CHAPTER FIFTEEN

ENVIRONMENT, CLIMATE CHANGE AND DEVELOPMENT

Like other developing countries, bio-diversity rich Bangladesh is combating against environmental degradation, a crucial challenge for Bangladesh. Efforts are continuing to integrate issues pertaining to environment with mainstream development policies to ensure economic growth and environmental sustainability. A number of policies and development plans have been adopted and are being implemented to encounter environmental hazards and to ensure a pollution-free eco-friendly environment. Furthermore, a detailed work plan has been formulated with a view to achieving environmental targets of Sustainable Development Goals (SDG's). 'Bangladesh Climate Change Strategy and Action Plan, 2009 (BCCSAP 2009)' is being implemented to address the impact of climate change where both adaptation and mitigation activities have been considered. In this plan, 44 programmes under six thematic areas were identified. For this reason, Bangladesh Climate Change Trust Fund (BCCTF) was created in 2010 from the Government's own revenue sources to combat climate change impacts as well as to implement Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009. All projects taken up under BCCTF are based on the thematic areas mentioned in BCCSAP 2009. During FY2021-22, a total of Tk. 53.40 crore has been disbursed as refinance facility in green products/initiatives such as Biogas Plant, Green Industry, Vermi Compost, Solar Home System, Biological ETP, Solar Mini Grid, Installation of Energy Auditor Certified Machineries, and Safety and Work Environment of Factory. National Environmental Policy, 2018, Bangladesh Biodiversity Act 2018, Environmental Crisis Management Rules, 2017 have been promulgated to take into account the challenges of environment, biodiversity conservation and management. Ministry of Environment, Forest and Climate Change, Ministry of Disaster Management and Relief and Ministry of Water Resources are also implementing various programmes/ projects in order to tackle eventualities emanating from natural disasters.

The concept of environmental protection as well as its development received wider global attention from the early 1970s. The decision agreed upon at the UN conference on the human environment held in Stockholm in 1972 worked as an eye-opener for international communities. The 'United Nations Environment Programme (UNEP)' was formed by this conference. In 1992, an Earth Summit was held at Rio De Jeneiro in Brazil, which is considered as a landmark in the environment conservation. Later, 'Kyoto Protocol' was signed in 1997, which proposed lessening of carbon dioxide and greenhouse gas emission.

Table 15.1 shows the list of 10 highest emitting countries with the level of their Green House Gas (GHG) emissions, which accounts for almost 65 percent of global GHG emission. In 2018, the global GHG emission stands at 48,939.71MtCO_2.

Table 15.1: Top Ten Greenhouse Gas Emitting Countries in the World

Sl. No	Country	Annual CO_2Emissions in 2018 (In millions ofmetric tonnes)	% of Global Total in 2018
1	China	11,705.81	23.92
2	USA	5,794.35	11.84
3	India	3,346.63	6.84
4	Europe	3,333.16	6.81

5	Russia	1,992.08	4.07
6	Brazil	1,420.58	2.90
7	Japan	1,154.72	2.36
8	Iran	828.34	1.69
9	Germany	776.61	1.59
10	Canada	763.44	1.56

Source: CAIT Climate Data Explorer, 2021

International Efforts for Addressing Climate Change

The United Nations Climate Change Conferences are yearly conferences of the UNFCCC Parties (Conference of the Parties, COP) to assess progress in dealing with the climate change issues. Implementation status of UNFCCC is mainly discussed in these conferences.

The COP 21 was held in Paris in 2015 and a climate change agreement called 'Paris Agreement' was accepted by 195 countries. The COP 22 was held at Marrakesh in Morocco. The first meeting of the apex body of implementing Paris Agreement 'Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA)' was held during this conference. The meeting decided to formulate the 'Paris Agreement Work Programme' by 2018. COP 23 took place in Bonn, Germany in 2017. COP 24 held at Katowice, Poland, accepted a 'Paris Agreement Work Programme'. All the participant countries agreed to reduce carbon emission in the conference. In addition, it was decided that the countries would publish the progress report of carbon emission biennially from 2024.

COP 25 took place under the Presidency of the Government of Chile and was held with logistical support from the Government of Spain in 2019. The COP was intended to finalise the 'rulebook' of the Paris Agreement- the operating manual needed when it takes effect in 2020 - by settling on rules for carbon markets and other forms of international cooperation under 'Article 6' of the deal. Ultimately, however, the talks were unable to reach consensus in many areas, pushing decisions into next year under 'Rule 16' of the UN climate process.

The UK hosted the 26th UN Climate Change Conference of the Parties (COP26) in Glasgow on 31 October – 13 November 2021. The COP26 summit brought parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change.

Threats to Bangladesh due to Climate Change

The rise in sea-level poses a big threat to the lives and livelihood of the huge population living in the coastal areas of Bangladesh. About 60 percent of land of the country is only 5 meters above from the sea level. 'Hadley Center for Climate Prediction and Research (HCCPR)' estimates that sea level in Bangladesh will rise about 40 cm by 2080.

Providing Regional Climates for Impact Studies (PRECIS) has projected that annual average rainfall of Bangladesh will increase about 4 percent, 2.3 percent and 6.7 percent in 2030, 2050 and 2070 respectively.

A study of the World Bank noted that up to two-thirds of Bangladesh is inundated by floods in every three to five years. As a result, infrastructure, housing, agriculture, and livelihoods damaged extremely. In addition, low-lying coastal areas are also at risk from cyclones and storm surges. 'Inter-governmental Panel on Climate Change (IPCC)' predicts that by 2050, Bangladesh will lose 17 percent of its land and 30 percent of its food production because of negative impact of climate change.

The report 'Economics of Adaptation to Climate Change in Bangladesh, 2010' of the World Bank estimates that Bangladesh will be required US$ 5,516 million for investment and US$ 112

million for recurrent cost until 2050 to protect against storm surge risk only.

Bangladesh is developing a 'National Adaptation Plan (NAP)' under UNFCCC in order to formulate an integrated adaptation strategy and activities to meet long-term impact of climate change. Meanwhile, a 'NAP Road Map' has also been prepared. In addition, Bangladesh has prepared 'Nationally Determined Contribution (NDC)' plan to manage growing emissions without compromising the required development. According to this plan, it is estimated to reduce 5 percent carbon emission voluntarily and additional 10 percent reduction if international assistance is available by 2030. The government has also developed the 'NDC Implementation Road Map.

Moreover, 'Nationally Appropriate Mitigation Action (NAMA)' is being formulated. A 'Climate Change Unit' has also been established at Ministry of Environment, Forest and Climate Change. Apart from this, various programmes and projects are being implemented by the government to adapt climate change impact.

A long-term integrated water sector mega plan 'Bangladesh Delta Plan 2100' has been formulated to combat climate change impact. The vision of the plan is to achieve upper middle-income status through eliminating extreme poverty by 2030 and to graduate to a prosperous country beyond 2041. Furthermore, six specific goals have been fixed to this plan. The goals are: (a) ensure safety from floods and climate change related disasters; (b) enhance water security and efficiency of water usages; (c) ensure sustainable and integrated river systems and estuaries management; (d) conserve and preserve wetlands and ecosystems and promote their appropriate use; (e) develop effective institutions and equitable governance for in-country and trans-boundary water resources management, and (f) achieve optimal and integrated use of land and water resources. With a view to attaining these goals 'Bangladesh Delta Plan 2100' has taken 'Flood Risk Management Strategies' and 'Fresh Water Strategies' at national level.

Internal Climate Finance

Bangladesh is pioneer among the developing countries regarding the enactment of climate finance for adaptation and mitigation of climate change that has been causing natural calamities and disasters. Finance Division published its first climate budget report titled 'Climate Protection and Development' covering 6 most climate relevant ministries in FY 2017-18. Inspired by the good response from every corner of the government and international communities, Finance Division brought out the second report 'Climate Financing for Sustainable Development' reflecting climate expenditure of 20 line-ministries in FY 2018-19. In its third and fourth report for FY 2019-20 and FY 2020-21, the coverage was extended to 25 climate relevant ministries/divisions. The budget allocation of these 25 ministries accounted for 56.69 percent of the total national budget of FY2020-21and out of their total allocation 7.55 percent is climate relevant. The climate relevant allocation for development budget increased from 6.6 percent in FY 2015-16 to 7.55 percent in FY 2020-21.

The government formulated 'Bangladesh Climate Change Strategy and Action Plan'-2009 to cope with the adverse effects of climate change. In this plan, 44 programs under six thematic areas were identified. Bangladesh Climate Change Trust Fund (BCCTF) was created in 2010 from the Government's own revenue sources to combat climate change impacts as well as to implement Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009. All projects taken up under BCCTF are based on the thematic areas mentioned in BCCSAP 2009. From the FY 2009-10 to FY 2020-21, BCCTF received a total

allocation of Tk. 3,900 crore to combat climate change.

International Climate Finance

Green Climate Fund (GCF) is the largest source of climate finance globally which is governed by a 24-member board, comprised equally of developed and developing countries, representing the United Nations Regional Groups. In Bangladesh the Economic Relations Division (ERD) is the National Designated Authority (NDA) for GCF. Since ERD became the NDA of Bangladesh in November 2014, it has identified 6 potential National Implementing Entities (NIEs)- Infrastructure Development Company Limited (IDCOL), PKSF, Department of Environment, Bangladesh Bank, Local Government and Engineering Department (LGED) and Bangladesh Climate Change Trust (BCCT), of which IDCOL and PKSF have got accredited by the GCF board. Bangladesh has received GCF Readiness support for strengthening NDA's Secretariat, preparing GCF country programme and accreditation GAP assessment for LGED- the prospective entity selected by ERD to get NIE accreditation support. Now the NDA secretariat is actively working on creating a GCF country programme and a strong project pipeline, which would enhance Bangladesh's readiness for accessing and utilizing GCF climate funds. GCF Financing of Projects are:

- Promoting private sector investment through large scale adoption of energy saving technologies and equipment for Textile and Readymade Garment (RMG) sectors of Bangladesh (total project value US$ 340 million).
- Increasing the resilience of poor, marginalised and climate-vulnerable communities in flood-prone areas of Bangladesh. (total project value US$ 13.3 million).
- Global Clean Cooking Programme Bangladesh (total project value US$40 million).
- Enhancing adaptive capacities of coastal communities, especially women, to cope with climate change induced salinity (total project value US$ 33 million).
- Climate Resilient Infrastructure Mainstreaming (CRIM) (total project value US $81 million).

Green Banking and Sustainable Finance

In order to facilitate green products/sector financing such as solar energy, bio-gas plant, effluent treatment plant, Bangladesh Bank established a revolving refinancing scheme of Tk. 200 crore in 2009 for green products/sector from its own fund. The size of the fund has been increased Tk. 400 crore in view of the growing demand for financing of environment friendly products/initiatives. At present, this scheme is known as 'Refinance Scheme for Environment Friendly Products/Initiatives'. During FY2021-22, a total of Tk. 53.40 crore has been disbursed as refinance facility in green products/initiatives such as Biogas Plant, Green Industry, Vermi Compost, Solar Home System, Biological ETP, Solar Mini Grid, Installation of Energy Auditor Certified Machineries, and Safety and Work Environment of Factory.

Removing Air Pollution

Air pollution is increasing with rapid urbanisation and industrialisation. Emissions from brick kiln, construction activities, industrial operation and vehicle are considered the key sources of air pollution. The Department of Environment (DoE) works for establishing energy saving, effective in air pollution and modern technology based environment-freindly brick kiln instead of traditional brick kiln to reduce brick kiln emision. 'The Brick Manufacturing and Kilns Establishment (Control) Act, 2013' has been enacted to

manage brick construction industry in accordance with the environment which has been effected from July 2014. The act realistically amended in 2019. From January 2019 to January 2022, 2,360 individuals/ institutions have been sued and fined 59,23,81,400/- by operating 1442 mobile courts against illegal brick kilns. Besides, 79 persons have been imprisoned to different terms and more than 761 illegal brick Kilns were demolished.

From January 2019 to February 2022, 588 cases have been filed against the vehicles emitting black smoke by conducting 86 mobile court operations and fines of Tk. 16,05,580.00 have been levied.

To improve traffic management for reducing traffic congestion, develop the existing transportation system, monitor the air pollution, increase the Brick Kilns management capacity & provide technical assistance in this regard, a project named "Clean Air and Sustainable Environment" funded by the World Bank has been implemented by Department of Environment under Ministry of Environment, Forest and Climate Change (MOEFCC). 16 Continuous Air Monitoring Station (CAMS) have been established in the divisional and industrial cities along with Dhaka to measure air pollution levels regularly. Besides, 15 more Compact Continuous Air Monitoring station (C-CAMS) have been installed in different districts and significant places. At present, a total of 31 CAMS and C-CAMS are being used to conduct air monitoring at various places regularly.

A comprehensive 'Air Pollution Control Rules, 2022' has been drafted with a view to effectively controlling overall air pollution. Necessary steps have been taken to approve the draft very quickly. The government's plan to control air pollution is shown in Annex 15.2.

The government is implementing hydrochlorofluorocarbon (HCFC) phase-out activities as per Montreal Protocol. According to schedule of Montreal Protocol HCFC Phase-Out Management Plan (Stage-II) is being implemented with the target of 67.5% reduction by 2025. In addition, a project titled "Enabling Activities of Bangladesh for hydrofluorocarbons (HFCs) Phase-down (UNEP Component)" is being implemented to enhance building capacity of Bangladesh in the case of controling import and utilization of HFC and HFC Blends in accordance with the Kigali Amendment to the Montreal Protocol.

Industrial Pollution Control

Issuance of Environmental Clearance: In accordance with Section 12 (1) of the Environmental Protection Act, 1995 (Amended 2010) in Bangladesh, it is mandatory to obtain environmental clearance in the prescribed manner as per the Environmental Protection Rules, 1997. According to the rules, all types of industries and projects are being forced to take environmental clearances. In the last 13 (thirteen) years from 2009 to 2021, about 65,000 environmental clearances are given in the case of establishing industry or implementing projects and about 1,10,000 environmental clearances have been renewed.

Establishment of ETP: The Department of Environment is compiling a detailed database of all the industrial establishments generating liquid waste and compelling non-ETP industrial establishments to establish ETP. ETPs have already been ensured in most of the industrial establishments including all the large industrial establishments. As of March 2022, the number of ETP establishable industrial units identified is 2,678 and the total number of industrial units where ETP was established is 2,249.

Implementation of Zero Discharge Plan: Zero Discharge Plan is being implemented by the DoE in the industrial establishments discharging

liquid waste under which the industrial enterprises are reusing the generated liquid waste without discharging it in nature. From 2014 to March 2022, the DoE has approved a Zero Discharge Plan in favour of a total of 600 T-Waste Emitting Industries.

Pollution Control Enforcement Activities

In order to prevent the destruction of the environment and the widespread pollution of the environment, the DoE started enforcement activities under the said section of the Act against polluters from July 13, 2010. Under the enforcement activities, the DoE takes other legal action including imposition of compensation against persons/institutions involved in pollution and conducts regular monitoring activities of industries. According to Section 7 of the Bangladesh Environmental Protection Act, 1995, there is a provision to collect compensation by conducting enforcement activities against polluting industrial establishments. DoE has carried out operations from July 13, 2010 to February 2022 against 9,178 river polluting industrial establishments for damaging the environment and imposed fines of Tk. 454.76 crore.

In addition to raising public awareness, enforcement and mobile court activities has been carried out to control noise pollution. According to Noise Pollution Control Rules 2006, industrial units / project activities/vehicles which produce noise more than the limit mentioned in the standard, DoE has taken legal action against them. From January 2019 to February 2022 DoE conducted 98 mobile courts against 661 persons/projects/vehicles and imposed fines of Tk 7,07,700.00.

A project costing of Tk. 4796.480 lakh titled "Integrated and Participatory Project in Noise Pollution Control" has been undertaken by DoE and the duration of the project is from 01 January 2020 to 31 December 2022. To implement the project the roads around Bangladesh Secretariat and Agargaon Administrative Area have been declared as "Silent Areas" since 17 December 2019. 60 billboards have been installed and 6,40,000 leaflets have been circulated in Dhaka and divisional cities. To control noise pollution all Divisional Commissioners are requested for installing billboards with awareness message. Institutions appointed to conduct survey on the measurement of sound level in 64 districts are working. A total of 13,620 people have been trained in noise pollution control through 144 trainings on awareness and meetings on exchange of views with various stakeholders till February 2022 in all districts including divisional cities.

Formulation of Biodiversity and Biodiversity Regulations

- **National Environmental Policy, 2018:** Taking into account the challenges of environment, environment and biodiversity conservation and management, the government has finalised the National Environment Policy 2018 on 3 October 2017 and published it in 2019 with the aim of developing the overall environmental conservation management of the country. In the newly adopted National Environmental Policy 2018, out of 9 more sectors/areas including the previous 15 sectors, mountain environment, biodiversity and environment conservation and life security, eco-friendly tourism, etc. sectors have been included with special emphasis. In order to implement the activities included in the 24 sectors mentioned in the National Environmental Policy 2018, the concerned ministries/ divisions/agencies have been identified which will be implemented by their respective ministries/divisions/agencies.
- **Bangladesh Biodiversity Act 2018:** The Bangladesh Biodiversity Act 2018 has been promulgated with the aim of conserving biodiversity and ensuring its sustainable use and has come into force on 30 November 2018. Under the Act, a Union Biodiversity

Management Committee has been formed from the National Committee on Biodiversity to implement biodiversity conservation activities at the grassroots level.

- **Environmental Crisis Management Rules, 2017:** The Environmental Crisis Management Rules, 2018 have been promulgated on 25 September 2017 to protect the environment with the powers given in the Bangladesh Environmental Protection Act, 1995. A notification has been issued by forming a national committee of ECA management under the said rules.
- **The 6th National Report on CBD:** As a signatory to the Biodiversity Charter, Bangladesh submits a national report on biodiversity to the CBD Secretariat every four years. In 2015, the 5th National Report on the Biodiversity Charter was prepared and submitted to the CBD Secretariat. Following this, the 6th National Report has been prepared. The Report was submitted to the CBD Secretariat in November 2019.

Blue-Economy Implementation Activities

The DoE has adopted a blue-economy action plan to conserve marine environment, prevent marine pollution, ensure marine resource extraction and environmental management, and conserve marine and coastal biodiversity and mainstream development activities. The action plan includes the following activities:

- Include the marine biodiversity conservation and management activities in the mainstream of development.
- Increase the capacity of the DoE for the management of coastal and marine resources.
- Create an integrated database of coastal and marine resources and the environment and biodiversity in the context of the adverse effects of climate change.
- Determine strategic environmental impact on coastal and marine resource extraction and management.
- Ensure conservation and management of coastal and marine environment and biodiversity.
- Prevent the marine pollution and conserve marine environment by implementing international conventions and protocols on marine conservation.
- Strengthen the legal framework to control marine pollution.
- Monitor the effects of various pollutants on the marine ecosystem.
- Monitor the impact of climate change on the marine environment.

"Assessment of Coastal and Marine Biodiversity Resources and Ecosystems to Implement the Blue Eeconomy Action Plan" project proposal has been developed to implement the activities such as 'Comprehensive database of coastal and marine resources and the environment and biodiversity in the context of adverse effects of climate change' and 'Monitoring the impact of various pollutants on the marine ecosystem'.

Ecologically Critical Area (ECA)

To protect the important environment and biodiversity of the country and to preserve and improve the natural environment, the government under the Bangladesh Environmental Protection Act 1995 to cut or extract natural forests and plants for the conservation of biodiversity, killing all kinds of prey and wildlife, oysters, corals, turtles and other wildlife The government has already declared 13 important areas as Ecologically Critical Areas (ECA) by banning all activities such as collection, destruction of animal and plant habitats, etc.

Some projects were implemented in collaboration with the stakeholders and concerned other government organizations and NGOs for natural resources and biodiversity conservation at Hakaluki Haor, Cox's Bazar-

Teknaf Sea Beach, St. Martin's Island and Sonadia Island declared as Ecologically Critical Area. To strengthen the CBA-ECA Project "Ecosystem based development, management and conservation of the Saint Martin's Island" is being implemented for the conservation of biodiversity of Saint Martin's Island through ecosystem management. The Ecologically Critical Area Management Rules, 2016 under Environment Conservation Act 1995 has been promulgated by the government to improve the management of Ecologically Critical Area. ECA Committee such as Zilla ECA Committee, Upazila ECA Committee, Union ECA Committee has been formed to oversee the biodiversity and natural resources of the ECAs. The government has published a gazette in this regard to protect Ecologically Critical Areas.

Sustainable Development Goals (SDGs) and Bangladesh

The government is working for the implementation of the environment and climate related goals and targets of SDGs. Among 17 goals of SDGs, 3 goals are directly linked with environment and climate. The Goal 13 declares 'Take urgent action to combat climate change and its impacts'. According to the first indicator of goal 13 'Number of deaths, missing persons and directly affected persons attributed to disasters per one lakh populations reduce to 6,500 by 2020 and 1,500 by 2030.'

The goal 14 says 'Conserve and sustainably use the oceans, seas and marine resources for sustainable Development'. One of the key targets of this goal is 'Coverage of 2.5 percent of marine areas of Bangladesh as protected area'.

The goal 15 states that 'Protect, restore and promote sustainable use of terrestrial ecosystem, sustainably manage forests, combat desertification, and halt and reserve land degradation and halt biodiversity loss'.

Conservation of Forest and Biodiversity

Bangladesh Forest Department (BFD) implemented different development projects to increase forest resources, conserve wildlife and biodiversity to support the overall development of the country. According to available information in FY 2018-19 total forest land is 25,75,196 hectares which is 17.45 percent of total area of the country. BFD is responsible for conservation and management of 18,80,494 hectares forests. Forest Department is implementing various activities such as restoration of forests through afforestation, conservation of wildlife habitat and biodiversity through coastal afforestation, improvement of forest management with the collaboration of the people dependent on the forest, increase of the forest coverage through social forestry under running 15 investment projects.

- According to the Tiger Conference, St. Petersburg, Russia's (2010) international declaration, appropriate steps have been taken to increase the number of tigers and deer in the Sundarbans by stoping deer hunting, developing habitats and ensuring regular patrols in the Sundarbans. Besides, Tiger Action Plan has been prepared to fulfill the target. In 2015 for the first time tiger counting started in the Sundarbans using camera trapping. In FY 2021-22, ECNEC has approved Sundarban Shurokkha and Tiger Conservation Project.
- From 2010-11 to 2021-22, 34 areas including 7 National Parks, 16 Wildlife Sanctuaries, 3 Ecoparks, 1 Botanical Gardens, 2 Marine Protected Areas (Swatch of No-Ground and St. Martin's) and 2 Special Biodiversity Conservation Areas have been declared as Protected Areas . At present the total number of protected areas in the country is 51.
- A total of 37,148 wild animals/ birds (including 55 amphibians, 755

mammals, 8934 reptiles and 27,404 birds) have been rescued from July 2012 to 2021 by performing operations by the Wildlife Crime Suppression Unit. Besides, 111 cases were filed during the period and 157 criminals were arrested.

- Forestry Master Plan (2016-2035) has been prepared for the next 20 years to conserve the biodiversity and ecosystem of forests and also to restore forest resources which is under processing for approval.
- In order to conserve the forests effectively, the amended Forest Act 2019 is under the process of ratification.
- 'Prime Minister's National Award for plantation' and 'Bangabandhu Award for Wildlife Conservation' has been announced in order to inspire people and organisation to conserve the forest and wildlife/biodiversity.
- The area of 1,738sq km has been declared as Marine Protected Area (MPA) (Swatch of No Ground) in the South Bay of Bengal. Another about 1,743 sq.km around the St. Martin Island has been declared as Marine Protected Area (MPA).
- Forest Department gradually formulating the master plans for the Protected Areas along with management plans to conserve the forest and wildlife/biodiversity.
- Formulation of co-management committees has been started since 2004 for protected areas co-management to ensure the participation of local people in the conservation of forests and wildlife/biodiversity. Legislative basis has been provided through the approval of co-management Rules-2017. Therefore, the activities of the co-management are strengthened and the jurisdiction of social forestry has been expanded.

National Herbarium

Bangladesh National Herbarium (BNH) conducts taxonomic research on the plant species of the country. Collecting, identifying, preserving and developing database of agricultural, woody, medicinal, threatened and economically important plants through field surveys is the main task of BNH. The institute publishes in a regular basis booklet series called 'Flora of Bangladesh' which includes information about plant species of the country.

BNH has already implemented a project entitled 'Survey of Vascular Flora of Chattogram and the Chattogram Hill Tracts' to collect the plant samples through botanical survey and publish a pictorial flora of five districts of Chattogram and the Chattogram Hill Tracts areas (*such as* Chattogram, Cox's Bazar, Bandarban, Khagrachari and Rangamati). Under the above said project, BNH has collected, identified & preserved 45,216 number of plant samples (a total of 1,15,000 including duplicates) and published a book in three volumes entitled 'Vascular Flora of Chattogram and the Chattogram Hill Tracts' containing illustrated description of 2,916 species found in the areas and published the information of the e-database in the website (bnh-flora.gov.bd). Scientific names, local names, description both in Bangla and English, current status, use, habitat, identification procedure etc. of each plant species are included in the book. Besides this, a total of 344 threatened plant species have been identified and their conservation measures have been formulated. Moreover, 92 new plant species are added to Bangladesh Flora in the mentioned book.

Bangladesh Forest Research Institute

'Bangladesh Forest Research Institute' is the only national research institute for forest and forest

resources. The main task of the institute is to develop innovative technology for increasing production of forest resources and better utilisation of these resources. In addition, the institute works for development and expansion of nursery and forestry strategies to retain some extinct plants. At present, the institute carrying out 54 research programs.

BFRI is conducting 61 research studies (17 new studies and 44 on-going) in 2021-22. To disseminate research findings and technologies training, workshops/ seminars are organized in the field level. 1, 02,500 seedlings of different plant species and 8500 medicinal plant seedlings were raised for experimental plantation. In the Sundarbans, some species like Dundul Jhana and Vatkhati are declining due to climate change and human interferences. Natural regeneration of those species is declining day by day. Research works have been taken for development of nursery and plantation techniques of that three species in the Sundarbans.

Natural Disaster Management

Bangladesh is one of the most disaster-prone countries in the world. These disasters include the devastating cyclone of 1970 and 1991, cyclone *Sidar* of 2007, *Aila* of 2009 the *Mahasen* of 2013and *Amphan* of 2020 and the horrific floods of 1988, 1998, 2004 and 2007. The 'vision' of the government in disaster management is to strengthen the overall capacity of disaster management, to create a disaster-tolerant country in addition to establishing an emergency response system capable of dealing with risk reduction of the people especially the poor and the vulnerable. With this aim in view, The Ministry of Disaster Management and Relief has been contributing importantly to the country's disaster risk reduction and the implementation of disaster response rehabilitation programmes. Some important measures taken by the ministry has been shown briefly as follows:

Steps for Action, Laws, Rules and Regulations

- Disaster Management Act 2012 has been formulated to provide proper legal framework for ensuring the effective management of disaster and institutional recognition of management of disaster risk, preparation and implementation of national and local planning, protection of life, property and fundamental rights of the people at risk of disaster.
- Standing Orders on Disaster (SOD) 2019 has been published for proper implementation of the responsibility and duties of all ministries, divisions, departments, organisations and individuals related to disaster management and to prepare their own action plans. Such permanent orders also include disasters such as earthquake, tsunamis and fire incidents alongside other common disasters. SOD has been modified including thunderbolt as disaster and incorporating Ward Disaster Management Committee.
- Cyclone Shelters Construction, Maintenance and Management Policy, 2011 is approved to keep the cyclone shelters built by different departments/agencies/authorities at various times in coastal areas useable and maintain and manage them.
- Bangladesh has been a member of the Asian Disaster Reduction Center (ADRC), Regional Integrated Multi-Hazard Early Warning System (RIMES), Asian Ministerial Conference on Disaster Reduction (AMCDR) and INSARAG (International Search and Rescue Advisory Group).
- National Disaster Management Policy 2015 has been published.
- Post Disaster Dead Body Management Guideline, 2016 is published.
- Draft Post-disaster Waste Management Guideline has been finalized.

Steps Related to Planning

- Indication Map has been prepared to get information about fixing up the location-based height caused by the tidal floods in the southern coastal region of the country. This map will provide an idea of determining the hight of the plinth area of the houses to be built in these areas including cyclone shelters and the hight of top level for roads or other infrastructure to be constructed.
- Preparation of guidelines on Incident Management System (IMS) in Bangladesh is at final stage for effective disaster management. Moreover, Debris Management Plan for Dhaka, Chattogram and Sylhet city has also been finalized for the removal of post-earthquake debris.
- 'Sendai Framework for Disaster Risk Reduction' was adopted in the presence of 187 countries in the World Conference on Disaster Risk Management in March 2015 in *Sendai* city of Japan. According to the framework, preparation of action plan for Bangladesh has been completed.
- Based on the evaluation of the National Disaster Management Plan (2016-2020) the next National Disaster Management Plan (2021-2025) has been formulated.
- Ministry of Disaster Management and Relief is helping to prepare the SAARC Plan of Action for Disaster Management by coordinating disaster management policy and planning of SAARC member countries.
- National contingency plan has been created for rapid transition from the post-disaster situation including earthquake. Contingency plans of rapid responding organisations like Fire Service and Civil Defense Department, Armed Forces' Division, Department of Disaster Management, Cyclone Preparedness Program (CPP), Dhaka, *Chattogram* and *Sylhet* City Corporation and various health services providing organisations like Power, Titas, T & T and of WASA have been done.

Awareness and Educational Steps/Measures

- Disaster Management and Climate Change has been incorporated in the training curriculums of 41 educational and training institutes for creating skill manpower on disaster management and climate change. In the meantime, Dhaka University, Rangpur Begum Rokeya University, Patuakhali University of Science and Technology and Bangladesh University of Professionals have started Honours and Masters courses on Disaster Management and Climate Change. So far, Masters / Diploma courses on Disaster Management have been introduced in 28 Universities.
- Lesson on Disaster management has been included from 3 to 10 class in order to increase disaster awareness among the students. Disaster management and climate change has been included in the curriculum of 41 educational and training institutes in Curriculum for creating skilled manpower for disaster management and climate change.
- A Harmonised Training Module for trainers and trainees has been developed in order to achieve equality and coordination in the training program of government and non-governmental organisations (NGOs).
- Damage and Need Assessment (DNA) Cell has been set up under ECRRP-D1 project. District Relief and Rehabilitation Officers and Upazila Project Implementation Officers of 64 districts of the country have been provided training on Damage and Need

Assessment (DNA) software for filling up SoS and D-Form Online.

- Multi-Hazard Risk and Vulnerability Assessment (MRVA) Cell has been set up under ECRRP-D1 project. Risk maps have been prepared and uploaded in the website of 6 major types of disasters (flood, cyclone and tidal wave, earthquake, tsunami, landslide, drought, technical and health related hazard) across the country.

Use of Information and Communication Technology to reduce the risk of disaster

- **Use of Interactive Voice Response (IVR) Technology on Mobile Phones for Sending Disaster Messages:** Disaster message is being circulated in the public understandable language through IVR system.
- **Damage and Need Assessment (DNA) Software:** A web based DNA software has been developed for online transmission and analysis of disaster related information. Besides, Citizen Reporting is included in the software and the public can send their disaster information and photos online. At present, the work of providing training to district relief and rehabilitation officers, *Upazila* executive officers and *Upazila* project implementation officers is going on in this field. Through this software, the information can be sent from the *Upazila*.
- **Establishment of the Multi Hazard Risk and Vulnerability Assessment, Modeling and Mapping (MRVA) Cell:** MRVA Cell has been established under the ECRRP 2007-D1 project in Disaster Management Department. This cell has prepared a map of various calamities, risks and hazards. Using these maps can be taken to reduce the risk of disaster planning, and if it is implemented properly, further disaster damage will be reduced in the future. The products of MRVA have been published on the Disaster Management Department's website.
- **Cyclone Shelter Database:** Detailed information about the cyclone shelters created in coastal areas has been preserved in website based database. In this database, the shelter centers have structural and accessories information such as geographical location (latitude/longitude), usage utility, retention capacity, etc. Information to determine the proper location of the new cyclone shelter, determining the appropriate path for bringing people to the shelter during cyclone and managing the repair and maintenance needs of the shelters can be done by using this database. In addition, every year the southern coastal areas of Bangladesh are flooded by the storm surge with cyclones, resulting in massive loss of life and livelihoods. This database can be viewed through DNA software.
- **Inundation Depth Map:** The location based depth information of the flood-related flooding in the southern coastal region of the country is based on the data base of the Inundation Map/Risk Map for Storm Surge, how high it will be to build the houses of the houses in these areas, how high the shelter center, the roads or other infrastructure To do it, its ideas can be found.
- **E-Library:** Electronic Libraries have been created so that all publications related to disaster and disaster management are available from one place. There are about 1,000 disaster related publications related to disaster in the e-library.
- **Risk Atlas:** Disaster Map or Risk Atlas is a map of risk of a place, a summary of the risk index, a collection of information on risk organisations, infrastructure, etc. Risk Atlas helps in the analysis of the zigzag map of a specific district, which is your condition (flood depth and circumference, depth of

borax and circumference, drought image and peripheral and danger information).

Setting up National Emergency Operation Center (NEOC)

Initiatives have been taken to set up a state-of-the-art National Emergency Operation Center (NEOC) to combat earthquake and other Mega Disasters. Different donor agencies have been contacted to build this building earthquake resistant. Soon, this will be implemented by a project.

Water Development Board to Combat Climate Change Risk and Disaster Management

To tackle the climate change effects and natural disasters, BWDB has taken different projects under Bangladesh Climate Change Trust Fund (BCCTF). From 2009 to February 2022, 134 projects costing of Tk. 1,093.71 crore have been approved and 125 projects costing of Tk 1,028.10 crore has been implemented. 9 projects costing of Tk 65.61 crore are being implemented. These projects are related to construction / repair of polders / dams in coastal chars, construction of cross dams for land reclamation, river bank protection, re-excavation of rivers / canals, afforestation. Due to flood control, protection of saline water intrusion, removal of water logging, availability of water, effective water management, the livelihood of beneficiaries of the project areas has been improved and adaptation capability has been increased to combat adverse effects of climate change.

Annual flood season

The 2020 flood caused 161.248 km erosion in 939 places of BWDB dams across the country (excluding Haor area). Among them, the damaged 72.816 km long dam was repaired by 568 packages through emergency works. 10.060 km river bank protection works in 160 spots out of 1,287 km was damaged by the flood across the country. Of these, the damaged 7.615 km river bank protection works was repaired by 194 packages and the erosion was faced by carrying out emergency works.

Moreover, there are many places on river banks where river bank protection works has never been implemented in the past. 193.651 km river banks were eroded at such 725 open river banks. Among them, 75.283 km river bank erosion was prevented by carrying out emergency works through 817 packages.

Flash flood in haor area

In 2021 about 819 km submerged dams costing Tk 146 crore were repaired by 1,090 PICs in haor areas of Sunamganj, Sylhet, Habiganj, Moulvibazar, Netrokona and Kishoreganj districts through kabita project under the operating budget of BWDB.

By May 10 2021, 100% harvesting has been completed in Haor area. As a result, about 1.5 million metric tons of boro crops have been saved from flash flood caused by heavy rains in mountain region.

Delta Plan-2100 to address the effects of climate change

Bangladesh Delta Plan-2100 is essentially an adaptation-based technical and economical master plan for which an action plan is formulated in the No Regret policy considering the impact of water resources management, land use, environmental and climate change on development outcomes, and their interactions. Therefore, in Delta Plan 2100 regional hydrology and efficient, sustainable and integrated water resources management are playing a major role in formulating regional plans. The overall objective of Delta Plan-2100 is to ensure sustainable economic growth and to determine strategies for its implementation ensuring water resources and food security of Bangladesh based on the consensus of the concerned stakeholders.

The Centennial Delta Plan identified 6 hotspots in coastal areas, Barind and drought prone areas, haor and flash flood prone areas, Chattogram Hill Tracts, river and estuary areas and urban areas and also identified 33 types of challenges. To implement this master plan, the government has to invest about US dollar 37 billion (approximately Tk 3,14,500 crore) for sustainable development of the country by 2030, of which about 80% will be implemented by Ministry of Water Resources. The implementation of Delta Plan 2100 will require an investment of 2.50% of Bangladesh's GDP by 2030.

Annex 15.1
Green Banking and Sustainable Finance

In FY 2021-22 (up to December 2021), amount of Sustainable finance and Green finance by Banks and Financial Institutes were Tk. 45935.57 crore and Tk. 3564.85crore respectively. At that time, banks and FIs have financed Tk. 1662.52 billion against 94,609 projects rated under Environmental and Social Risk Management (ESRM) Guidelines. In FY 2021-22 (Up to December 2021), Tk. 34.77 crore has been disbursed by banks and FIs from their own climate risk fund.

To facilitate green products/sector financing such as solar energy, bio-gas plant, effluent treatment plant, Bangladesh Bank established a revolving refinancing scheme of Tk. 200 crore in 2009 for green products/sector from its own fund. The size of the fund has been increased to Tk. 400 crore in view of the growing demand for financing of environment friendly products/initiatives in 2020. At present, this scheme is known as 'Refinance Scheme for Environment Friendly Products/Initiatives'. During FY 2021-22, under this scheme total of Tk. 53.40 crore has been disbursed as refinance facility from the fund against Bank and FI's financing, in total 10 green products/initiatives such as Biogas plant, Green Building, Green Industry, Vermi Compost, Solar Home System, Biological ETP, Net Metering Rooftop Solar System, Installation of Energy Auditor Certified machineries, Environment Friendly/Brick Kiln Efficiency improvement Project, and Safety and Work Environment of Factory.

Asian Development Bank (ADB) supported revolving relending facility–Financing Brick Kiln Efficiency Improvement Project was established in Bangladesh Bank in June 2012 with a view to improving the brick sector especially environment friendly brick kilns through energy saving efficient use of technology resulting in reduced Green House Gas and Suspended Particulate Matter. The total amount of ADB's relending facility is USD 50.00 million (equivalent Bangladeshi currency). The project has two parts: Part-A (Ordinary Capital Resources) conversion of Fixed Chimney Kiln (FCK) to Improved Zig-zag Kiln (USD 30.00 million/equivalent Bangladeshi currency) and Part-B (Special Funds Resources) establishment of Vertical Shaft Brick Kiln (VSBK), Hybrid Hoffman Kiln (HHK) and Tunnel Kiln (USD 20.00 million/equivalent Bangladeshi currency). Total USD 50.00 million equivalent to Tk. 407.97 crore relending facility has been disbursed to 19 subprojects through 20 participating banks and FIs till December 2019. The tenure of the project ended in December 2019 with full disbursement. The revolving phase of the project is active in two tenors-Part-A is 25 years and Part-B is 32 years.

Steps have been undertaken during FY 2021-22:

- Circular regarding definition of targets for sustainable and green finance, basis of determining rate of achievement and addition of 09 new component/parameters in existing sustainability rating methodology for Banks and FIs has been issued.
- For the modernization and technological development/up-gradation of export oriented industries, a refinancing fund of Tk.1000 (one thousand) crore has been formed in the light of 'Export Policy 2018-21' by Bangladesh Bank which is named as 'Technology Development/Up-gradation Fund'. Under this fund, Tk. 9.12 Crore has been disbursed under the fund till February 2022.
- 'Green Transformation Fund (GTF)' was introduced for widening the scope to manufacturer-exporters irrespective of sectors against import of capital machinery and accessories for implementing specified green/environment-friendly initiatives. USD 134.66 million and Euro 45.22 million have been disbursed from GTF as of February, 2022.
- Till February, 2022 total Tk. 49.76 crore to 260 Projects has approved as grant from the 'Bangladesh Bank Disaster Management and Social Responsibility Fund' which was formed under CSR activities.

Annex 15.2
Government's Plan to Control Air Pollution

Air pollution is a cross-cutting issue, so the government will take the following steps in collaboration with all ministries, departments, agencies and institutions:

Short Term

- To ensure the emission level of the vehicle while issuing the fitness certificate of the vehicle;
- To take appropriate measures to control air pollution caused by ongoing development and construction activities;
- To control the transportation of construction materials such as soil / sand / cement etc. in open trucks;
- Rapid repair of all damaged and broken roads;
- Ensure management of all municipal waste and stop burning of waste;
- continue the campaign against all illegal brick kilns around Dhaka;
- Conduct mobile courts and strict enforcement campaigns against the persons or organizations concerned for air pollution;
- Uncovered spaces on the side of the road are covered with concrete and emphasis is placed on raising awareness;

Mid-term

- To control the pollution caused by vehicles, to remove more polluting vehicles from the roads of Dhaka;
- increase the number of public transport by reducing the use of private cars;
- Increase imports and use of hybrid / electric vehicles;
- Reviewing all types of fuel and vehicle emissions levels and vehicle engine standards (Euro-3/4) to determine the suitability;
- Closing all illegal brickfields in the vicinity of Dhaka;
- Establishment of modern sanitary landfills for waste management;
- Creating emissions inventory to formulate effective action plans on air pollution control;
- The government will install permanent High speed water sprinkler in air pollution prone areas of Dhaka city which will control air pollution by water at high speed from far above.
- Installing Dust Soccer;
- Arranging vacuum sweeping trucks instead of manual sweepers for road cleaning.

Long Term

- These should be implemented expeditiously with emphasis on up-to-date transportation system in Dhaka to control air pollution.
- To increase coordination and awareness among all concerned organizations to prevent air pollution and to ensure accountability.
- To increase the manpower of the Department of Environment in air pollution control and to take activities to increase the capacity and efficiency of the manpower.