plan	200.00
Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity					
11. By 2021, Bangladesh's 3% area under terrestrial ecosystem (forests), 3% area under inland wetlands and coastal ecosystems and 5% of total marine area will come under PAs or ECAs with development and implementation of	1. Identify new areas of biodiversity significance for declaration as PAs and ECAs	BFD and DoE will identify new areas and make proposal to MoEF for declaration as PAs and ECAs.	MoL, MoWR	Gazette notification of new PAs and ECAs	20.00
	2. Development of management plan for PAs	BFD, and DoE will prepare management plan and submit it to MoEF for approval and	MoL, MoWR	Published management plan	200.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
management plan for these areas	and ECAs	circulation			
	3. Strengthen and expand community based management or co-management in all PAs and ECAs	BFD, and DoE will implement management plan through relevant government agencies, CBOs and NGOs	MoLGRD, INGO, Development Partner	Number of functional VCG or CMC	2000.00
12. By 2021, the extinction of known threatened species will be prevented and their conservation status, particularly of those most in decline, has been improved and sustained	1. Preparation of list of threatened species which are most in decline.	MoEF, MoA and MoFL will work together on updating list of threatened species through the agencies like BFD, DoE, BNH, NARS institutes, university faculties and IUCN will take project to prepare list of threatened species which are in most decline. DoE and BFD will provide support with development project to undertake the activity.	IUCN, BNH	Updated list of threatened flora and fauna	200.00
	2. Take recovery programme to prevent extinction of the known threatened flora and fauna	BFD, DoE, NARS institutes and DLS will take recovery programme to prevent extinction of known flora and fauna	IUCN, BNH	Number of recovered species availability of threatened flora and fauna	500.00
13. By 2021, capacity of *in-situ* and *ex-situ* conservation facilities will be strengthened to conserve the genetic diversity of cultivated	1. Establishment of National Genetic Resources Institute (NGRI)	Ministry of Agriculture will take a project with the support of relevant ministries	BFRI, BNH, University	Establishment of NGRI	1000.00
	2. Strengthen existing gene banks or conservation	MoA and MoFL will take development project to strengthen *in-situ* and *ex-situ*		Number of strengthen gene	500.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
plants, indigenous livestock and poultry resources	facilities in institutes (BARI, BRRI, BLRI, BJRI, BINA, Universities etc) through capacity building, establish collaboration and prepare a database accessible to common people	conservation facilities of genetic diversity to be implemented by the agencies or organizations working under those ministries. MoEF will facilitate these ministries towards resource mobilization for implementing these activities.		bank Number of species in gene bank or under conservation facilities.	
	3. Strengthen existing farmers and community gene bank and promote such initiatives to be established by others.	MoA, NARS institute, DLS, DAE will take motivation and training program to establish and strengthen the capacity of farmers and community to establish gene bank for cultivated plants and conservation facilities for livestock and poultry resources.	MoLGRD	Number of farmers and community gene bank	1000.00
Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services					
14. By 2021, develop and implement restoration plan for degraded wetlands and rivers taking into account the needs of vulnerable people and local communities	1. Prepare restoration plan for degraded ecosystems.	DOE and BFD will take project to develop restoration plan for degraded ecosystem,	MoWR, MoL	Project document Restoration Plan document	100.00
15. By 2021, initiate implementation of restoration plan for degraded ecosystems,	1. Take project to initiate implementation of restoration plan for degraded forest ecosystems.	BFD will take project to implementation of restoration plan for degraded forest ecosystems.	MoWR, MoL	Project document Area restored	5000.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
especially, forest lands and wetlands for addressing climate change mitigation, adaptation and combating desertification	2. Take project to initiate implementation of restoration plan for degraded wetland ecosystems.	DoE, will take project for implementation of restoration plan for degraded wetland ecosystems.	MoWR, MoL	Project document Area restored	5000.00
16. By 2016, Bangladesh Biological Diversity Act addressing the issues of ABS will be finalized and the instrument of ratification for the Nagoya Protocol on ABS will be submitted to the secretariat of CBD	1. Pass the Act in the national parliament and circulate it to public and implement the act	MoEF will take initiative to pass the act by the parliament.	Local Government	Bangladesh Biodiversity Act enacted	02.00
	2. Prepare the Instrument of ratification for Nagoya Protocol ensuring ABS	DoE will help MoEF with the instrument of ratification.		Nagoya Protocol is ratified	02.00
Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building					
17. By 2016, Bangladesh will develop, adopt and update NBSAP and commence implementation of the document in an effective and participatory manner	1.Update NBSAP with the participation of relevant stakeholders	DoE will take project to update and implement NBSAP	All relevant Ministry/ Organization	Updated NBSAP Report	-
	2.Adopt NBSAP as a policy instrument	MoEF will take action to adopt NBSAP as a policy instrument.	All relevant Ministry/ Organization	NBSAP adopted as a policy instrument.	20.00
18. By 2021, traditional knowledge, innovations	1. Take development project to recognize and document the	DoE will take project to recognize and documentation of the traditional knowledge,	MoLGRD,MoCHTs	Project document	100.00

National Targets	Activities	Implementation strategy and responsible Ministry/Organization	Associated Ministry / Organization	Indicators	Indicative Budget in Million BDT
and practices of local communities or ethnic groups will be recognized and documented	traditional knowledge, innovations and practices of local communities.	innovations and practices of local communities.		Recognized and documented traditional knowledge, innovations and practices	
19. By 2021, Agencies responsible for Biodiversity and Natural Resources Management will be adopting modern information technology like GIS and RS and information on biodiversity will be shared through Clearing House Mechanism (CHM)	1. Strengthen application of GIS and Remote Sensing for monitoring of biodiversity	DOE and BFD will take project to be implemented to establish GIS and RS setup.	CEGIS, SPARSO	Project document, Application of GIS and RS	100.00
	2. Establish Clearing House Mechanism (CHM) and make it operationalzed	DoE will take initiative to establish and operationalize CHM	All relevant stakeholder	Project document, Established and operationalized CHM.	05.00
20. By 2017, financial resources will be mobilized towards accelerated implementation of targets and activities of updated NBSAP	1. Accelerate financial resource mobilization from external and internal sources	MoEF with the help of Economic Relations Division will take actions to increase mobilization of financial resources from internal and external resources.	ERD, MoF and all other relevant stakeholder	Adequate resources for NBSAP implementation	5.00

6. Capacity Development for Implementation of NBSAP

Capacity development is the key issue for implementing any novel type of plan that needs human engagement, as well as technological excellences to move the plan ahead. NBSAP implementation requires the capacity of the organizations and managers to be up-scaled for discharging their responsibilities with optimum level of application of technical and technological knowhow.

6.1 Capacity Development Needs

In order to achieve the targets of the updated NBSAP, capacity building is effectively needed at individual, institutional and systemic levels.

6.1.1 Individual capacity development

Capacity development initiative at individual level aims at developing ability for the personnel from grass-root level to the policy makers who are involved in management of biodiversity or who are associated with implementation of NBSAP. Individual level capacity includes attaining improved knowledge, professional skills, awareness and motivation towards conservation and sustainable use and decision making capability to this end.

This is going without say that implementing the activities highlighted in the NBSAP and attaining the targets needs active engagement of individuals having expertise on biodiversity. Without strengthening capability towards understanding and assessing the nature and dynamics of the problems of ensuring conservation and sustainable use or enforcement of access and benefit sharing regime would be challenging a task. In that regard strengthening capacity of the individuals (officials, scientists and researchers) working in the relevant departments like DOE, BFD, DOF, DAE, research organizations like NARS institutes, NGOs, CBOs and financing entities or organizations is very important and it could be achieved through imparting intensive training, organizing consultations, establishing interactions and networking among the individuals.

6.1.2 Institutional capacity development

Institutional capacity development is needed to have stronger institutes or organizations equipped with logistics and infrastructural facilities towards effective implementation of NBSAP. Many institutes or departments already have the research labs and logistics while some others are still lacking adequate facility to cover research and development on biodiversity. A detailed capacity needs assessment will be required as a starting point of implementing NBSAP.

In the context of Bangladesh, if the capacity question comes, we find that the country has established Government institutions and Non-government agencies working in the arena of the development aspect of Biodiversity. Ministry of Environment and Forests is coordinating biodiversity activities in the country. The Ministry is implementing development initiatives through the departments: Department of Environment and Bangladesh Forest Department and the institutes: Bangladesh Forest Research Institutes, Bangladesh National Herbarium. Bangladesh Climate Change Trust is working under MOEF to manage government fund entrusted to address climate change. At the government institutional level, capacity building is required for the agencies under the MOEF, as well as for Department of Agriculture Extension, Department of Fisheries, Bangladesh Agricultural Research Institute, Bangladesh Rice Research Institute, Bangladesh Fisheries Research Institute, Bangladesh

Forest Research Institute, Bangladesh Livestock Research Institute, Bangladesh Sugarcrop Research Institute, Bangladesh Jute Research Institute and many more of this kind may be mentioned which have got researchers/scientists/officials working in the areas of biodiversity but without having adequate number of people and logistic supports.

Most of the public and private universities of the country have the departments on environmental science and management, plant/animal science and biotechnology. These Universities produce work force on management of biodiversity and related areas. In addition, these universities and institutes conduct research works on issues like environmental status, loss of ecosystems and habitats, spatial and temporal changes, detection of land use and land cover, biodiversity assessment and monitoring issues, etc. These institutes need adequate number of skilled researchers, as well as lab facilities and others logistic supports to be enable to contribute much more to the process of implementation of NBSAP.

A strong role has been played by local and international NGOs and development partners in research and development on biodiversity conservation and sustainable management. The specialized knowledge of these organizations and their publications are sometimes are very useful for the decision makers. In addition, country offices of UNDP, World Bank, ADB and FAO foster research and development programs relevant to biodiversity. These organizations also need skilled officials who understand the problems of biodiversity and management needs to undertake appropriate projects.

Towards ensuring implementation of NBSAP and SDG targets, capacities of the institutes need to be re-energized with mobilization of adequate financial resources and technological knowhow.

6.1.3 Systemic capacity development

Systemic capacity development aims at having in place the national policies, acts, rules and regulations that create clear mission, vision, mandate and resource allocation towards effective implementation of NBSAP. The Government of Bangladesh included Biodiversity and environment issues in The Constitution of People′s of Republic of Bangladesh and formulated Bangladesh Biological Diversity Act. Development of comprehensive rules-regulations will be required to implement the Act. Furthermore, there are other acts which are related to biodiversity conservation and sustainable use are: Bangladesh Environment Conservation Act 1995 (amendment in 2010), The Forest Act 1927 (amendment in 2000), Wildlife (Conservation and Security) Act 2012, Brick manufacturing and Kiln installation Act 2013, Plant Quarantine Act 2011, Fish Conservation and Protection Act 1950, etc.
Capacity development needs at individual, institutional and systemic levels to implement NBSAP are shown in Table 15.

Table15 Capacity Development Needs for implementation of NBSAP

Category	Capacity Needs	Contributing to Achieve National Target Number	Responsible Ministries/Agencies/Institutes
Individual level	1. Training and Advocacy Program for Policy level on Biodiversity	1	DoE, MoEF
	2. Training for trainer to provide training on biodiversity conservation and sustainable use issues at DOE, BFD, DOF, NARS Institutes, NAPD, BPATC, BARD and other training institutes.	1	DoE, MoEF

Category	Capacity Needs	Contributing to Achieve National Target Number	Responsible Ministries/Agencies/Institutes
	3. Training for teachers of Environmental Science, Biological Sciences, Social Sciences, Development Studies and other relevant disciplines towards introducing biodiversity related curriculum at Public and Private Universities.	1	DoE, MoEF
	4. Develop community groups; impart training and motivation for biodiversity conservation among these groups in PAs and ECAs or other areas of biodiversity importance.	1	DoE, BFD, DOF, NARS Institutes
	5. Training of field level extension personnel and farmers for balanced use of chemical fertilizer, granular urea and practices on Integrated Crop Management (ICM) that includes Seedling Establishment, Integrated Disease Management (IDM), Integrated Pest Management (IPM), Integrated Weed Management (IWM), Integrated Nutrient Management (INM), etc. issues.	3	DAE, NARS Institutes
	6. Training of officials in all ports of entries to prevent importation and introduction of IAS.	9	DoE, DAE
	7. Training on use of GIS, Remote Sensing and others moderns tools in relation to biodiversity conservation and natural resources management	19	DoE, BFD, DoF, DAE
	8. Training on maintaining and updating of Clearing House Mechanism (CHM)	19	DoE
	9. Training for researchers on germplasm conservation and sustainable use	13	NARS
Institutional level	10. Establish biodiversity cell in relevant ministry/agency/organization for implementation of NBSAP	17	Relevant Ministry/Agencies
	11. Strengthen enforcement capability of the managers responsible for the management of PAs/ECAs	11	BFD, DoE
	12. Strengthening the research and development facilities for *In-situ* conservation in the PAs/ECAs, etc.	11	BFD, DOE, BFRI, FRI
	13. Strengthen enforcement drive to control pollution	8	DoE
	14. Provide incentive to promote ICM practices	3	MoA, DAE

Category	Capacity Needs	Contributing to Achieve National Target Number	Responsible Ministries/Agencies/Institutes
	15. Enhance logistic support at the port of entries to deal unauthorized genetic materials (e.g. IAS)	9	MoCAT, MoS
	16. Install and operate Common Effluent Treatment Plant (CETP) in the industrial zones	8	MOI
	17. Train-up DOE officials for regular updating of CHM	19	DoE
	18. Strengthening the research and development facilities of *Ex-situ* conservation in BARI, BRRI, FRI, BLRI, BFRI, BJRI, BINA, BSRI, BLRI Botanical Gardens, Zoos and in the Academic Institutions, etc.	13	MOA
Systemic level	19. Develop effective policies, strategies along with functional legislations, rules-regulations or standards on biodiversity conservation and sustainable use	1	MOEF, MOA, MOFLR
	20. Enhance the capacity of coordination and engagement of various public and private organizations towards NBSAP implementation	All Targets	MOEF
	21. Developing and strengthening systems for monitoring and safeguarding genetic diversity and minimizing erosion of plant genetic resources.	13	MoA
	22. Strengthening capacity to liaison with development partners for enhancing financial support	20	MoF
	23. Develop capacity of effective utilization of financial resources in biodiversity related projects	20	MOEF, MOFLR, MOA and the agencies there under
	24. Develop partnership with business association (like FBCCI, DCCI, BJMEA, BKMEA) to channelize a significant portion of CSR and introduce market based certification to the companies which are following environment-friendly operations	20	MOEF, MOI, MOC

6.2 Technology Needs

Technology is playing a powerful role towards addressing various management problems of biodiversity and thus it is very important for the implementation of NBSAP. Effective diffusion and transfer of technology will be dependent on adequate financing and cooperation among the developed and developing nations. Bangladesh as a developing nation is suffering a lot in terms of vulnerability to climate change and other man-made disasters. Biodiversity is the innocent victim of the onslaught of climate change and other disasters. Towards ensuring better adaptation or risk management of climate change or other vulnerability, services offered by the ecosystems of the country must be protected. To this end, technological applications and innovations will be the cornerstone to achieve the successes of implementation of NBSAP. The technology needs with the results are illustrated in the Table 16.

Table 16 Technology Needs and Expected Results for various sectors of Biodiversity management

Sector	Prioritized Technologies		Relevant National Targets	Expected Results
	Basic Technologies	Associated Issues		
Environment	1. Industrial effluents treatment plants/bio-treatments of waste/waste water treatment plants 2. Biological means to treat water (i.e. snails); using eggshells to remove toxic water pollutants (e.g. Chromium) 3. Artificial wetlands/reed lands based waste water treatment 4. Application of GIS and RS (remotely sensed images derived from satellites, radar, lider and drones to map the wetlands cover, 3D map and cost-effective survey for all the wetlands of Bangladesh 5. Predictive mathematical models to project the future of river/canal water flow, pollution and navigation	6. Promotion of the industries or factories that maintain the highest level of sustainable practice or to introduce easy loan for sustainable industries 7. Restoration of rivers, such as the Buriganga, the Sitalakhya and the Karnaphuli	8, 11, 14	1. Reduced water pollution, improved aquatic biodiversity and ecosystem services 2. Environmental flow maintained to an optimum level
Forestry	1. Application of GIS and RS (remotely sensed images derived from satellites, radar, lider and drones to map the forests cover, total biomass, 3D map and cost-effective survey in the forests of Bangladesh 2. Ecosystems modelling towards restoration; carbon sequestration; resilience 3. Use of SCP (Spatial Conservation Planning) framework and software in Protected Area planning depending on the allocated resources 4. Continuous update on the fragmentation of	9. Building capacity to introduce FSC & MSC to ensure sustainable harvest 10. Infrastructural development to redefine the National Botanical Garden as a centre attraction for not only capturing botanical knowledge but also for other target groups (e.g. introducing jungle or trail biking, spot for birdwatchers,	5, 7, 9, 10, 12	1. Changes in forest resources and forest health monitored 2. Forest and protected area improvement initiatives facilitated 3. Species diversity and ecosystem integrity are maintained 4. Wildlife trafficking reduced through multifaceted monitoring approach

Sector	Prioritized Technologies		Relevant National Targets	Expected Results
	Basic Technologies	**Associated Issues**		
	forest and possible corridors with the help of GIS 5. Camera-trapping technology to record the biodiversity of the forest and radio-collaring and bird-ringing to track the migration or movement or to stop poaching and hunting of wild vertebrates 6. Modern quarantine tools, vigilance and monitoring tools and techniques for pet animals, ornamental plants, seeds, exotic plants, fish and genomes 7. Develop app on the details of national botanical garden to make the public learning easier 8. Develop a database for Bangladesh National Herbarium on stored herbarium specimens collected from all over the country	etc.)		5. National repositories of live and collected specimens maintained for research on plant biodiversity
Agriculture	1. Organic agro-technologies, e.g. Integrated Pest Management, bio-fertilizers 2. Identifying land that suits best for either land sharing or land sparing 3. Crop rotation/ Inter-cropping/ Agro-forestry/ Homestead forestry 4. Enhanced apiculture 5. Research facility or centre on drought-resistant, salinity-resistant and disease-resistant seeds 6. Less natural resource-dependent agro-tech, e.g. alternative wet-dry irrigation method	1. Identifying and building capacity on patent issues of unique and indigenous agro-based products 2. Preservation of seeds of different local and native fruits, medicinal plants and other trees, etc. 3. Building and increasing the capacity to record and sustain the indigenous practices in agriculture	3, 7, 9, 11, 13, 18, 19	1. Less dependent on fertilizer/pesticides that are harmful for environment 2. Maximizing local biodiversity through planned land sharing or land sparing technique which in turn meet the demand for food 3. Preservation of genetic diversity of native and indigenous plant species 4. Agro-forestry, inter-cropping

Sector	Prioritized Technologies		Relevant National Targets	Expected Results
	Basic Technologies	**Associated Issues**		
	7. Surveying and inventorying, and exploration and collection of germplasm 8. *In vitro* and cryopreservation, DNA bank, seed bank, field gene bank 9. Characterization and evaluation of germplasm and identification of important trait 10. Molecular characterization of germplasm	4. Recognizing the traditional ecological knowledge that have been practiced for millennia in Bangladesh 5. Building germplasm centre with necessary resources/equipments and human resources		promises to increase the economic sustainability and enhance the diversity of farm land 5. Apiculture increases the natural pollinators and ultimately increases the production through increased pollination 6. Number of cultivated and wild plant in Bangladesh will be identified. 7. Germplasm will be in secured position 8. Genetic diversity of crop will be identified 9. Intellectual Property Right (IPR) will be established through morpho-molecular characterization of germplasm
Fisheries and Livestock	1. Turtle Excluder Device (TED) in fishing 2. Attaching tracking device to deep sea fishing boats or trawlers 3. Models to identify what would be the sustainable exploitation of fish and fisheries resources 4. Improved fish and fisheries farming technologies in freshwater, estuary and marine	1. Improvement of the existing fish landing centres and increase the facility with the estimation of the fish and fisheries harvest from inland and coastal-marine area 2. Authoritative body to keep track of the introduction of	4, 6, 7, 9	1. Sustainable exploitation of inland water and marine resources 2. Create options for alternative livelihood income sources to lessen the pressure on inland and marine resources 3. Meeting the demand of

Sector	Prioritized Technologies		Relevant National Targets	Expected Results
	Basic Technologies	**Associated Issues**		
	water resources and enhance malacoculture 5. Testing kit/device to measure water quality 6. Models and software to predict the fisheries stock for future 7. Testing tools for farmers to examine and identify the infectious disease in the fisheries and livestock 8. Develop an apps detailing every bit of information on Dhaka National Zoo	new breed or cross in fisheries and livestock sector 3. Identification of more women-friendly fisheries culture (e.g. cage culture) 4. Look for more economically and environmentally sustainable farming of fisheries and livestock 5. Technical training on the preparation of exportable goods from fisheries sector 6. Technical training on identifying the non-native or alien species		protein 4. Employment opportunities for both men and women 5. Engagement of women as bread winner
Tourism	1. Use of separate webpage or portal to establish the protected areas and small forests as the centre of nature-based tourism	1. Use the online platforms to promote the sustainable and environmental-friendly behaviour from tourists	1	1. Nature-based tourism developed and payment for ecosystem services option to improve biodiversity conservation

Sector	Prioritized Technologies		Relevant National Targets	Expected Results
	Basic Technologies	Associated Issues		
Information and Communication Technology (ICT)	2. Ensure use of 'Bangabandhu Satellite' and other future satellite for mapping purposes 3. National database or web-portal on the status, value of existing biodiversity in Bangladesh in an interactive and engaging way—separate platforms for different age groups 4. Free online database of different satellite images, focusing forest cover, extent of water bodies, and land cover, etc. 5. Map of Bangladesh with an extension from Google promoting citizen science or para-biologists/para-ecologists to incorporate any new recorded or identified species only with geographical coordinates 6. Inventorying biodiversity with bioinformatics 7. Create an open access system to storage large data of different climatic parameters, weather, etc.	1. Citizen science – creating an option/platform for school, college and university students to volunteer, learn and disseminate knowledge through surveying and collecting data on biodiversity of Bangladesh	1, 2, 5, 11, 17, 18, 19	1. Widen the scope of independent research on biodiversity conservation and other related fields on biodiversity 2. Participation and engagement of non-experts or layman on biodiversity related discussion or dialogue would be increased with the sharing of open access interpretable data or databases 3. Creating a baseline on the existing biodiversity in Bangladesh 4. Building a scope to assess or compare the state of biodiversity in future 5. Creating useful for biodiversity conservation

7. Resource Mobilization towards Implementation of NBSAP

Bangladesh is a land of rich biodiversity due to its geographic location. The biodiversity of the country is facing continuous threat of loss due to mobilization of inadequate financial resources for biodiversity or ecosystem management. To prevent further loss of biodiversity, the county has to improve mobilization financial resources in an effective manner, as well as new and innovative mechanisms of financing should be in place towards management, research and development of biological resources. Although the government has established Bangladesh Climate Change Trust Fund (BCCTF) in 2010 to support implementation of Bangladesh Climate Change Strategy and Action Plan (BCCSAP), there is no dedicated fund in the budget headline on Biodiversity or towards implementation of NBSAP. After signing of CBD in 1992, Biodiversity issue came up in the several planning document (Five Year Plans and PRSP) without allocation of specific financial resources. The seventh five year plan (2016-21) included implementation of NBSAP as an issue, but again no clear budget allocation is shown for this item.

Bangladesh formulated the National Biodiversity Strategy and Action Plan (NBSAP) in 2004 and Biodiversity National Assessment and Program of Action 2020 (the Fourth National Report to CBD) in 2010. Although financial resource requirements were outlined in the latter, the first generation NBSAP did not included financial requirements. Biodiversity conservation or management related activities until now are carried out by the Government of Bangladesh (GOB) budget or development partner supported budgets through Annual Development Plan (ADP) or non-ADP projects executed by the government and non-government agencies.

The updated NBSAP formulation process looked at the existing mechanisms of financial resources flowing to biodiversity related activities. The status of financial resource allocation to the biodiversity related organizations have been analyzed towards understanding of the present scenario of budgets. The following section reveals a glimpse on the budgetary allocation by the government from fiscal year 2009-10 to 2015-16 for the activities those are directly or indirectly related to biodiversity. Data on resource allocations in the ADP were collected from the Planning Commission for the last seven fiscal years (July 2009- June 2016). Information on the biodiversity related projects taken with the support of BCCTF has also been collected and assessed. Data on non-development budget of two major organizations (DOE and BFD) have been collected and analyzed to see the trend in resource flow. Contribution of ODA in biodiversity conservation has also been collected and analyzed.

The projects under ADP and BCCTF have been categorized in two types. The projects that have potential impacts on biodiversity conservation or have direct linkage with biodiversity conservation categorized as 'biodiversity specific conservation projects'. In addition, some projects those might have positive impact on biodiversity has been categorized as mixed project. The lists of projects those were analyzed in this chapter are given in Annexure 2 and Annexure 3. An analysis of various categories of the biodiversity projects is depicted in the following sections.

7.1 Allocation in development budget (ADP)

Allocations through biodiversity specific projects

Over the years, a number of projects in the sectors of Agriculture, Forestry, Fisheries and Livestock have been implemented that specifically address biodiversity conservation and found to have potential impact over conservation of biodiversity. Specific biodiversity related projects are found to be implemented in crop, forestry, fisheries and livestock sub-sectors under agriculture sector. A total of 17860.8 million BDT was allocated in as a whole in ADP from fiscal year 2009-10 to 2015-16. Analysis on data showed an increasing trend of resource allocation for biodiversity conservation in the ADP with slight decrease in fiscal year 2015-16 (Figure 17). Resource allocation was highest in fiscal year 2014-15 (3865.6 million BDT) followed by 2015-16, 2013-14, 2011-12, 2012-13, 2010-11 and 2009-10 (with 668.9 million BDT). Comparing allocation of 2009-10 to 2014-15 and 2015-16, an increase in growth, almost 5.6 and 5.4 times was observed respectively in resource allocation.

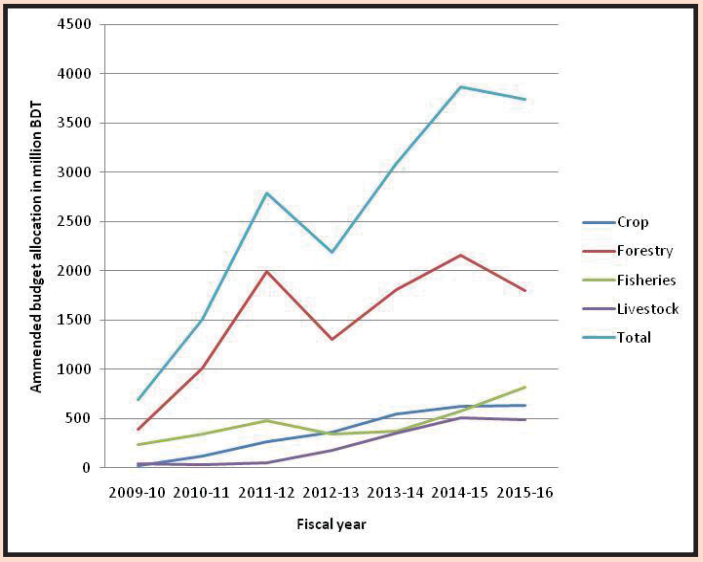


Figure 17 Fiscal year-wise resource allocation inADP for different sectors relevant to biodiversity conservation in Bangladesh

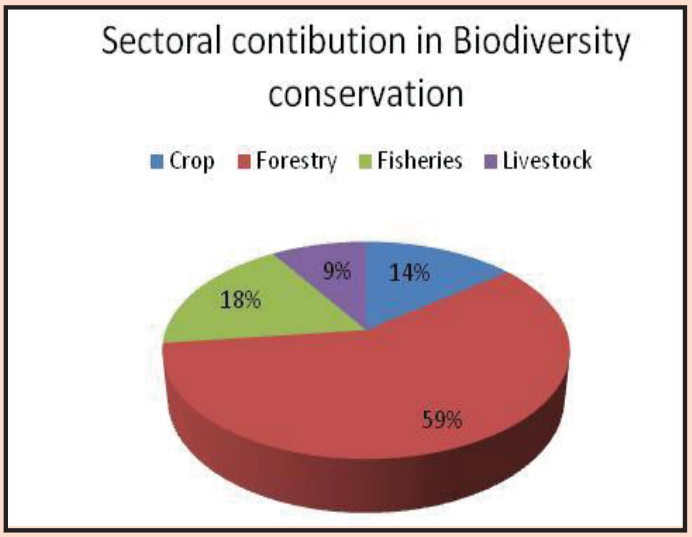


Figure 18 Contribution of resources under the ADP in different sectors for biodiversity conservation in Bangladesh

An increase in ADP has been observed in fisheries sector. Other sectors like forestry, livestock and crop also showed an increasing trend with slight decrease in the fiscal year 2015-16 but compared to 2009-10, a potential growth in resource allocation was observed in all sectors (Figure 18). In this analysis on biodiversity specific projects, the highest resource allocation was found in forestry sector (10464.3 million BDT) followed by fisheries, crop and livestock sector (Figure 19).

Allocations through mixed projects in ADP

Some projects have been taken for addressing different objectives but might have positive impacts over conservation of biodiversity were categorized as mixed project. In one hand, it has been found that some projects have been approved in ADP under subsectors of agriculture sector namely crop, fisheries and livestock might have positive impact over biodiversity conservation and have been categorized as mixed project. On the other hand, some projects under irrigation, water resources, physical planning, water supply and housing and rural development found to have contribution for conserving biodiversity were considered mixed projects because these were taken for fulfilling other objectives like developing irrigation facility, beautification, enhance production of native, hybrid and HYV species of crop, fish, etc.

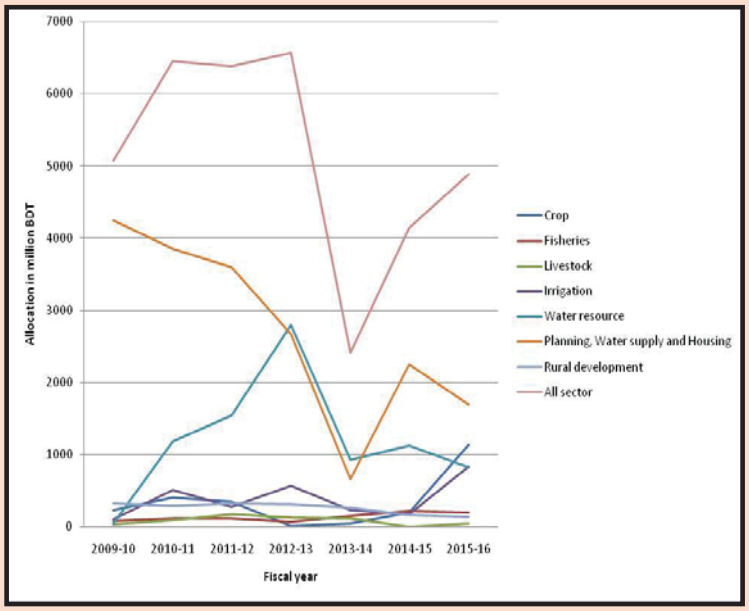


Figure 19 Fiscal year-wise resource allocation in mixed projrct under ADP for different sectors in Bangladesh

A high level of fluctuation in resource allocation was observed in fiscal year to fiscal years. A total of 36142 million BDT was allocated in different sectors during 2009-10 to 2015-16. Allocation was highest in fiscal year of 2012-13 (6567.4 million BDT) followed by 2011-12, 2010-11, 2009-10, 2015-16, 2014-15 and 2013-14. Among the mixed projects, higher resource allocation was found in Physical Planning, Water Supply and Housing sector followed by Water Resources, Irrigation, Crop, Rural Development, and Fisheries and Livestock. Increasing trend in resource allocation was observed in crop and irrigation sector. A decreasing trend was observed in Physical Planning, Water Supply and Housing, and Rural Development, Water Resource and Livestock sector. Increasing trend in resource allocation was found in fisheries sector with slight decrease in fiscal year 2015-16 (Figure 19).

The fluctuation was due to the allocation of mega projects of physical planning, water supply and housing and water resource sector. Two mega projects (Begunbari and Hatir Jheel Lake Development and Gulshan-Baridhara-Banani Lake Development) were taken for the purpose of wetland restoration and rain water retention which might have positive effect on conservation of urban environment and aquatic resources. In case of mixed projects, it was difficult to segregate the portion of money exclusively allocated for biodiversity conservation. Because the detailed evaluation and analysis of the project component needs rigorous interviewing of the respective project authority, this was not accomplished under this study.

7.2 Allocation in non-development budget for biodiversity conservation

Resource allocation by the government for accelerating departmental activities in non-development budget of pioneer organizations for biodiversity conservation, namely, Bangladesh Forest Department and Department of Environment under the Ministry of Environment and Forests showed an increasing trend (Figure 20). It has been found that the non development budget of Bangladesh Forest Department and Department of Environment increased by 2 and 3.19 times, respectively, from the fiscal year 2009-10 to 2015-16 that indicates positive approach of the Government of Bangladesh towards enhancing capacity of this two organizations working on conservation of biodiversity.

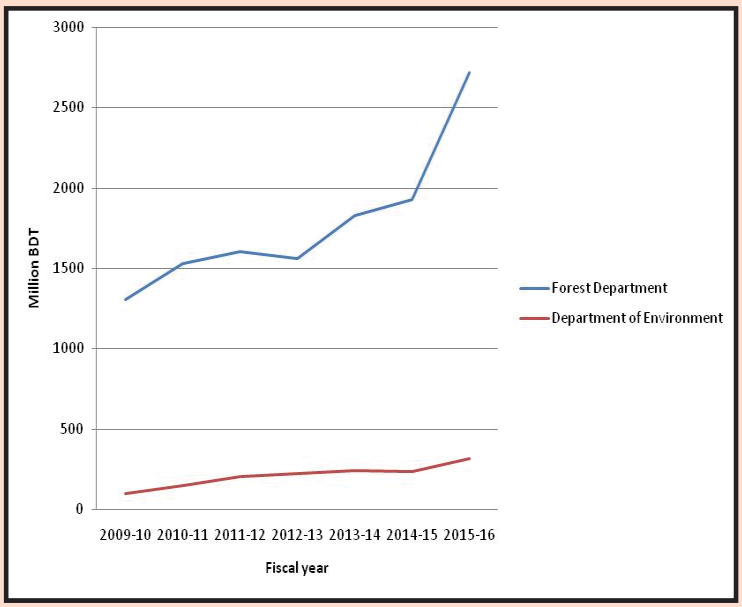


Figure 20 Year wise non development budget allocation

7.3 Allocation in Bangladesh Climate Change Trust Fund for conservation of biodiversity

Good numbers of projects have been implemented by different organization with fund from Bangladesh Climate Change Trust Fund (BCCTF) from fiscal year 2009-10 to 2015-16. Some of these projects have been taken to conserve biodiversity those are categorized as specific biodiversity conservation project. Some projects have been implemented to address climate change but those have potential impact over biodiversity conservation and those are categorized as mixed projects

Allocation of BCCTF resources for specifically biodiversity conservation

Twenty projects have been found those were implemented for biodiversity conservation under BCCTF. A total of 2137.97 million BDT was allocated to implement these projects. There is a decreasing trend of resource allocation found from fiscal year 2009-10 to 2014-15 which is increased in 2015-16. Highest resource allocation was observed in the fiscal year 2009-10 (694.02 million BDT) followed by 2010-11, 2012-13, 2015-16, 2011-12 and 2014-15 (Figure 21). Addressing climate change adaptation

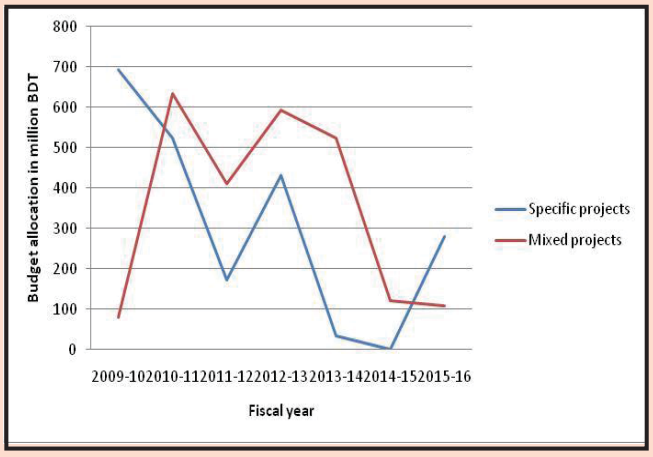


Figure 21 Fiscal year-wise resource allocation in specific and mixed projrcts under BCCTF for biodiversity conservation

and mitigation aspects are the priority of the BCCTF and that might be reason behind decrease of fund for biodiversity conservation over the year. BCCTF approved 30,000 million BDT (BCCTF 2016) from the fiscal year 2009-10 to 2015-16 to combat climate change and 7% of that fund used in projects that specifically addressed biodiversity conservation.

Allocation of BCCTF resources through mixed project

From BCCTF, fund has been allocated for 28 more projects those might have potential impact over biodiversity conservation. These projects were mainly taken to reduce impact of climate change through re-excavating canals, promoting measures to reduce fuel wood consumption, varietal development etc. Re-excavation of canals will promote water flow and that seem to enhance crop diversification and fish biodiversity. The projects related to reduce fuel wood consumption, may reduce dependency of people over forest resources and varietal development will enhance crop diversification.

In case of BCCTF, a decreasing trend was observed with high level of fluctuation in resource allocation from fiscal year 2009-10 to 2015-16. Total 2469.62 million BDT allocated for implementing these 28 projects, but it is difficult to segregate exactly how much money has been allocated for biodiversity conservation. Highest allocation was found in the fiscal year 2010-11 (634.33 million BDT) followed by 2012-13, 2013-14, 2011-12, 2014-15, 2015-16 and 2009-10 (Figure 21).

7.4 Biodiversity Financing in ODA

Organization for Economic Co-operation and Development (OECD) coined the term Official development assistance (ODA) through its Development Assistance Committee (DAC) in order to measure aid flows globally. After DAC first used the term ODA in 1969, it has been widely used as an indicator of international aid flow; including some loans.

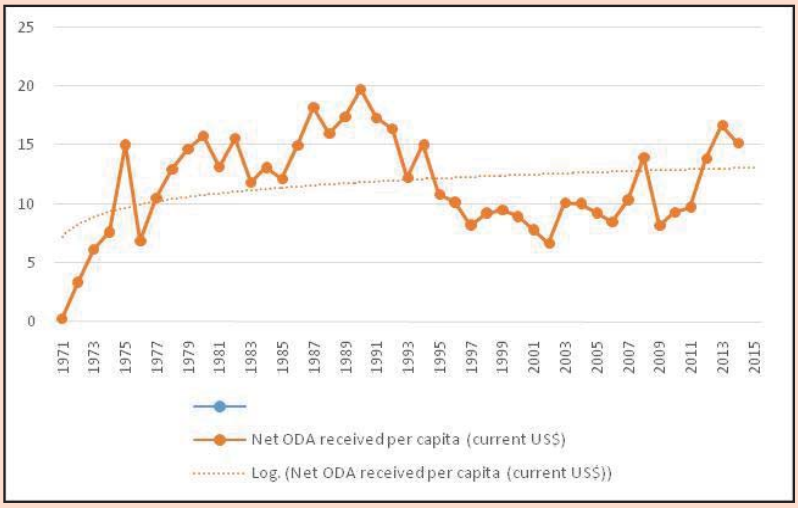


Figure 22 Per-capita ODA flow to Bangladesh since 1971. (Source: OECD, DAC statistics. http://stats.oecd.org/Index.aspx?DataSetCode=DACGEO)

At present there are a handful of projects that fall under the broader umbrella of ODA in Bangladesh. Fewer still, fall directly or indirectly, under the umbrella of biodiversity-related ODA. Since the beginning of Bangladesh (in 1971) there has been a slow and inconsistent rise in the ODA received by the country as shown by the Figure 22.

Figure-23 depicts the per capita ODA value received by Bangladesh in current USD prices. The two jumps on the ODA received in 1975 and 1990 may be due to a response mechanism following the great Bengal Famine (1970-1973) and the great flood of 1988 respectively. Since then, majority of ODA has been used for infrastructural projects like building bridges, roads, water constructions and the like. OECD reports suggest that, since 2004-06, the total Biodiversity-related ODA for Asia has fallen while that of South America rose considerably (from 225 million USD to 1 billion by 2010-2012 per annum). During the 2007 to 2012 period, Bangladesh received only 2 % of biodiversity-related ODA (OECD 2014).

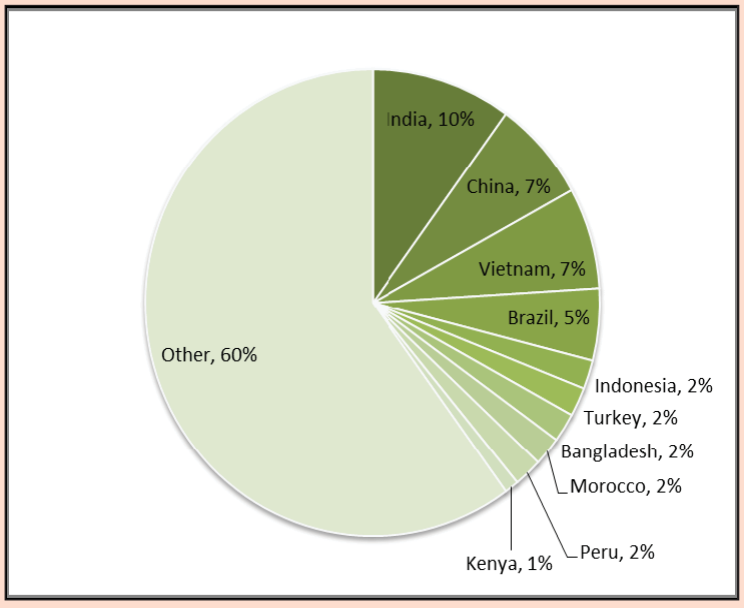


Figure 23 Top 10 recipients of total biodiversity-related ODA 2007-12

However, it also reports that considerably larger shares of biodiversity-related aid are "unspecified". "Unspecified" *covers aid that is not earmarked to a country, region or income group, but rather contributes to biodiversity-related funds and programs managed by development co-operation agencies, international organizations, NGOs and research institutions* (OECD 2014). In link to that, since 2005 the total Net ODA that Bangladesh received according to the World Bank, has been in the graph of Figure 24.

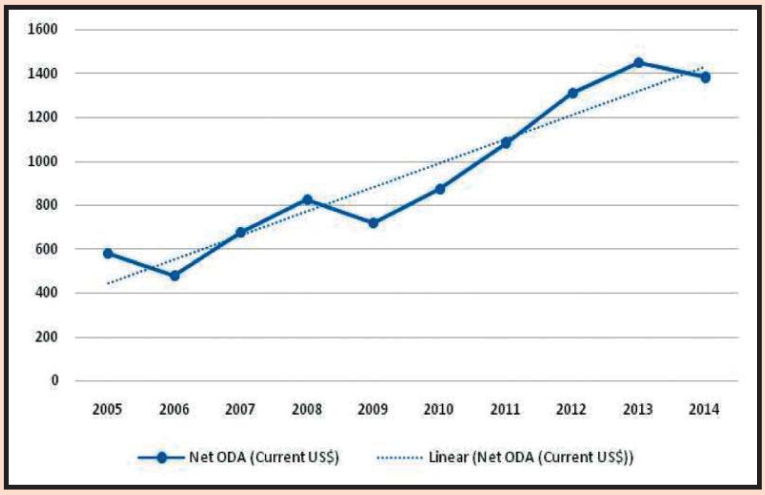


Figure 24 Net ODA flow to Bangladesh, 2005-2014 (in million USD current prices) (Data source: World Bank, web at: http://data.worldbank.org/indicator/DT.ODA.ODAT.PC.ZS?locations=BD),

From Bangladesh's point of view, a number of these unspecified ODAs could be captured through various projects that have some relations with biodiversity. USAID NISHORGO, IPAC and CREL, Ecosystems for Life: A Bangladesh-India Initiative, SRCWP, ECOFISH BD Projects are good examples of this relationships. However, some of these projects are calculated in Annual Development Plan (ADP) (e.g. SRCWP, IPAC and CREL). It is clear that, ODA is indeed an important contribution in the overall economic development. However, the overall resource and budget that the biodiversity sector requires makes the case for a more strategic initiative towards

securing finances for biodiversity-related ODA utilization. In order to do that, a greater effort in terms of mainstreaming biodiversity in all sectoral activities needs to be in place and a so called "market" needs to be convincingly created to attract biodiversity-related ODA as happened in the South American case.

7.5 Financial Resources needed for implementing NBSAP

Effective management and conservation of ecosystem as well as biodiversity need proper flow of resources to carry out a set of planned activities in lieu with international commitment. As a signatory and party to CBD, Government of Bangladesh is committed to work forward for biodiversity conservation. Table 7.1 summarize resource need for biodiversity conservation in the light of Aichi Biodiversity Targets 2020 and proposed National Biodiversity Targets of Bangladesh. On the other hand table 7.2 summarises probable sources of fund of resources.

Success of Implementation of NBSAP will be dependent on mobilization of adequate financial resources for taking up the activities chalked-out in Table-14 of Chapter 5 that has included an indicative budget estimated for each of the activities under the national targets of NBSAP and a total of 18329.00 million BDT is estimated to be required for the implementation of NBSAP.

7.6 Possible Sources of Funding

There are opportunities for international and domestic funding which can be exploited by the biodiversity related government or non-government organizations in collaboration with relevant development partners. In addition funds may be created through voluntary and mandatory funds, advertisement, fines and levies, CSR, innovative funds, biodiversity–based lotteries (Table 17).

Table 17 Possible Sources of Funds for implementation of NBSAP

Type of Fund	**Description of Source**	**Relevant Fund Channelizing ministry/departments /organization**
Direct Core Funding	Government of Bangladesh	MoF
Non-Core Funding	Trust Fund, Jolmohal Leasing, Fish harvest	MoSW, MoWR, MoLF, MoF
Indirect Peripheral	Regional and Global Forum Fund, Scientific and development initiative, Carbon trading	INGO, Development partners, etc.
Development Partners	Grant, Aid, Loan	World Bank, ADB, GEF, UNDP, INGOs
Private Sector	CSR (Bank, Multinational company etc), donation	MoF, BB
INGO	Research Grant, Training and Education	INGOs, Charity
Green Tax	Polluter Pays Principle should be applied and extra tax to be imposed on the polluting industries or products	MoF, MoEF, MoFL
Reform subsidies	Reduce or remove subsidies that adverse impacts on biodiversity, such as, on fertilizers, and increase subsidies that have beneficial impacts on ecosystems. Shifting certain portion of subsidies from chemical fertilizer into organic fertilizer could be taken into account	MoA

Type of Fund	Description of Source	Relevant Fund Channelizing ministry/departments /organization
Voluntary and mandatory fees	Develop voluntary fees (such as hotel or tourism fee) that allows individuals to contribute to sustainable management, and develop mandatory fees (such as airport departure fees) that can be directed toward sustainable management	MoCA&T
Advertisement	Wildlife Logo patent rights	MoI
Fines and levies	Pollution abatement damage recovery cost	DoE
Ecosystem Services	Payment for Ecosystem Services (PES), Nature based tourism	MoF, MoCAT
Game fishing/water games	Government owned lakes, ponds etc can be used for game fish	MoF, MoWR, MoFL
Export	In case natural resources like sand, Export tax can be earned while export	Ministry of Commerce
Biodiversity-based Lotteries	Periodic lotteries	MoF

7.7 Constraints, Gaps and Challenges for Fund Raising

Effective, efficient and dynamic mobilization of resources for conservation of biodiversity is crucial. The understanding of policy makers on the value of the services of ecosystem and biodiversity is still a challenge. Eecosystem and biodiversity conservation aspects are although included in the development plans no dedicated or stand alone resource allocation for biodiversity is in place. Change in mind-set of all planners to address biodiversity related issues in their sectoral development plans and projects still remain a challenge. Placing of lucrative ideas to the development partners with the capacity of negotiation skill is still a challenge and resulted in less amount of resource mobilization. Strong public and private partnership in the field of biodiversity conservation and paying for ecosystem services do not exist strongly in place.

Effective mobilization of resources is crucial towards NBSAP implementation and attaining the related SDG targets. Willingness of the government, as well as development partners to increase allocation for biodiversity conservation will be important factor towards mobilization of resources for implementation of NBSAP. Change in mind-set of all planners and policy makers with regard to importance of biodiversity still remain a challenge. Proper negotiation with and placing of lucrative project ideas to development partners towards funding is still suffering from inadequate number of skilled and enthusiastic officials. Constraints of technical knowledge on project preparation and managerial skill of project execution should also be taken into account. Public and private partnership in the field of does not exist strongly in place. Willingness of private entrepreneurs to allocate money for biodiversity conservation would also be important towards NBSAP implementation.

Conservation of biodiversity needs integrated efforts from all sectors interacting with natural resources and therefore, priority of biodiversity issues need to be incorporated in sectoral policies and legislations that is still a challenge and narrowing down the scope for allocating resources for biodiversity by different sectors.

8. Coordination, Monitoring and Reporting of NBSAP

8.1 Coordination, monitoring and reporting

Coordination among stakeholders including implementing agencies, as well as monitoring and reporting of the activities are important for the effective implementation of NBSAP. A total of 50 activities under 20 national targets have been set through a series of consultations ensuring participation of multi-stakeholder. The updated NBSAP proposes that these activities will be implemented by the lead ministries/agencies with other associated ministries/agencies. Activities will be monitored and evaluated by the respective ministry and various biodiversity committees to be constituted under Bangladesh Biological Diversity Act. The National Committee on Biodiversity would oversee the progress of implementation periodically with strong engagement of all the stakeholders.

Monitoring and reporting of the progress of activities under each of the 20 national targets set in the updated NBSAP will be periodically done by the National Committee on Biodiversity. Department of Environment will provide all kind of technical and secretarial support to the National Committee on Biodiversity. The monitoring issues include follow up of any changes in base-line data of biodiversity, assess periodic progress of NBSAP implementation, review monitoring indicators, produce national report to the CBD Secretariat and prepare updated information on progress of NBSAP.

8.2 Communication and Outreach Strategy

Developing holistic communication, extension, motivation and outreach activities will be important to create awareness about biodiversity as part of implementing updated NBSAP. This section depicts various key elements to be used in creating awareness about biodiversity related issues (Table 18).

Table 18 Communication, extension and outreach strategies for awareness on biodiversity

Strategy	How to frame the process	Expected Output	Ministry/Organization
Dissemination of NBSAP documents	• Adoption of NBSAP as National document	• Awareness build-up	• MoEF/DOE
Publicity through print and electronic media	• Articles • Supplementary • Talk-show • Documentary • Folks	• Awareness build-up	• MoEF/DOE/ BFD/DOF
Educational curriculum	• Develop or Update Biodiversity related curriculum for Secondary and Higher level students	• Students will be aware	• MOE/NCTB
Social communication through internet and mobile phone	• Facebook, Twitter • SMS/E-mail	• Awareness build-up	• Post and Telecommunications Division/Mobile operators
Training	• Government and Non	• People will be	• Training

Strategy	How to frame the process	Expected Output	Ministry/Organization
	Government Officials • Community/Religious leaders	educated and skilled	institutions
Promoting eco-tourism	• Ensure tourism with minimum disturbance to biodiversity and eco-friendly behavior of the tourist	• Nature based tourism further flourished	• Bangladesh Parjaton Corporation / Private tour operators
Dissemination of research findings	• Scientific publication • Seminar • Symposium	• Policy makers will be aware & take necessary steps for Biodiversity conservation	• Ministry of Environment and Forests
Message dissemination through promotional materials	• Brochure • Festoons • Posters • Billboard	• Awareness, understanding and appreciation of Biodiversity developed	• MoEF/DOE/BFD/DOF
Clearing House Mechanism	• Establishment and operationalization	• Share biodiversity related information	• Department of Environment
Enforcement of Biological Diversity Act	• Committee formation from national level to grass-roots level	• Awareness build-up and Biodiversity conservation	• MoEF

8.3 Bangladesh Clearing House Mechanism (BDCHM)

The Bangladesh Clearing House Mechanism (CHM) is web based platform to provide update on the biodiversity related information of the country. This is established as per the article 18.3 of the Convention to facilitate and promote technical and scientific co-operation. In addition, the CHM will facilitate access to information on the status of biodiversity and biodiversity management initiative in Bangladesh. It will contribute to the dissemination of biodiversity related programme and raising public awareness. DoE will be administering the operation and maintenance of the BCHM web-based database.

The following information will be available in the BDCHM web site:

- Biodiversity National Assessment Report
- NBSAP
- CBD thematic issues
- CBD cross-cutting issues
- Biodiversity related committee report
- Budget allocation for Biodiversity/Biodiversity related programme/ project
- Scientific Journal/ technical report
- Status of biodiversity (floral and faunal data, Red list etc)
- Protected Areas/ ECAs management status
- Institutional capacity and capacity needs

Beyond CBD, CHM will also be linked and inter-connected with the biodiversity related other conventions like Convention on Wetlands of International Importance or the Ramsar Convention, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention on the Conservation of Migratory Species of Wild Animals, etc.

9. Concluding Remarks

Bangladesh is facing pressure of degradation of genetic, species, ecosystem diversity. The diverse ecosystems of the country and the bounty of nature is getting fragile day-after-day. The increasing population of Bangladesh continues to put pressure on existing natural resources resulting over-exploitation. Although, the government has taken initiatives towards conserving biodiversity with its scarce resources, more efforts should obviously be taken to halt further degradation. Implementation of updated NBSAP would pave the way towards maintaining the rich biodiversity of the country. The task should ensure effective engagement of the all stakeholders as well as the development partners.

Mainstreaming of NBSAP in all the relevant sectors would be the prime work that needs urgent and immediate attention to be initiated by the Ministry of Environment and Forests and the Department of Environment. There are enormous challenges ahead towards building financial and technical capacities of the implementing agencies, accomplishment of the valuation of goods and services of ecosystems and incorporation of the values into the national accounting system and monitoring of the activities towards achieving national targets.

Although it is a challenging task to implement NBSAP, but it is once again a great opportunity for the country to move forwards for halting the loss of biodiversity and keeping the country enriched with fresh water, staple crops, delicious fruits and grains, fisheries resources and fresh air around us. By implementing the targets within the timeframe, the country can contribute a lot to fulfill the vision of living in harmony with the nature by 2050 and achieving the SDGs in 2030.

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Annexure

Annexure-1 : List of Extinct or Threatened Species

Table 1.1: Species not found for last 50 years or more than 50 years in Bangladesh

Sl. No.	Botanical names	Family
1.	*Acanthephippium sylhetense* Lindl.	Orchidaceae
2.	*Aechmantheratomentosa*Nees	Acanthaceae
3.	*Aglaiaedulis* (Roxb.) Wall.	Meliaceae
4.	*Alangiumbarbatum* (R. Br.) Baillon	Alangiaceae
5.	*Alchornea tiliifolia* (Benth.) Muell.-Arg.	Euphorbiaceae
6.	*Alisma plantago* L.	Alismataceae
7.	*Alphonseaventricosa* Hook. f. & Thom.	Annonaceae
8.	*Ammanniaoctandra*L.f.	Lythraceae
9.	*Ammannia verticillata* Lamk.	Lythraceae
10.	*Anamirtacocculus* Wight &Arn	Menispermceae
11.	*Ancistrocladuswallichii* Planch.	Ancistrocladaceae
12.	*Angelonia grandiflora* Morr.	Scrophulariaceae
13.	*Apocopis paleacea* (Trin.) Hochr.	Poaceae
14.	*Archidendron jiringa* Nielsen	Mimosaceae
15.	*Ardisia icara* Wall. & A. DC.	Myrsinaceae
16.	*Aristida redacta* Stapf	Poaceae
17.	*Artabotryscaudatus* Wall.	Annonaceae
18.	*Arthrocnemum indicum* Willd.	Chenopodiaceae
19.	*Aspidopterys nutans* A. Juss.	Malpighiaceae
20.	*Asystasiamacrocarpa*Nees	Acanthaceae
21.	*Balanostreblus ilicifolius* Kurz	Moraceae
22.	*Begonia laciniata* Roxb.	Begoniaceae
23.	*Begonia megaptera* A. DC.	Begoniaceae
24.	*Beilschmiedia fagifolia* Nees	Lauraceae
25.	*Blastus cochinchinensis* Lour.	Melastomataceae
26.	*Brachiaria eruciformis*Griseb.	Poaceae
27.	*Bromus himalaicus* Stapf	Poaceae
28.	*Broussonetia papyrifera* Herit.	Moraceae
29.	*Buchanania lancifolia* Roxb.	Anacardiaceae
30.	*Caldesia oligococca* Buchen.	Alismataceae
31.	*Caldesia parnassifolia* Parl.	Alismataceae
32.	*Capsella bursa-pastoris* (L.) Medic.	Brassicaceae
33.	*Carex caespitita* Nees	Cyperaceae
34.	*Careyasphaerica*Roxb.	Lechythidaceae
35.	*Ceropegia macrantha* Wight	Asclepiadaceae
36.	*Chionanthus mala-elengi* subsp. terniflorus Green	Oleaceae
37.	*Chiritaoblongifolia* B. L. Burtt	Gesneriaceae
38.	*Cinnamomum glanduliferum* Meiss.	Lauraceae
39.	*Cinnamomum glaucescens* (Nees) Meiss.	Lauraceae
40.	*Cinnamomum pauciflorum* Nees	Lauraceae
41.	*Cnidiummonnieri*Cusson	Apiaceae
42.	*Codonacanthuspauciflorus*Nees	Acanthaceae
43.	*Cordiagrandis*Roxb.	Boraginaceae
44.	*Corymborkis veratrifolia* Blume	Orchidaceae
45.	*Crotalariamysorensis*Roth	Fabaceae
46.	*Crotalaria occulta* Grah.	Fabaceae
47.	*Curanga amara* Juss.	Scrophulariaceae
48.	*Cuscuta chinensis* Lamk.	Cuscutaceae
49.	*Cymbopogon schoenanthus* (L.) Spreng.	Poaceae
50.	*Dendrobium chryseum* Rolfe	Orchidaceae
51.	*Dendrobium crepidatum* Lindl. & Paxt.	Orchidaceae
52.	*Dendrobium formosum* Roxb.	Orchidaceae
53.	*Dendrobium lituiflorum* Lindl.	Orchidaceae

Sl. No.	Botanical names	Family
54.	*Dendrobium ochreatum* Lindl.	Orchidaceae
55.	*Dendrobium podagraria* Hook.f.	Orchidaceae
56.	*Dendrobium transparens* Wall.	Orchidaceae
57.	*Dendrobium tuberiferum* Hook.f.	Orchidaceae
58.	*Derris monticola* (Kurz) Prain	Fabaceae
59.	*Desmodiumdichotomum* DC.	Fabaceae
60.	*Didymocarpusmollis* Wall.	Gesneriaceae
61.	*Dracaena angustifolia* (Medik.) Roxb.	Agavaceae
62.	*Elaeocarpus lucidus* Roxb.	Elaeocarpaceae
63.	*Elaeocarpus serratus* L.	Elaeocarpaceae
64.	*Endiandra firma* Nees	Lauraceae
65.	*Engelhardtia spicata* Lesch. var. acerifolia Koord	Juglandiaceae
66.	*Eriachne pallescens* R. Br.	Poaceae
67.	*Eriobotrya bengalensis* Hook. f.,	Rosaceae
68.	*Eriocaulon luzulaefolium* Mart.	Ericaulaceae
69.	*Erythroxylum kunthianum* Wall.	Erythroxylaceae
70.	*Eulalia fastigiata*Haines	Poaceae
71.	*Eulaliopsis binata* Hubb.	Poaceae
72.	*Eulophia herbacea* Lindl.	Orchidaceae
73.	*Euphorbia fusiformis* Buch.-Ham.	Euphorbiaceae
74.	*Fagraea ceilanica* Thunb.	Loganiaceae
75.	*Ficus concinna* (Miq.) Miq.	Moraceae
76.	*Ficus conglobata* King	Moraceae
77.	*Ficus crininervia* Miq.	Moraceae
78.	*Ficus glaberrima* Blume	Moraceae
79.	*Ficus oligodon* Miq.	Moraceae
80.	*Ficus sarmentosa* Buch.-Ham.	Moraceae
81.	*Ficus subulata* Blume	Moraceae
82.	*Fimbristylis scaberrima* Nees	Cyperaceae
83.	*Gardneriaovata* Wall.	Loganiaceae
84.	*Gonatanthus pumilus* Engler & Krause	Araceae
85.	*Gymnostachyum*listeriPrain	Acanthaceae
86.	*Habenaria furcifera* Lindl.	Orchidaceae
87.	*Habenaria longifolia* Buch.-Ham.	Orchidaceae
88.	*Habenaria marginata* Coleb.	Orchidaceae
89.	*Habenaria plantaginea* Lindl.	Orchidaceae
90.	*Habenaria viridiflora* (Sw.) R. Br.	Orchidaceae
91.	*Hedyotis brunonis* Merr.	Rubiaceae
92.	*Hedyotis insularis* Deb & Dutta	Rubiaceae
93.	*Hedyotis lineata* Roxb.	Rubiaceae
94.	*Hedyotis pseudocorymbosa* Bakh. f.	Rubiaceae
95.	*Hedyotis thomsoni* Hook. f.	Rubiaceae
96.	Hedyotis uncinella Hook. & Arn.	Rubiaceae
97.	*Helicia excelsa* (Roxb.) Blume	Proteaceae
98.	*Hemicyclia venusta* Thw.	Euphorbiaceae
99.	*Heynea trijuga* Sims	Meliaceae
100.	*Homalium nepalense* Benth.	Flacourtiaceae
101.	*Homalomena pendula* Bakh.f.	Araceae
102.	*Iodeshookeriana*Baill.	Icacinaceae
103.	*Iodes thomsoniana* Baill.	Icacinaceae
104.	*Ischaemum hirtum* Hack.	Poaceae
105.	*Ischaemum semisagittatum* Roxb.	Poaceae
106.	*Ixora subsessilis* Wall.	Rubiaceae
107.	*Jasminum anastomonzans* Wall.	Oleaceae
108.	*Jasminum coarctatum* Roxb.	Oleaceae
109.	*Jasminum laurifolium* Roxb.	Oleaceae
110.	*Jasminum listeri* King	Oleaceae
111.	*Jasminum listeri* King	Oleaceae

Sl. No.	Botanical names	Family
112.	*Jasminum subtriplinerve* Blume	Oleaceae
113.	*Justiciaoreophila* C. B. Clarke	Acanthaceae
114.	*Justiciapunduana* Wall.	Acanthaceae
115.	*Lagenandra gomezii* Bogner & Jacob.	Araceae
116.	*Lasianthus inodorus* Blume	Rubiaceae
117.	*Lasianthus rigidus* Miq.	Rubiaceae
118.	*Lepionurus sylvestris* Blume	Opiliaceae
119.	*Limnophila erecta* Benth.	Scrophulariaceae
120.	*Limnophila roxburghii* G. Don	Scrophulariaceae
121.	*Lindera reticulata* (Nees) Benth.	Lauraceae
122.	*Lindernia micrantha* D. Don	Scrophulariaceae
123.	*Litsea angustifolia* Wall.	Lauraceae
124.	*Litsea laeta* Wall. ex Nees	Lauraceae
125.	*Litsealancifolia* (Roxb. ex Nees) Hook.	Lauraceae
126.	*Litseasemecarpifolia* Hook. f.,	Lauraceae
127.	*Loeseneriella macrantha* (Korth.) A. C. Smith	Hippocrataceae
128.	*Luisia volucris* Lindl.	Orchidaceae
129.	*Lysimachia japonica* Blume	Proteaceae
130.	*Maclura fruticosa* (Roxb.) Corner	Moraceae
131.	*Macroptilium lathyroides* var. semierectum (L.) Urban	Fabaceae
132.	*Mastixia macrophylla* (Thw.) Kosterm.	Cornaceae
133.	*Melastomaimbricatum* Wall.	Melastomataceae
134.	*Memecylon cerasiforme* Kurz	Melastomataceae
135.	*Memecylon pauciflorum* Blume,	Melastomataceae
136.	*Meriandra bengalensis* Benth.	Lamiaceae
137.	*Mimulus strictus* Benth	Scrophulariaceae
138.	*Mitrasacmealsinoides* R. Br.	Loganiaceae
139.	*Mitrephoratomentosa* Hook. f. & Thom.	Annonaceae
140.	*Myrica nagi* Thunb.	Myricaceae
141.	*Myrioneuron clarkei* Hook. f.	Rubiaceae
142.	*Nesaeabrevipes*Koehne	Lythraceae
143.	*Nymphoides parvifolium* Kuntze	Menyanthaceae
144.	*Oberonia gammiei* King & Pantl.	Orchidaceae
145.	*Oberonia wallichii* Hook. f.	Orchidaceae
146.	*Olax scandens* Roxb.	Oleaceae
147.	*Olea gamblei* C. B. Clarke	Oleaceae
148.	*Oryza latifolia* Desv.	Poaceae
149.	*Osbeckiachinensis* L.	Melastomataceae
150.	*Osbeckia stellata* Buch.-Ham.	Melastomataceae
151.	*Osbeckiatruncata* D. Don	Melastomataceae
152.	*Pachystoma pubescens* Blume	Orchidaceae
153.	*Paracalyxscariosus* (Roxb.) Ali	Fabaceae
154.	*Peristrophe fera* C. B. Clarke	Acanthaceae
155.	*Persea gamblei* Kosterm.	Lauraceae
156.	*Perseavillosa* (Roxb.) Kosterm.	Lauraceae
157.	*Persicaria macrantha* Haraldson	Polygonaceae
158.	*Peucedanumdhana* A. Ham.	Apiaceae
159.	*Phaius nanus* Hook. f.	Orchidaceae
160.	*Photinia arguta* Lindl.	Rosaceae
161.	*Phyllanthus pendulus* Roxb.	Euphorbiaceae
162.	*Pimpinella heyneana* (DC.) Benth.	Apiaceae
163.	*Piper hamiltonii* C. DC.	Piperaceae
164.	*Plesmonium margaritiferum* Schott	Araceae
165.	*Poikilospermum suaveolens* (Blume) Merr.	Cecropiaceae
166.	*Polyalthiajenkinsii* Hook. f. &Thom.	Annonaceae
167.	*Polycarpaea corymbosa* Lamk.	Caryophyllaceae
168.	*Polygala longifolia* Poir.	Polygalaceae
169.	*Polytoca digitata* (L. f.) Druce	Poaceae

Sl. No.	Botanical names	Family
170.	*Pomatocalpa undulatum* Tang & Wang,	Orchidaceae
171.	*Potentilla supina* L.	Rosaceae
172.	*Premna micrantha* Schauer	Verbenaceae
173.	*Pseudosorghum fasciculare* Camus,	Poaceae
174.	*Psilanthus fragrans* Leroy	Rubiaceae
175.	*Psychotria helferiana* Kurz	Rubiaceae
176.	*Psychotria sphaerocarpa* Wall.	Rubiaceae
177.	*Rhaphidophora affinis* Schott	Araceae
178.	*Rhaphidophora calophyllym* Schott	Araceae
179.	*Rhinacanthus calcaratus* Nees	Acanthaceae
180.	*Rhynchosiabracteata*Benth.	Fabaceae
181.	*Rhynchosiarothii*Benth.	Fabaceae
182.	*Rhynchosia viscosa* DC.	Fabaceae
183.	*Rorippa benghalensis* (DC.) Hara	Brassicaceae
184.	*Rorippa palustris* (L.) Bess.	Brassicaceae
185.	*Rotalasimpliciuscula* (S. Kurz) Koehne	Lythraceae
186.	*Rotalasubrotunda*Koehne	Lythraceae
187.	*Saccolabium cephalotes* Hook. f.	Orchidaceae
188.	*Salicornia brachiata* Roxb.	Chenopodiaceae
189.	*Sauropusbacciformis* Airy Shaw	Euphorbiaceae
190.	*Schoenorchis gemmata* Sm.	Orchidaceae
191.	*Smilax ferox* Wall.	Smilacaceae
192.	*Smilax oxyphylla* Wall.	Smilacaceae
193.	*Sopubia stricta* Baker	Scrophulariaceae
194.	*Spiranthes sinensis* (Pers.) Ames	Orchidaceae
195.	*Staurogyne angustifolia* Anders.	Acanthaceae
196.	*Streptocaulon sylvestre* Wight & Arn.	Asclepiadaceae
197.	*Striga angustifolia* Saldanha	Scrophulariaceae
198.	*Striga asiatica* (L.) O. Kuntze	Scrophulariaceae
199.	*Strobilanthesisophyllus* Anders.	Acanthaceae
200.	*Strobilanthesmacrostegius* Clarke	Acanthaceae
201.	*Strobilanthespanichanga* Anders.	Acanthaceae
202.	*Strobilanthesphyllostachyus*Kurz	Acanthaceae
203.	*Strychnoswallichiana*Benth.	Loganiaceae
204.	*Stylidium kunthii* Wall.	Stylidiaceae
205.	*Symplocos caudata* Wall.	Symplocaceae
206.	*Tarenna disperma* (Hook. f.) Pitard	Rubiaceae
207.	*Tarenna odorata* (Roxb.) Robinson	Rubiaceae
208.	*Tetraphyllumbengalense* Clarke	Gesneriaceae
209.	*Tetrastigma dubium* Planch.	Vitaceae
210.	*Torenia flava* Buch.-Ham.	Scrophulariaceae
211.	*Tournefortia candollii* C. B. Clarke	Boraginaceae
212.	*Trias oblonga* Lindl.	Orchidaceae
213.	*Triumfetta obliqua* Roth	Tiliaceae
214.	*Uncaria canescens* Korth.	Rubiaceae
215.	*Uncaria homomalla* Miq.	Rubiaceae
216.	*Vanda cristata* Lindl., Gen.	Orchidaceae
217.	*Vanilla parishii* Reichb.f.	Orchidaceae
218.	*Ventilago denticulata* Willd.	Rhamnaceae
219.	*Vignagrahamiana*Verdc.	Fabaceae
220.	*Vitis rubifolia* Wall.	Vitaceae
221.	*Vossia cuspidata* (Roxb.) Griff.	Poaceae
222.	*Vrydagzynea viridiflora* Hook. f.	Orchidaceae
223.	*Wattakaka lanceolata* (T. Cooke) Kerr	Asclepiadaceae
224.	*Wendlandia paniculata* (Roxb.) DC.	Rubiaceae
225.	*Ziziphus glabrata Heyne*	Rhamnaceae

Source : *Encyclopedia of Flora and Fauna of Bangladesh* (Vol 6-12)

Table 1.2: List of threatened landraces of different crops

Sl.No.	Crop name	*Scientific name*	Threatened landraces	Area of cultivation
1	Foxtail millet	*Setaria italica*	Kalo kaon	Chittagong Hill Tracts
2	Finger millet	*Eleusine coracana*	Marua	All over Bangladesh
3	Mungbean	*Vigna radiata*	Sonamug	All over Bangladesh
4	Sesame	*Sesamum indicum*	Hafri til	All over Bangladesh
	Brinjal	*Solanum melongena*	Laffa	Mymensingh
5			Dohazari	Chittagong
			Katakhore begun,	All over Bangladesh
			Makra begun	Jessore
6	Cauliflower	*B oleracea chinensis var botrytis*	Boiltali	Chittagong
	Tomato	*Solanum lycopersicum*	Patharkuchi	Jessore
7			Guli	Jessore
			Bira	Gazipur
8	Stem amaranth	*Amaranthus sp.*	Amoina data	All over Bangladesh
9	Broad leaf mustard	*Brassica juncia*	Lia shak	Chittagong Hill Tracts
10	Mango	*Mangifera indica*	Bira, Nawabpasand, Sukurkand, Kishanbhog, Gourjit, Bombai, Ranipasand, Mohanbhog.	Rajshahi and Nawabganj
			Deori	Chittagong
			Kohitur	Jessore
11	Water melon	*Citrullus lanatus*	Pagenga	Chittagong
			Goalanda	Rajbari
12	Banana	*Musa sapientum*	Amritsagar	Munshiganj
13	Guava	*Psidium guajava*	Syedi peeyara	All over Bangladesh
14	Lime	*Citrus aurantifolia*	Kagzi lime	Pabna
			Rangpur lime	Rangpur
15	Onion	*Allium cepa*	Faridpuri,	Faridpur
			Jhitka	Manikganj
16	Rose	*Rosa chinensis*	Bengal rose, Irani rose	All over Bangladesh
17	Rice	*Oryza sativa*	Almost all the landraces	All over Bangladesh
18	Cotton	*Gossypium herbaceum*	Hill cotton	Chittagong Hill Tracts
19	Sugarcane	*Saccharum officinarum*	Misrikanta	-

Source: BARI, 2016, Personal Communication

Table 1.3: List of threatened crops

Sl. No	English name	Threatened crop	*Scientific name*
1	Proso millet	Cheena	*Panicum miliaceum*
2	Sorghum	Joar	*Sorghum bicolor*
3	Barley	Job	*Hordeum vulgare*
4	Buckwheat	Dhemsi	*Fagopyrum esculentum*
5	Pigeon pea	Arhar	*Cajanus cajan*
6	Horse gram	Kulti kalai	*Macrotyloma uniflorum*
7	Faba bean	Bakla	*Vicia faba*
8	Niger	Guzi til	*Guizotia abyssinica*
9	Castor	Varenda	*Ricinus communis*
10	Safflower	Kusumful	*Carthamus tinctorius*
11	Bazna	Bazna	*Zanthoxylum rhetha*
12	Cylinder amaranth	Shaknoty	*Amaranthus viridis*
13	Thorny amaranth	Katanoty	*Amaranthus spinosus*
14	Mallow	Napa shak	*Malva verticillata*
15	Wild teasle gourd	Buno kakrol	*Momordica cochinchinensis*
16	Roselle	Chukur	*Hibiscus sabdariffa*
17	Sorrel	Tak Palong	*Hibiscus sabdariffa*
18	Bullock's heart	Ata	*Annona reticulate*
19	Custard apple	Sharifa	*Annona squamosa*
20	Hogplum	Amra	*Spondias pinnata*
21	Jamun	Jam	*Syzygium cumini*
22	Pomegrante	Dalim	*Punica granatum*
23	Rose apple	Golapjam	*Syzygium jambos*
24	Tamarind	Tetul	*Tamarindus indica*
25	Monkey jack	Deoa	*Artocarpus lakoocha*
26	Karanda	Karomcha	*Carissa carandas*
27	Cowa	Caofal	*Garcinia cowa*
28	Water chesnut	Panifal	*Trapa bispinosa*
29	Bilimbi	Bilimbi	*Averrhoa bilimbi* .
30	Butter tree	Mahua	*Madhuca indica*
31	Chebulic	Horitoki	*Terminalia bellirica*
32	Flacourtia	Lukluky	*Flacourtia jangomas*
33	Madagascar plum	Boichi	*Neodypsis decaryi*
34	River ebony	Deshi gub	*Diospyros peregrine*
35	Star goose berry	Arboroy	*Phyllanthus distichus*
36	Black current tree	Khude jum	*Antidesma ghaesembilla*
37	Wild mango	Buno aam	*Mangifera sylvartica*
38	Dephal	Dephal	*Garcinia xanthochymus*
39	Ajowan	Join	*Trachyspermum ammi*
40	Celery	Randhuni	*Apium graveolens*
41	Chui jhal	Chui jhal	*Pepper chaba*
42	Amada	Amada	*Curcuma amada*
43	Cardamom (large)	Baro alach	*Amomum subulatum*
44	Culantro	Bilati dhonia	*Eryngium foetidum* .
45	Dill	Shulpha	*Peucedanum officinale*
46	Yam bean	Keshore alu	*Pachyrhizus erosus*
47	Silk cotton	Semul tula	*Bombax malbariucm*

Source: BARI, 2016, Personal Communication

Annex-2 List of Biodiversity Related Projects of different sectors under ADP

Table 2.1: List of specifically biodiversity related projects under crop sector

Sector	Sub-sector	Project name		Amended allocation (in Lac BDT)						
			Ministry/ Department	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	Crop	Rice variety conservation and breeder seed production	BRRI	260	340	240	230	0	0	0
		Integrated pest management	DAE	0	530	906	800	0	0	0
		Second crop diversification project	DAE	0	310	1300	2380	5000	5040	4200
		Pilot project for palm, date and Golpata	BSRI	0	60	225	250	208	121	0
		Safe food production through integrated pest management	DAE	0	0	0	0	278	1028	2131
			Total	**260**	**1240**	**2671**	**3660**	**5486**	**6189**	**6331**

Table 2.2: List of specifically biodiversity related projects under forestry sector

Sector	Sub-sector	Project name	Ministry/ department	Amended allocation (in Lac BDT)						
				2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	Forestry	Reed land social forestry project	FD	151	401	0	0	0	0	0
		Biodiversity conservation and natural environmental development of greater Jessore	FD	114	51	27	0	0	0	0
		Establishment of botanical garden and ecopark at Sitakunda, Chittagong	FD	44	0	0	0	0	0	0
		Support for management of Sundarban's reserve forest	FD	114	0	0	0	0	0	0
		Development and extension of Bangabandhu Sheikh Mujib safari park, cox's bazar	FD	191	241	0	100	650	963	1378

Sector	Sub-sector	Project name	Ministry/ department	Amended allocation (in Lac BDT)						
				2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
		Establishment of ecopark at Tilaghar and Borsijora	FD	45	33	0	0	0	0	0
		Establishment of Dhansiri ecopark and development of ramsagar National park	FD	6	14	0	0	0	0	0
		Biodiversity conservation and development of baskhali upazila and Chunati sanctuary	FD	209	182	0	0	0	0	0
		Establishment of ecopark at Madhabkunda	FD	258	215	0	0	0	0	0
		Afforestation at different hills of Chittagong north forest division	FD	384	619	667	571	0	0	0
		Biodiversity conservation and poverty reduction through greater Rajshahi and Kushtia	FD	257	538	517	226	0	0	0
		Afforestation at coastal charlands	FD	484	0	0	0	0	0	0
		Afforestation for natural equilibrium at Barind tract	BMDA	490	0	0	0	0	0	0
		Strengthening monitoring, assessment & reporting of sustainable forest management in Asia	FD	8	0		0	0	0	0
		Coastal & wetland Biodiversity management at Cox's Bazar & Hakaluki Haor	DoE	887	398	0	0	0	0	0
		Biodiversity targets national assessment project	DoE	15	0	0	0	0	0	0
		Capacity building & resource mobilization for sustainable management (eco-system management) in Bangladesh	MoEF	255	139	73	0	0	0	0
		Bangabandhu Sheikh Mujib Safari Park, Gazipur	FD	0	4053	12255	2800	3500	4075	3100
		Sheikh Rasel aviary & eco-park, rangunia, Chittagong	FD	0	213	438	1700	700	467	574
		Integrated Protected Area Co-management	FD	0	1976	918	610	0	0	0
		Sundarban's Environment & livelihood Security	FD	0	393	2940	2900	4158	3560	0

Sector	Sub-sector	Project name	Ministry/ department	Amended allocation (in Lac BDT)						
				2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
		Project preparation towards implementation of national biosafety framework	DoE	0	18	0	0	0	0	0
		Community based sustainable management of Tanguar haor project	MoEF	0	612	429	519	553	550	475
		Restoration & conservation of biodiversity in the denuded hills of Sitakunda, Mireswari, Baskhali, Inani, Barind, Dhamoirhat sal forest and Shingra sal forest	FD	0	0	408	598	244	0	0
		Strengthening regional cooperation for wildlife protection	FD		0	1130	2500	4311	8000	7000
		Biodiversity conservation and eco-tourism development in Bangladesh	FD	0	0	120	500	1329	2689	1040
		Sustainable development & biodiversity conservation in coastal (protection) forest (SDBC-Sundarban's)	FD	0	0	0	0	2600	975	980
		Updating & mainstreaming of national biodiversity strategy & action plan for Bangladesh	DoE	0	0	0	0	25	117	81
		Implementation of National Biosafety Framework	DoE	0	0	0	0	20	182	228
		Establishment of botanical garden at Lalmai Hills	FD	0	0	0	0	0	0	50
		Afforestration in five coastal districts	FD	0	0	0	0	0	0	175
		Ecorestoration of the northern region of Bangladesh	FD	0	0	0	0	0	0	50
		Survey of vascular Flora Chittagong and the Chittagong Hill Districts	BNH	0	0	0	0	0	0	100
		Bengal Tiger Conservation Activity	FD	0	0	0	0	0	0	2790
			Total	**3912**	**10096**	**19922**	**13024**	**18090**	**21578**	**18021**

Table 2.3: List of specifically biodiversity related projects under fisheries sector

Sector	Sub-sector	Project name		Amended allocation (in Lac BDT)						
			Ministry/ department	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	Fisheries	Fish Habitat restoration of open wetlands	DoF	291	0	0	0	0	0	0
		Chalan Beel fisheries development project	DoF	1100	0	0	0	0	0	0
		Regaining natural breeding ground of fish at Halda river	DoF	100	197	335	240	151	0	0
		Establishment of Brood bank	DoF	326	250	183	134	0	0	0
		Research for jatka conservation and AIG identification for fisherman	DoF	491	933	803	226	373	1817	0
		Identification of impact on aquatic environment due to use of drugs and chemical for fish culture	BFRI	55	588	218	106	607	513	363
		Wetland Biodiversity rehabilitation Project	DoF	11	657	810	1380	1355	1052	1109
		Support to sustainable management of the Bay of Bengal large marine ecosystem	BFRI	20	34	30	30	25	0	0
		Development and management of selected wetland and conservation of native fish species	DoF	0	600	1900	900	569	0	0
		Strengthening fish production, conservation & management of kaptai lake	BFDC	0	182	530	447	696	589	75
		Nursery establishment and fingerling release in open waterbody	DoF	0	0	0	0	10	1467	2800
		Impact assessment of Upstream water withdrawal to conserve natural habitat of major carps in the river Halda	BFRI	0	0	0	0	0	138	62
		Establishment of Brood bank 3rd phase	DoF	0	0	0	0	0	250	2155
		Enhanced coastal Fisheries (ECOFISH)	DoF	0	0	0	0	0	0	1645
			Total	**2394**	**3441**	**4809**	**3463**	**3786**	**5826**	**8209**

Table 2.4: List of specifically biodiversity related projects under fisheries sector

Sector	Sub-sector	project name	Ministry/ department	Amended allocation (in Lac BDT)						
				2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	livestock	Community based conservation and development of native sheep in commercial farm	BLRI	198	161	0	0	0	0	0
		Development and conservation of red Chittagong cattle	BLRI	140	122	0	0	0	0	0
		Establishment of regional duck breeding farm with hatchery (3rd phase)	DLS	0	0	486	1400	2682	3726	3550
		Community based conservation and development of native sheep in commercial farm (2nd phase)	DLS	0	0	0	308	800	1217	1290
		Conservation and development of native cock	BLRI	0	0	0	0	0	120	621
			Total	**338**	**283**	**486**	**1708**	**3482**	**5063**	**4840**

Table 2.5 Summary of sectoral allocation (specifically biodiversity related project) from fiscal year 2009-10 to 2015-16

Sector	Amended budget allocation (million BDT)							Sectoral total
	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	
Crop	26	124	267.1	366	548.6	618.9	633.1	2583.7
Forestry	391.2	1009.6	1992.2	1302.4	1809	2157.8	1802.1	10464.3
Fisheries	239.4	344.1	480.9	346.3	378.6	582.6	820.9	3192.8
Livestock	33.8	28.3	48.6	170.8	348.2	506.3	484	1620
Total	690.4	1506	2788.8	2185.5	3084.4	3865.6	3740.1	17860.8

Annex-3: List of mixed projects of different sectors under ADP

Table 3.1 List of mixed projects under crop sector

Sector	Sub-sector	Project name	Ministry/ department	Amended allocation (in Lac BDT)						
				2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	crop	Strengthening & capacity building of biotechnology laboratory in BRRI	BRRI	0	260	94	163	0	0	0
		Production, conservation and distribution of rice, wheat and jute seed at farmer level		1755	2699	2611	0	0	0	0
		Production, conservation and distribution of pulse, oil and onion seed at farmer level	BARI	590	1079	802	0	0	0	0
		Production, conservation and distribution of rice, wheat and jute seed at farmer level (2nd phase)	DAE	0	0	0	0	200	1500	2655
		Production, conservation and distribution of pulse, oil , garlic and onion seed at farmer level (2nd phase)	DAE	0	0	0	0	274	517	1210
		Quality seed production of Rice, Maize and wheat	DAE	0	0	0	0	0	0	6900
		Development and seed production of Wheat and maize	BARI	0	0	0	0	0	0	500
		Mixed fruit cultivation in remote areas of Chittagong Hill Tracts	CHTDB	0	0	0	0	0	0	97
			Total	**2345**	**4038**	**3507**	**163**	**474**	**2017**	**11362**

Table 3.2 List of mixed projects under fisheries sector

Sector	Sub-sector	Project name	Ministry/ department	Amended allocation (in lac BDT)						
				2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	Fish	Structural development of Comilla flooodplain for fish culture	DoF/LGED	483	565	0	0	0	0	0
		Greater Pabna fisheries development project	DoF	337	294	287	150	190	0	0
		Fisheries culture and management in vabodaha at Jessore	DoF	18	282	255	77	300	0	0
		Aquaculture and fisheries management of Hura sagar	DoF	0	0	50	200	559	1059	0
		Fisheries culture and management in Haor	DoF	0	0	600	300	500	1200	894
		Greater Comilla fisheries development project	DoF	0	0	0	0	0	0	1150
			Total	**838**	**1141**	**1192**	**727**	**1549**	**2259**	**2044**

Table 3.3 List of mixed projects under livestock sector

Sector	Sub-sector	Project name	Amended allocation (in Lac BDT)							
			Ministry/ department	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	livestock	Extension of artificial breeding and embryo replacement project (2nd phase)	DLS	340	950	1700	1300	1165	0	400
			Total	**340**	**950**	**1700**	**1300**	**1165**	**0**	**400**

Table 3.4 List of mixed projects under irrigation sector

Sector	Sub-sector	Project name	Ministry/ Department	Amended allocation (in Lac BDT)						
				2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture	Irrigation	Fish culture and irrigation facility development Through re-excavating connecting channel between gaznar Beel and river of suzanagar upazila in Pabna	BWDB	1020	5090	2719	5701	2278	1500	8200
		Re-excavation of karjon canal and nearby other canals for improvement of irrigation and drainage facilities	BWDB	0	0	0	0	0	0	50
		Water reservation in natural steams of CHT for sustainable agriculture	BARI	0	0	0	0	0	159	86
			Total	**1020**	**5090**	**2719**	**5701**	**2278**	**1659**	**8336**

Table 3.5 List of mixed projects under water resource sector

Sector	Project name	Ministry/ Department	Amended allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Water resources	Study on the impact of inter basin river connection	WARPO	91	0	0	0	0	0	0
	Preparation of master plan & development of database for haors	Bangladesh haor and wetland development board	300	303	247	0	0	0	0
	Modernization and integration of hydrological monitoring network of Bangladesh and environmental and social impact assessment on gorai river restoration	BWDB	0	5	0	0	0	0	0
	Rescue of Gorai river		130	9044	14115	23000	3000	6000	3000
	Development of Borni baor	Bangladesh haor and wetland development board	0	0	200	2000	2800	0	0
	Rescue of Buriganga river	BWDB	0	2500	875	3000	3000	2000	2500

Sector	Project name	Ministry/ Department	Amended allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
	Bangladesh delta plan formulation project	Planning commission	0	0	0	0	578	3253	3673
	Re-excavation of upper part of Titas river at Brahmanbaria	BWDB	0	0	0	0	0	0	100
		Total	**521**	**11852**	**15437**	**28000**	**9378**	**11253**	**9273**

Table 3.6 List of mixed projects under Physical Planning, Water supply and Housing sector

Sector	Project name	Ministry/ Department	Amended allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Physical Planning, Water supply and Housing	Coordinated development of Begunbari and Hatirjheel	RAJUK	42500	30102	30000	23653	4000	20160	10700
	Lake development of Gulshan-Baridhara banani	RAJUK	0	8500	6000	3000	2615	2356	6250
		Total	**42500**	**38602**	**36000**	**26653**	**6615**	**22516**	**16950**

Table 3.7 List of mixed projects under Rural Development sector

Sector	Project name	Ministry/ Department	Amended allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Rural Development	Production, conservation and processing of minor crops for reducing poverty	BRDB	0	0	120	485	1830	1700	1444
	Community based resource management	LGED	3179	2889	3100	2645	886	0	0
	Total		**3179**	**2889**	**3220**	**3130**	**2716**	**1700**	**1444**

Table: **3.8** Summary of sectoral allocation (Biodiversity mixed project) from fiscal year 2009-10 to 2015-16

Sector	Amended budget allocation (million BDT)							Sectoral total
	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	
Crop	2345	4038	3507	163	474	2017	11362	23906
Fisheries	838	1141	1192	727	1549	2259	2044	9750
Livestock	340	950	1700	1300	1165	0	400	5855
Irrigation	1020	5090	2719	5701	2278	1659	8336	26803
Water resources	521	11852	15437	28000	9378	11253	9273	85714
Physical Planning, Water supply and Housing	42500	38602	36000	26653	6615	22516	16950	189836
Rural Development	3179	2889	3220	3130	2716	1700	1444	18278
Total	**50743**	**64562**	**63775**	**65674**	**24175**	**41404**	**49809**	**360142**

Table 3.9 List of specific biodiversity project implemented under BCCTF

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
1	Countrywide Seedling Culture Project for Mass Afforestation to Counter the Adverse Effects of Climate Changes	Department of Forests	1,578.00	0	1,040.00	0	0	0	0
2	Resilience Forestry to Check Climate Change in Core Zone of the Central Regions	Department of Forests	700.00	0	0	0	0	0	0
3	Re-vegetation of Madhupur Forest Through Rehabilitation of Forest Dependent Local and Ethnic Communities	Department of Forests	1,545.00	0	0	942.00	0	0	0
4	Afforestation Program in the Coastal Embankments of the Water Development Board and their adjacent Sand Bar Areas	Department of Forests	1,159.30	0	0	0	0	0	0

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
5	Community-based Adaptation in the Ecologically Critical Areas Through Biodiversity Conservation and Social Protection	Department of Environment	1,957.88	0	0	0	0	0	0
6	Reduction of Carbon Emission through Establishment of Sonaichari Botanical Garden, Bangladesh	Department of Forests	0	1,842.00	0	0	0	0	0
7	Afforestation Program in the Coastal Areas to Counter the Adverse Effects of Climate Changes (Revised)	Department of Forests (DoF)	0	2,406.00	0	0	0	0	0
8	Forest Information Generation and Networking System	Department of Forests (DoF)	0	812.59	0	0	0	0	0
9	People's Outreach Program to Conserve and to Vote the Sundarbans as one of the Seven Natural Wonders	Department of Forests	0	189.62	0	0	0	0	0
10	Restoration and Biodiversity Conservation of Swamp Forests to Prevent the Adverse Effects of Climate Change	Department of Forests	0	0	682.47	0	0	0	0
11	Eco-restoration of Hill Forests, Cox's Bazar	Department of Forests	0	0	0	550.00	0	0	0
12	Formation of Carbon Sink in Kaptai through Plantation Program	Department of Forests	0	0	0	1,200.00	0	0	500.00
13	Biodiversity Conservation and Promoting Ecotourism in Laldia Reserved Forests	Department of Forests	0	0	0	250.00	0	0	0
14	Expansion Program to Floating Technology of Producing Vegetables and Spices in Flood Prone and Water Clogged Areas as Adapting Strategy to Manage Climate Change	Department of Agricultural Extension (DAE)	0	0	0	1,380.00	0	0	0
15	Development Project of Extension of Biodiversity Park, Bangabandhu Sheikh Mujib Safari Park, Gazipur	Department of Forests	0	0	0	0	0	0	300.00

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
16	Afforestation, Renovation and Beautification Program (Second Phase) of Pirojpur River View Ecopark (DC Park)	Department of Forests	0	0	0	0	0	0	150.00
17	Project for Creating Entertainment Opportunities in SFNTC of Upazila - Kazirbag under Feni District through Establishing Ecopark	Department of Forests	0	0	0	0	0	0	200.00
18	Afforestation and Establishment Program in Pirojpur Police Lines	Department of Forests	0	0	0	0	0	0	700.00
19	Strengthening and Consolidation of Community-based Adaptation in the Ecologically Critical Areas through Biodiversity Conservation and Social Protection Project	Department of Environment	0	0	0	0	0	0	500.00
20	Re-excavation of Dead Khals for Biodiversity Conservation and Green Belt Plantation of Upazila - Vandaria under Pirojpur District or Countering the Effects of Climate Change	Department of Forests	0	0	0	0	0	0	449.80
	Update of National Conservation Strategy	Department of Forests	0	0	0	0	345.00	0	0
		Total	**6,940.18**	**5,250.21**	**1,722.47**	**4,322.00**	**345.00**	**0.00**	**2,799.80**

Table 3.10: List of mixed projects implemented under BCCTF

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
1	Inventing Sustainable Crop in Drought Prone and Coastal/Salinity Prone Areas to Check Climate Change	Bangladesh Agricultural Research Institute (BARI)	600.00	0	0	0	0	0	0
2	Ecological Management Project of Parki Beach	Department of Environment (DOE)	191.50	0	0	0	0	0	0

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
3	Spread of Biogas and Modernized Oven To Reduce Carbon Emission and To Increase Usage of Alternative Fuel Source	Bangladesh Council for Scientific and Industrial Research (BCSIR)	0	931.25	0	0	0	0	0
4	Re-excavation of Drainage Khal in Upazila Kalkini under Madaripur District	Bangladesh Water Development Board	0	676.42	0	0	0	0	0
5	Re-excavation of 24 Drainage Khals in Upazila-Rajoir & Madaripur Sadar under Madaripur District	Bangladesh Water Development Board	0	1,891.77	0	0	700.00	0	0
6	Research on Inventing, Processing and Marketing of Resilient Varieties of Rice, Wheat, Pulse and Oilseed	Bangladesh Agricultural Development Corporation (BADC)	0	2,443.00	0	0	0	0	0
7	Re-excavation of Ichamati River of Upazila-Shibaloy under Manikganj District	Bangladesh Water Development Board	0	400.90	0	0	0	0	0
8	Re-excavation of Betna River of Satkhira District to Mitigate Water logging	Bangladesh Water Development Board	0	0	2,495.00	0	0	0	0
9	Re-excavation of Drainage and Irrigation Khals in Upazila Damudda, Gosairhaat, Shariatpur Sadar and Noria under funding of BCCTF	Bangladesh Water Development Board	0	0	1,290.09	0	0	0	0
10	Solid Waste Management System Improvement and Plantation Program in Benapole Purashava for Climate Change Risk Reduction and Mitigation	Benapole Pourashava, Jessore	0	0	311.83	0	0	0	0

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
11	Re-excavation of Khals Located in-between Coastal Polders of Upazila - Kalapara under Patuakhali District to Store Rainwater for Countering the Effects of Climate Change by Increasing Crop Production and Mitigating Water Clogging	Bangladesh Water Development Board	0	0	0	800.00	0	0	0
12	Construction of Regulator and Re-excavation of River Kharkharia of Upazila - Parbotipur and Bank Protection of River Dhepa of Upazila - Kaharol under Dinajpur District	Bangladesh Water Development Board	0	0	0	1,238.40	0	0	0
13	Re-excavation of Beel Sachar-Ghugra of Pitamborodi, Narinda, Kawadi Bazaar and Naergaon to Sachar Khal of River Meghna to Maintain Ecological Balance	Bangladesh Water Development Board	0	0	0	1,499.72	0	0	0
14	Re-excavation of 37 Khals of Upazila - Meghna under Comilla District	Bangladesh Water Development Board	0	0	0	1,198.77	0	0	0
15	Re-excavation of Khals of Upazila - Kotalipara under Gopalganj Distrcit to Mitigate the Effects of Climate Change	Bangladesh Water Development Board	0	0	0	1,198.64	0	0	0
16	Re-excavation of Khals of West Kotalipara of Upazila - Kotalipara under Gopalganj Distrcit to Mitigate the Effects of Climate Change	Bangladesh Water Development Board	0	0	0	0	0	0	985.87
17	Re-excavation of River Old Dakatia of Upazila - Nangolkot under Comilla District to maintain Ecological Balance	Bangladesh Water Development Board	0	0	0	0	600.00	0	0

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
18	Re-exavation and Bank Conservation of Suvadda Khal from Suvadda to Aganagar of Upazila - Keraniganj of Dhaka District for Conserving Ecological Balance	Bangladesh Water Development Board	0	0	0	0	1,000.00	0	0
19	Khal Re-excavation and Plantation Program to Maintain Ecolofical Balance and Socio-Economic Improvement in Areas Affected by Droughts due to Climate Change	Barind Multipurpose Development Authority	0	0	0	0	795.00	0	0
20	Re-excavation of Nine Khals and Six Inundated Banks under the Drainage and Irrigation Project of Upazila - Daudkandi and Chandina under Comilla District to Check the Effects of Climate Change	Bangladesh Water Development Board	0	0	0	0	350.00	0	0
21	Re-excavation of Khals Located in-between Coastal Polders of Upazila - Kalapara and Rangabali under Patuakhali District to Store Rainwater for Countering the Effects of Climate Change by Increasing Crop Production and Mitigating Water Clogging	Bangladesh Water Development Board	0	0	0	0	200.00	0	0
22	Program for Inventing, Processing and Marketing Resilient Grain Seeds	Bangladesh Agricultural Development Corporation (BADC), Bangladesh Agricultural Research Institute (BARI)	0	0	0	0	253.00	0	100.00

Sl. No	Project name	Implementing organization	Fiscal year wise allocation (in Lac BDT)						
			2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
23	Re-excavation of Fultala Khal (Ward No. 01, including Pitching of 1.58 km of Blocks) of Patuakhali Sadar Upazila and Patuakhali Pourashava under Patuakhali District for Countering the Effects of Climate Change	Patuakhali Pourashava	0	0	0	0	250.00	0	0
24	Market Development Initiative for Bondhu Chula (Phase - II)	Department of Enviroment (DoE)	0	0	0	0	0	1,000.00	0
25	Re-excavation of River Basia of Upazila - Biswonath under Sylhet District for Countering the Effects of Climate Change	Bangladesh Water Development Board	0	0	0	0	0	200.00	0
26	Development of climate resilient variety/technology in different environmental region through BINA	BINA	0	0	0	0	345.00	0	0
27	Re-excavation of canals of Kotalipara and Tungipara Upzalia of Gopalganj District to maintain environmental equilibrium and combat with the impact of climate change	BWDB	0	0	0	0	500.00	0	0
28	Re-excavation of Fultali canal under 1 no. ward of Patuakhali Municipality for combating with the impact of climate change	Patuakhali Pourashava	0	0	0	0	250.00	0	0
		Total	**791.50**	**6343.34**	**4096.92**	**5935.53**	**5243.00**	**1200.00**	**1085.87**

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