

CHAPTER 15

ENVIRONMENT AND DEVELOPMENT

[Environment development is a pre-condition for green economy which is a crucial challenge for the bio-diversity rich Bangladesh, like other developing countries. Efforts are on to integrate issues pertaining to environment with mainstream development policies to ensure economic growth and environmental sustainability. The Government of Bangladesh is implementing 'Vision 2021' incorporating the measures of environmental pollution control and impact of global warming. Meanwhile, Bangladesh has achieved the target ensuring safe drinking water and sanitation for all people as envisaged in the MDG set by United Nations. 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. Bangladesh Climate Change Trust Fund (BCCTF) has been formed from internal resources in implementing BCCSAP 2009 and allocated total amount of Tk.3,100 crore from the FY2009-10 to FY2015-16. The Finance Division has undertaken a Technical Assistance Project titled Inclusive Budgeting and Financing for Climate Resilience (IBFCR) funded by UNDP at an estimated cost of Tk.185.20 million. Moreover Government has enacted Climate Change Trust Fund Act 2010 and Climate Change Trust Fund Policy for better management of BCCTF. In addition to that Bangladesh Climate Change Resilience Fund (BCCRF) has also been formed with the assistance of development partners in implementing BCCSAP 2009. The Ministry of Environment and Forests has also undertaken many awareness programmes and reform activities for environment conservation including Ozone Layer Protection and Pollution Control. Bangladesh is rich in biodiversity which is very important to environment and ecosystem and considering this Government has prepared National Action Plan 2020 and many projects are being undertaken under this action plan. National Bio safety Framework and National Biodiversity Strategy and Action Plan are being implemented and has been updated for biodiversity conservation in the country. The Ministry of Disaster Management and Relief is also agile in implementing various programmes in order to tackle eventualities emanating from natural disasters.]

The existence of the planet Earth's nowadays is threatened due to the climate change and environmental degradation which is again induced by the rapid growth of economy, urbanisation and population. Bangladesh is also facing various environmental crisis like climate change, water pollution, air pollution, noise pollution and hazardous waste. Bangladesh is one of the most vulnerable and disaster prone countries in the world for the impact of climate change and global warming. Climate Change continues to induce risks like cyclones, tidal surges, salinity intrusion and water logging in coastal areas due to sea-level rise, irregular rainfall, floods, river erosion, drought, landslides and the adverse impacts on agricultural production has become a major threat to achieving the country's Sustainable Development Goals. The present Government is utterly trying to overcoming these environmental problems for achieving a healthy, beautiful, durable and eco-friendly Bangladesh for the benefit of present and future generations. Ministry of Environment and Forests is playing an important role by undertaking necessary steps for

environmental pollution control and biodiversity conservation, preparing and implementing timely legislation, institutional strengthening and implementing other relevant activities.

International Initiatives on Protection of Environment

The significant international initiative on environment protection issue was negotiations on the Kyoto Protocol signed in December 1997 under the United Nations Framework Convention on Climate Change (UNFCCC). The Kyoto Protocol was signed to reduce carbon dioxide and greenhouse gas emission. There are 192 parties to the convention: 191 states (including all the UN members except Andorra, South Sudan, Canada and the United States) and the European Union. As part of the Kyoto Protocol, many developed countries have agreed to legally binding limitations/reductions in their emissions of greenhouse gases in two commitments periods. Table 15.1 shows the list of highest emitting 10 countries with the level of their GHG emissions.

Table: 15.1 Greenhouse Gas Emissions of Top 10 Countries

S.L	Country	Annual CO₂Emissions in 2012 (In millions of metric tons)	% of Global Total in 2012
1	China	8,106.43	25.08
2	United States	5,270.42	16.31
3	India	1,830.93	5.66
4	Russia	1,781.71	5.51
5	Japan	1,259.05	3.89
6	Germany	788.32	2.43
7	South Korea	657.09	2.03
8	Iran	603.58	1.86
9	Saudi Arabia	582.67	1.80
10	Canada	550.82	1.70

Source: EIA (Energy Information Administration), 2015

Paris Summit on Climate

The Paris Agreement (an agreement within the framework of the UNFCCC dealing with greenhouse gases emissions mitigation and adaptation) was negotiated by representatives of 195 countries. Paris Climate Change Agreement has been accepted by all the countries with appreciation. The United Nations Climate Change Conference, COP 21 or CMP 11 was held in Paris, France, from 30 November to 12 December 2015. Bangladesh takes active role in favour of the climate vulnerable countries in the issue based discussion of the conference. The major achievements of the COP 21 are stated in below:

- **Legally Binding Agreement:** Paris agreement is a legally binding global document which will be effective after ratification, acceptance and approval by 55 countries that are liable for 55 percent Green House Gas (GHG) emission in the world.
- **Targets to Limit Temperature:** In the Paris agreement, the target has been fixed to limit temperature below 2 degree Celsius concerning to the demand of the climate

vulnerable countries. It has also been taken into account of the target of GHG emission to 'Net Zero' in between second half of this century.

- **Special Priority for the Least Developed Countries (LDCs):** Paris Agreement and COP 21 decisions include priority supports to the LDCs countries on financial, technology transfer, capacity development along with relaxation from legal bindings.
- **Adaptation:** A Global goal on adaptation has been accepted for the first time in the conference.
- **Rights to the Displaced People by the Climate Change and Loss and Damage:** Paris Agreement includes the rights of displaced and vulnerable peoples. Support on Early Warning System, Emergency Preparedness, Comprehensive Risk Assessment and Management and Risk Insurance Facility will be provided for Loss and Damage.
- **Finance:** Developed countries would extend financial support to the LDCs for climate change adaptation and mitigation. Especially, public funds and grant-based financial support will be provided for adaptation to the vulnerable countries, LDCs and SIDS.
- **Technology Transfer and Capacity Development:** For the implementation of Paris Agreement, Climate Technology Center and Network (CTCN) is requested for taking necessary actions on improvement, enrichment and transfer of technology. Financial support to the LDCs for the technology improvement and transfer has also been included. Capacity development on technology improvement, publicity and installation and attained to the climate finance for the LDCs and climate vulnerable countries under the convention.

The Paris Agreement is kept open for signing from 22 April, 2016 to 21 April, 2017 in UN headquarters. Effectiveness of this agreement will depends on signing and implementation of the agreement by member countries. Bangladesh has already signed the agreement in New York City on 22 April 2016. As of 7 August, 2016, 179 UNFCCC members have signed the treaty among which 22 has already ratified it. The Ministry of Environment and Forests (MoEF) has already initiated the process of ratification of the agreement. Bangladesh has gained significant fame in the international climate change negotiation arena. Bangladesh has been elected as member of the Green Climate Fund under UNFCCC, the Executive Committee of Loss and Damage, the Adaptation Fund Board and the Consultative Group of Experts.

Climate Change and Bangladesh

The rise in sea-level poses a big threat to the lives and livelihood of the huge population of the coastal areas of Bangladesh. The Government is attaching the highest importance to the issue of tackling climate change induced disasters and the country's preparedness to protect lives and livelihoods of the people. Some policy initiatives concerning these are given below:

- National Adaptation Programme of Action (NAPA), 2005, (revised 2009)
- Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009

- Nationally Appropriate Mitigation Action (NAMA) preparation
- Establishment of Climate change Unit in Ministry of Environment and Forestry.

Besides, various development programmes under the annual development programmes and revenue budget, Government of Bangladesh has established three fund to tackle the adverse impact of climate change:

- **Bangladesh Climate Change Trust Fund (BCCTF):** A Climate Change Trust Fund (CCTF) was established by enacting a law in FY2009-10 and a budgetary allocation of Tk.700 crore was made from the Government's own resources. Over the last seven consecutive fiscal years, the Government allocated a total of Tk.3,100 crore for this fund. The main objective of this fund is to implement the BCCSAP, 2009. To run this fund, government has established Bangladesh Climate Change Trust Fund Board. Bangladesh Climate Change Trust Fund Policy was constituted in 2009 and Bangladesh Climate Change Trust Fund Act has been passed in 2010. As of June 2016, 440 projects have been undertaken. Among them 377 projects are being implemented by the government, semi-government and autonomous agencies; while 63 projects are being implemented by NGOs which is managed by PKSf. Among these projects 31 have been already completed.
- **Bangladesh Climate Change Resilience Fund (BCCRF):** Bangladesh Climate Change Resilience Fund (BCCRF) is a coordinated financing mechanism by the Government of Bangladesh, development partners and the World Bank to address the impacts of climate change. The fund was established in May, 2010 with financial support from Denmark, European Union, Sweden and United Kingdom. Switzerland, Australia and United States subsequently joined the fund. As of now, an amount of over US\$187 million has been pledged for this fund. On behalf of the development partners, World Bank will give technical and financial management support to Bangladesh Government up to December, 2016.
- **Strategic Programme for Climate Resilience Bangladesh:** The Pilot Programme for Climate Resilience (PPCR) of the Strategic Climate Funds (SCF) established under the Multi-donor Climate Investment Fund (CIF) aims to help countries transform to a climate resilient development path, consistent with poverty reduction and sustainable development goals. US\$110 million in grants (45 percent) and near-zero interest credits (55 percent) from the PPCR will enable Bangladesh to make strategic investments in critical areas of climate resilience planning and implementation in a manner consistent with its poverty reduction and sustainable development objectives. Bangladesh's PPCR investment plan was designed under the leadership of the government, in coordination with the Asian Development Bank (ADB), members of the World Bank Group (IBRD, IDA, and IFC), key Bangladeshi stakeholders and other development partners.

The Finance Division has taken a Technical Assistance Project titled “Inclusive Budgeting and Financing for Climate Resilience (IBFCR)”. This project is funded by UNDP at an estimated cost of Tk.1852.00 lakh and the implementation period is five years.

The Progress Status of Bangladesh in Achieving the Targets of Millennium Development Goals (MDGs)

Ensuring environmental sustainability is one of the most important goals under MDGs declared by the UN. The main issues associated with this goal are integration of the principles of sustainable development with state policies and principles and amelioration of the loss of natural environment and bio-diversity. The “Millennium Development Goals: Bangladesh Progress Report 2015” published jointly by UNDP and Bangladesh Government, indicates that Bangladesh has already been made a remarkable progress towards achieving the target of “Ensuring availability of safe drinking water and sanitary latrines” as enunciated in goal-7 of the MDG. Table 15.2 shows the achievements made in goal-7 of the MDG.

Table 15.2: Environment Related Progress in Achieving Millennium Development Goals

No.	Objective Aims and Indicators	Base Year 1991	Current Status	Target by 2015
Goal 7.B: Reduce Biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss				
7.1	Proportion of land area covered by forest	9.0	13.40(DoF 2014) (Tree Density>30%)	20.0 (Density>70%)
7.2	CO ₂ emission (metric tonnes per capita)	0.14	0.23(2 nd National Communication, 2012)	-
7.3	Consumption of ozone-depleting Substance (ODP tons)	202.1 ODPtones	64.88 (DoE, 2013)	65.39
7.4	Proportion of fish stocks within safe biological limits	-	54 inland 16 marine	-
7.5	Proportion of total water resources used	-	2.9% (UNSD 2010)	-
7.6	Proportion of terrestrial and marine areas protected	0.91	1.83% (Terrestrial): 1.34% (Marine) (BFD, 2013)	5.0
7.7	Proportions of species threatened with extinction		a.23% of resident vertebrates (IUCN2003) b.5.81% of vascular plants (BNH 2013)	
7.8	Proportion of population using an improved drinking water sources	68	97.9(MICS 2013) 98.5(SVRS 2013)	100
7.9	Proportion of population using an improved sanitation facility	34	55.9 (MICS 2013) 64.2(SVRS 2013)	100
7.10	Proportion of urban population living in slums	-	5.25(CSAFP,BBS 2014)	-

Source: Millennium Development Goals Bangladesh Progress Report 2015; GED, Planning Commission and UNDP.

Sustainable Development Goals (SDGs)

The Millennium Development Goals (MDGs) were supposed to be achieved by 2015. A new initiative was taken to agree and develop development goals from 2015-2030. Discussion on the post-2015 framework for international development began well in advance on Post 2015 Development Agenda releasing the first report known as *Realising the Future We Want*. On 19 July 2014, a proposal was forwarded to the United Nations General Assembly. The Inter-governmental Negotiations on the Post 2015 Development Agenda (IGN) began in January 2015 and ended in August 2015. Following the negotiations, a final document was adopted at the UN Sustainable Development Summit September 25–27, 2015. The Sustainable Development Goals

(SDGs), officially known as *Transforming our world: the 2030 Agenda for Sustainable Development*. The MDGs will be replaced by the SDGs, which will be implemented within 2015-2030. The Sustainable Development Agenda outlines 17 goals and its associated 169 targets. The 17 goals are: 1. Poverty, 2. Food, 3. Health, 4. Education, 5. Women, 6. Water, 7. Energy, 8. Economy, 9. Infrastructure, 10. Inequality, 11. Climate, 12. Consumption, 13. Habitation, 14. Marine-ecosystems, 15. Ecosystems, 16. Institutions and 17. Sustainability. To implement the SDGs Bangladesh has set 11 targets in the Seventh Five Year Plan.

Adaptation and Mitigation

Adaptation and mitigation activities are necessary to face the recent challenges due to climate change. The activities of other ministry and department also have direct and indirect impact on environment climate change. As a result to ensure a secured and sustainable environment preparation of an integrated investment plan is necessary according to the policies, strategies projects etc. of Ministry of Environment as well as other relevant ministries. Ministry of Environment implementing a project titled *Strengthening the Environment, Forestry and Climate Change Capacities of the Ministry of Environment & Forests and its Agencies* with the technical assistant of World Agriculture and Food Organisation (FAO). An important output of this project a country Investment Plan (CIP) preparation is under process. By this time five sectors were developed under this programme like; environment and climate change, forestry, agriculture, livestock, food security, development of economy and infrastructure, gender) to identify the gap, duplication and capacity of existing policies and acts of the relevant sector. In the process of CIP preparations different committees such as Departmental Focal Points Committee, CIP Technical Advisory Groups etc. at different level were formulated for providing necessary suggestion and guidelines. After the formulation of draft CIP, a consultation process will be followed to take the opinion of different ministries/agencies and stakeholders. A local workshop has already been held with different ministries/agencies and stakeholders and their opinion had been incorporated in the draft CIP. A national workshop about CIP will be organised soon.

Air Pollution Control Activities

Air pollution is one of the threats to the environment in Bangladesh. For controlling air pollution, the Department of Environment (DoE) monitors air quality in important places in different cities of the country.

Control Air Pollution

- Aiming to improve the overall air quality of the country, The Department of Environment is implementing some projects and initiatives with the co-operation of development partners. Among this, Clean Air and Sustainable Environment (CASE) Project supported by the World Bank for the period of 2009-2016 has established 11 Continuous Air Monitoring Stations (CAMS) at various places of important cities in the country which include *Dhaka, Chittagong, Rajshahi, Khulna, Barishal, Sylhet, Gazipur and Narayanganj*. The programmes encompasses operation of the sampling and monitoring

network and quality assurance activities to ensure the quality of the data collected and disseminated. In addition, there is a Transboundary Air Quality Monitoring Station operating at *Syamnagar of Shatkhira* district.

- The basic statistics of the data along with the data capture rate and the number of days are summarised for which specific pollutant exceeded the Bangladesh National Ambient Air Quality Standard (BNAAQS). Concentration of particulate matter in Dhaka city remain high exceeding national ambient air quality standard (NAAQS) in dry season of the year.
- The data presented in this report are based on monitoring of air quality parameters at 11 CAMS operating under CASE-DoE monitoring network. Based on those data, monthly monitoring report and Air Quality Index (AQI) are prepared which are regularly published on (case.moef.gov.bd) website. DOE is planning to publish those data in print and electronic media in future. Public can get overall air quality condition by the Air Quality Index (AQI) .

Vehicular Emission Control

- According to Bangladesh Environment Coservation Act,1995 (Revised 2010) the mobile court can penalty for air pollution due to vehicular emission. Moreover, the activities are also run by police administration according to Motor Vehicle Ordinance Act, 1983. Among the polluting vehicles the diesel-run ones are considered to be the worst. Emission tests for diesel vehicles are conducted in different parts of country including Dhaka and Chittagong to ensure that test vehicle constitute representative sample of the vehicle pollution as far as possible.

Air Pollution Emission from Brick Kiln

- Emission of huge quantity of toxic elements from brick kiln is causing air pollution. To reduce emission from traditional brick kiln, aim at energy efficiency and environment friendly brick technologies, government introduces “Brick Manufactures and Kiln Establishment (Control) Act 2013”. This act was enacted on 1st July 2014. Existing forms of brick kiln technology are prohibited according to the “Brick Manufactures and kiln Establishment Control act 2013”. Cleaner technologies such as Hybrid Hoffman Kiln (HHK), Zigzag Kiln, Vertical Shaft Brick Kiln, Tunnel Kiln or other improved technologies should be implemented by this act. Any kind of woody fuel is prohibited for burning bricks. Moreover, low grade coal, consisting high sulphur, ash, mercury or any other material cannot be used as fuel in brick field and also brick field cannot be established in municipality or city corporation within 1 kilometer.
- To implement the “Brick Manufactures and Kiln Establishment (Control) Act, 2013” in field level, a number of consultation meetings were held with Brick Manufacturing Owners Association, Journalists, NGOs and Law implementing Agency. In this respect different training workshops were organized with Brick Manufacturing Owners Association in district and divisional offices.

- Approving license to old brick kiln already stopped. All old brick kiln should convert into new environment friendly technology. There are about 6,623 brick kilns in the country of which 63 percentage that is 4,181 (up to June, 2016) brick kiln are run with environment friendly technology starting on 30th June, 2014.

Industrial Pollution Control

The Environmental Conservation Act, 1995 and Environmental Conservation Rule, 1997 are being followed for the approval of site Clearance in case of new industry as well as for the issuance of Environmental Clearance for the control of pollution from existing industries. For the Industries that are supposed to generate severe pollution, Environmental Clearances are issued after the establishment of Effluent Treatment Plant (ETP), sound barrier, Air Treatment Plant (ATP) and implementation other mitigation measures. Environmental clearances are also issued on the condition to build up an in house environmental monitoring system with their own manpower and equipment. Besides these, follow up of government approved 3R policy (Reduce, Reuse & Recycle) and to implement all types of Resource Conservation Plan like establishment of Rain Water Harvesting system, Sewage Treatment Plan (STP) in multistoried building and liquid waste recycling system and zero discharge plan in industry.

Industrial Pollution Control Activities

- **Establishment of Effluent Treatment Plant (ETP):** To protect water pollution DoE is monitoring rapidly and operate enforcement activities to establishment ETP for the industry which discharge liquid waste. Attempts have been taken to collaborate with the industrialists and relevant sector associations to develop appropriate Effluent Treatment management system in the industries. As a result, ETP have been established in 1,156 industry so far throughout the country.
- **Enforcement activities:** DoE take legal action including filed case in environment court, operate mobile court and penalty for environment pollution under the Environmental Conservation Act, 1995 (Revised in 2010). Up to December, 2015 enforcement activities has taken against 2,112 institutions, penalty for Tk.203.09 crore and earned Tk.131.78 crore. 29 industry sealed and 20 industries gas and electricity line disconnected. DoE also filed case in environment court against 602 institutions due to environment pollution.
- **Operation Against Banned Polythene Shopping Bags:** To prohibited banned polythene shopping bags 8 taskforce established including related institutions. Penalty is taken from the owner of banned polythene shopping bags producing factory. DoE enforcement activities has taken against 1,623 institutions, confiscated 108.20 tonnes banned polythene shopping bags and fined Tk.1.20 crore. Besides, this to build up awareness among the people activities has taken to declare the markets 'polythene shopping bags free (without)'. Already several markets declare as the 'polythene shopping bags free (without) market'.
- Relocation of Tanneries from *Hazaribagh* to *Harindhara, Savar* is continuing through a project under the supervision of BSCIC, Ministry of Industry to control industrial

pollution and to protect the rivers around Dhaka City from pollution. Construction of a modern Central Effluent Treatment Plant (CETP) is under construction. DoE is giving essential supports and consultation. By this time final notice has been issued to all owners of the industries.

- A survey project on “ Survey and Mapping of Environment Pollution from Industries in Greater Dhaka and Preparation of Strategies for Its Mitigation” related to pollution of air has already been implemented by DoE for measuring accurately the number of industries in greater Dhaka district and the degree of pollution and also for effective planning to control pollution. To protect sound pollution and for awareness building about it a project on *Survey of Noise Level in Seven Divisional Headquarters under the Integrated and Participatory Program to Control Noise Pollution* has been started to execute.

Water and Environment

Rivers are important features of Bangladesh’s landscape where hundreds of rivers crisscrossed the landmass. According to the Environment Conservation Rule 1997 the water quality of the main rivers in Bangladesh such as the *Padma, Meghna, Jamuna, Korotoa, Dhaleshwari, Surma, Kushiara* are within the acceptable limit all the year round. But the water quality of the rivers flowing around the Dhaka City namely *Buriganga, Balu, Shitalakhya* and *Turag* deteriorates drastically during the dry season when the water flow is very low. At these times Dissolved Oxygen (DO) of these rivers comes virtually to a naught for which phytoplankton and zooplankton cannot grow and live. The Government has, therefore, declared the rivers like *Buriganga, Shitalakshya, Turag, Balu* and their foreshores Ecologically Critical Area (ECA) to take necessary actions to improve the ecosystem of these rivers.

The Department of Environment (DoE) has been monitoring surface and ground water quality since 1973. The surface water quality monitoring programme of DoE includes 63 stations of 27 rivers in Bangladesh. Six divisional offices of DoE measure about 12 parameters (physical and chemical) of collected samples. These are pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Suspended Solid (SS), Total Dissolved Solid (TDS), Electrical Conductivity (EC), Chloride, Turbidity and Total Alkalinity.

Based on the parameters mentioned above, water quality of the major rivers viz. *Padma, Meghna, Jamuna, Dhaleshwari, Surma, Korotoa* etc. was within the limit of Environmental Quality Standards (EQS) in 2015. While rivers around greater *Dhaka* were highly polluted specially in the first five months of 2015 in terms of DO, BOD and COD value. DO was almost zero from January to May at different locations of *Buriganga, Shitalakhya* and *Turag*. High level of BOD 35 mg/l (acceptable range 6 mg/l or less according to Environmental Conservation Rules 1997) and COD 124 mg/l (acceptable range up to 35 mg/l or less according to UNECE standard), TDS 639 mg/l (acceptable range up to 500 mg/l according to USEPA standard) were found in *Buriganga* river from January to December in 2015.

High level of Chloride 12,692 mg/l (acceptable range 250 mg/l USEPA standard) and TDS 16376 mg/l were found in *Pashur* River. Generally high turbidity of water was found in the

rivers flowing in the southern coastal part *Bangladesh*, part of central zone. High turbidity reduced transparency of water that ultimately caused reduction in phytoplankton production in one hand and up lift river channel bed through silt deposition on the other hand. High COD 353 mg/l (acceptable range up to 35 mg/l or less according to UNECE standard) was found in *Karnaphuli* River. Chloride content in *Karnaphuli* river water was mostly beyond the EQS. DO and BOD of *Halda* river water were within the EQS. DO was above the EQS throughout the year of 2015, chloride content was relatively higher during high tide.

A comparative analysis between the periods of 1975-1979 and 2010-2014 for *Buriganga*, *Sitalakhya* and *Turag* river revealed that the water quality was up to the EQS during eighties of the last century, then with the passage of time water quality began to degrade following enormous population pressure, dumping of huge effluent and industrial sewerage and solid wastes into rivers, encroachment, etc. and finally reached to an ecologically critical condition.

Bio-diversity Conservation

Bangladesh is a signatory to the United Nations Convention on Biological Diversity (UNCBD). Being a party of the UNCBD, on behalf the government, the Department of Environment is working for international commitment of Bangladesh. The Department of Environment provides support to the government in preparing policies and strategies related to conservation of biological diversity at national and international levels. At national levels National Biodiversity Strategy and Action Plan (NBSAP) is in the process of updating in conformity with the United Nations Biodiversity Strategic Planning 2011-2020.

Biodiversity National Assessment and Programme of Action 2020 have been prepared for conservation of important biological resources of the country. Different projects have been implemented and under implementation. Some activities are:

- **Formation of Village Conservation Groups (VCG):** 74 Village Conservation Groups (VCG) have been formed by the Department of Environment engaging dedicated organized people in *Hakaluki Haor*, *Cox's Bazar-Teknaf Peninsula* and *Sonadia Island* Ecologically Critical Areas (ECA). The VCGs are registered with the Department of Cooperatives. Environmental, Ecological, Biodiversity conservation and livelihood diversification activities are systematized by these VCGs.
- **Creation and Conservation of Mangrove Forest:** Mangrove forest were created and as well as conserved in different areas in Cox's Bazar such as *Nuniarchhra* of Cox's Bazar Sadar Upazila, *Sonadia Island* of *Moheshkhali Upazila*, *Khurushkul Rastarpara* of Cox's Bazar Sadar Upazila and *Teknaf* area. 400 acres *Nuniarchhara* Mangrove Forest created and conserved by the Department of Environment is important for environmental conservation and improvement of the area. The *Nuniarchhara* Mangrove protects the life, livelihood and resources of the area from cyclone and surge.
- **Creation and Conservation of Swamp Forest:** The Department of Environment has improved the *Hakaluki Haor* ecosystems by creation and conservation of Swamp Forest.

The department has conserved 500 ha Swamp Forest and created 10 ha Swamp Forest in different areas in *Hakaluki Haor*. Swamp contributes in carbon sequestration and habitat creation. Swamp Forest is important habitat for fish, aquatic plants and animals, wildlife and local and migratory birds.

- **Establishment of Wetland Sanctuary:** Established 9 wetland sanctuaries after re-excavation envisioned for ecosystems management and fisheries conservation, which is very important for conservation of wetland biodiversity and fisheries resources of *Hakaluki Haor*.
- **Construction of Submersible Greenbelts:** 10 submersible greenbelts have been constructed in *Hakaluki Haor* to protect *Haor* fringe villages from powerful wave action locally called *afal* during flooding time. 10 submersible embankments constructed and at the same time was planted many saplings aimed at formation of green belt alongside the ridge.
- **Installation of Solar Based Irrigation Plants:** Installed 5 solar based irrigation plants with the objectives of reduce fossil fuel burning; at the same time helping farmers to get a good harvest with proper watering. The irrigation pumps will also play a central role in diversifying agriculture crops which has multifarious benefit for farmers and for land including reduces the risk of farming. This is an effective intervention for climate change mitigation.
- **Installation of Solar Based Desalinisation Plants:** Installed 2 solar based desalinisation plants to supply pure drinking water to the most vulnerable coastal communities in Cox's Bazar where there is no source of pure drinking water close by and people are mostly compelled to drink saline water due to intrusion of salinity at the same time using renewable energy. This is a great intervention for climate change mitigation.

Bangladesh is a party to the Cartagena Protocol on Biosafety to UNCBD. Department of Environment has developed guidelines, framework and rules-regulations towards addressing the potential risks of Genetically Modified Organisms (GMO) to biodiversity and human health. In line with the obligations of the Cartagena Protocol to UNCBD, the government has enacted Bangladesh Biosafety Rules 2012. Development of National Biosafety Framework (INBF) is in place to enhance the capacity building on biosafety at the institutional and individual levels. Necessary amendment of Bangladesh Biosafety Rules 2012 is underway.

Besides these, other important activities of DoE for bio-diversity are:

- 1) Turtle's conservation in *Cox's Bazar-Teknaf sea beach*, *Sonadia Island* and *Saint Martin's Island*.
- 2) Bird and wildlife conservation in *Cox's Bazar-Teknaf sea beach*, *Sonadia Island* and *Hakaluki Haor* by saving their residents.
- 3) Plantation in *Hakaluki Haor*, *Cox's Bazar-Teknaf sea beach*, *Sonadia Island* and *Saint Martin's Island*.
- 4) Coral preservation in *Saint Martin's Island*.
- 5) Introduce eco-friendly improved stoves or *Bandhu Chula* in Ecologically Critical Areas.

- 6) Introduce eco-friendly solar system at household in Ecologically Critical Areas.
- 7) Dune conservation in *Cox's Bazar-Teknaf sea beach*, *Sonadia Island* and *Saint Martin's Island*.
- 8) Allotment of Tk.1.00 crore as Endowment fund to 10 *upazila* committee in *Hakaluki Haor* and *Cox's Bazar* area for emergency protection work and other enforcement activities.
- 9) Awareness builds up among population of Ecologically Critical Areas to bio-diversity conservation and adaptation and mitigation for climate change.

Two Safari Parks named *Bangabandhu Sheikh Mujib* Safari Park in *Gazipur* and *Cox's Bazar* and *Sheikh Russell* Aviary and Eco-Park in *Rangunia*, 17 National Parks and 21 Wildlife Sanctuaries have been established as a part of conservation of bio-diversity and natural environment of forests. Another two safe zones have been declared for conservation of vulture. Harvesting of old plantation along with natural reserved forest has been stopped for conservation of bio-diversity. Harvesting of natural forests of government *khas* land is being controlled. A crime control unit involving Police, Customs, Coast Guard and Bangladesh Forest Department has been working for curb the killing and trafficking of wildlife through making necessary co-ordination.

According to the Article 20(1) mentioned in the Wildlife (Protection and Security) Act 2012, “*Swatch of No Ground*” with 1,738.00 sq. kilometers situated in the Bay of Bengal has been declared as marine protected area by the People's Republic of *Bangladesh*.

In order to promote sustainable tourism in *Sundarbans*, some restrictions must be imposed on random travels to maintain long term sustainability of *Sundarbans* Reserved Forest. Eventually, *Sundarbans* Travel Rule-2014 has been proposed where the number of tourist should never exceed the carrying capacity.

Presently a number of special projects are being implemented by the Bangladesh Forest Department for biodiversity conservation; such as i) *Bangabandhu Sheikh Mujib* Safari Park, *Gazipur*, ii) *Sheikh Russell* Aviary and Eco-Park, *Rangunia, Chittagong*, iii) Strengthening Regional Co-operation for Wildlife Protection iv) Development and Extension of *Bangabandhu Sheikh Mujib* Safari Park, *Cox's Bazar* v) Eco-Restoration of the Northern Region of Bangladesh and vi) Establishment of botanical garden at *Lalmai Hill* Areas.

Forest conservation has been more accelerated at 21 protected areas to protect forests for future generation and conserve existing biodiversity involving local communities in co-management approach. Co-management activity has been strengthened and expanded along with the expansion of social forestry area as a part of this process. Half of the income from entry fee of protected areas is being allocated for livelihood improvement of local communities and landscape development

Ozone Layer Protection

Bangladesh had signed the Montreal Protocol on 2 August, 1990 and ratified its London, Copenhagen, Montreal and Beijing amendments in 1994, 2000, 2001 and 2010 respectively. Bangladesh is enlisted in Article 5 (1) of the protocol. Guided by the condition of the protocol, use of CFC control started gradually from 1 July 1999 in 2010 it became zero level. In addition, an Ozone Cell was formed in DoE in 1996 and several other projects are on board under the financial support of the Multilateral Fund (MLF).

Some important activities carried out by the Department of Environment (DoE) to protect the Ozone Layer are as follows:

- Survey and Data reporting on the use and import of Ozone Depleting Substances (ODS) to the Ozone Secretariat, Montreal Protocol Multilateral Fund and Implementing agencies each year;
- Enacted “Ozone Depleting Substances (Control) Rules, 2004” in 2004 and amended in September 2014.
- Phased-out about 50 percent CFCs in the aerosol sector in 2002 by Public Private Partnership conversion project.
- 653 law enforcing officials have been trained by training workshop named “Promotion of Ozone Layer Protection in Bangladesh” and Implementation of Montreal Protocol in Bangladesh.
- 6,850 refrigeration technicians have been trained through “Good Service Practices in Refrigeration and Air-conditioning”. Again, 350 customs officers and other law enforcing officials have been trained through “Green Trade for the Protection of Ozone Layer”. Besides, to prevent illegal trade of ODSs at customs entry point, customs department have been provided with the ODS identifiers.
- CFCs have been phased-out from the pharmaceutical sector in the manufacturing of Metered Dose Inhalers (MDIs) in 2012.
- HCFC-141b has been phased-out completely from the refrigerator insulation foam production as a blowing agent in 2012.
- 2,000 technicians have been trained in Refrigerator Retrofit training programme.
- 800 service shops owners have been provided with retrofitting tools and other servicing equipment.
- Organising training programme on capacity building of ODS users;
- Phase out CFC-11 (chlorofluorocarbons) and CFC-12 in manufacturing of Metered Dose Inhalers (MDIs) in pharmaceutical industry in Bangladesh. Transition Strategy project and Conversion project is being implemented with the assistance of UNEP and UNDP respectively funded by Multilateral Fund (MLF);

- Formulation of the ‘HCFC Phase-out Management Plan (Stage-I)’ to phase out hydro-chlorofluorocarbon (HCFC);
- Start implementation of project financed by Multilateral Fund assisted by UNDP with a view to phasing out HCFC-14 B from Foam Sector;
- Reduction of Chlorofluorocarbon (CFC) use at zero level in all sectors except pharmaceutical industry by 1 January 2010 and full phasing out of the use of Chlorofluorocarbon (CFC) in pharmaceutical industry by 2012.
- Phased-out HCFC-141b from the manufacturing of refrigerator foam as foam blowing agent on 1 January 2013. Bangladesh is the first Article 5 country to phase-out HCFC-141b from foam sector.

Green Banking

Green banking initiatives of Bangladesh Bank(BB) are broadly categorized into the following aspects: policy initiatives, monitoring of green banking activities of banks and FIs, refinance support from BB in diverse green products/sectors and Bangladesh Bank’s own initiatives in environmental management. Bangladesh Bank issued a comprehensive Policy Guidelines for Green Banking to banks and financial institutions in January 2011 with a view to develop a sustainable financial system. In FY2015-16 (Up to March 2016), banks and FIs have disbursed Tk.36,002.00 crore for green finance. In the same period, out of 41,462 rated projects banks and FIs have disbursed Tk.1,66,473.00 crore against 36,042 environmental risk rated projects.

To promote renewable energy and environment friendly financial activity in the country, Bangladesh Bank has formulated a refinance scheme of a revolving nature from its own source amounting Tk.200.00 crore in 2009 for 6 environmental friendly sectors. In FY2014-15 this list has been increased from 6 to 47 and in FY2015-16 it has been increased from 47 to 50. Newly included products in the product list are 'Central Effluent Treatment Plant', 'Waste heat recovery system' and 'Used lead acid battery recycling'.

Conservation of Forest

Forest Department has been managing forests of the country for conservation of biodiversity and to ensure sustainability of the forest resources. The total forests of Bangladesh are 1.60 million hectares at present. About 1.40 million hectares are natural forests and the rest of 0.20 million hectares are coastal forest which has been created by Forest Department artificially through coastal forestation on newly accreted areas. Moreover, there are about 0.77 million hectares homestead forests growing on around villages and marginal land of the country.

Table 15.3: The Comparative Scenario/Statistics of Forest Land in SAARC Countries (2015)

Solano	Name of the Country	Total Land(Sq.Km.)	Total Forest	Forest
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			Land(Sq.Km)	Coverage(%)
1.	Afghanistan	6,52,860	13,500.00	2.10
2.	Bangladesh	1,47,570	1,950.97	13.22
3.	Bhutan	38,117	27,550.00	72.30
4.	India	29,73,190	7,06,820.00	23.80
5.	Maldives	300	10.00	3.30
6.	Nepal	1,43,350	36,360.00	25.40
7.	Pakistan	7,70,880	16,010.00	2.08
8.	Srilanka	62,710	20,700.00	33.00

Source: <http://data.worldbank.org/indicator/AG.LND.FRST.ZS>

Meanwhile, Forest Department has taken initiative to implement different types of development projects and programs, providing training and creating suitable environment for agriculture production, to enrich depleted forest resources, to ensure supply of raw materials to wood-based industries, to conserve and develop bio-diversity, environment as well as wildlife and to expand eco-tourism.

During FY2015-16, Forest Department implemented 10 development projects (6 investment projects and 4 technical assistance project) with an ADP allocation of Tk.29,204.00 lakh. Out of this allocation, the amount of Tk.26,914.81 lakh has been spent, which was 92 percent of the total allocation.

Social Forestry and Poverty Reduction Activities

Social forestry activities are milestone achievement of Forest Department which is playing a vital role to reduce poverty. During FY2015-16 Forest Department established 7,694 hectares Block/Woodlot plantation, 869 km. Strip plantation and 33.217 lakh seedlings has been raised under different projects, climate change trust fund projects and revenue budget.

In the FY2014-15, Tk.2,038.35 lakh was distributed among 20,000 beneficiaries as their share. To date about 6,05,566 beneficiaries involved with social forestry activities. In the meantime, about 1,20,413 beneficiaries have received about TK.23,700.00 lakh as benefit sharing of the social forestry. Social Forestry Rule-2004 has been updated in which rate of benefit has been enhanced in particular cases. This activity is playing a vital role in the social safety net programme of Government. Social forestry is largely contributing towards economic development and women empowerment as well as reducing poverty.

National Herbarium

Bangladesh National Herbarium (BNH) plays an important role in research and development of plant resources like medicinal resources, botanical and economically important plant of the country and also takes other measures to preserve environment and conserve bio-diversity. The collection of the herbarium is a national property that goes down to the posterity through generations and work as reference materials on the flora of the country. The Herbarium published a booklet series called 'Flora of Bangladesh' which includes information about plant species of the country.

The Herbarium carried out a range of activities during FY2015-16 which include among others Botanical Survey Activities, Plant Identification, Plant Specimen Preservation and Developing Database of the Identified Samples, Plant Preservation, Publication of Flora of Bangladesh, Floristic Publication and Recording of Plant Species as new records get available in Bangladesh. In addition, a programme titled *Red Data Book of Vascular Plants of Bangladesh, Vol-2*, during the period from FY2009-10 to FY2012-13 and 'Red Data Book of Vascular Plants of Bangladesh, Vol-3' during FY2013-14.

Natural Disaster Management

Bangladesh is one of the most disaster-prone countries in the world. Every year, lives and property are affected due to various disasters. Among these disasters, the cyclone of 1970, 1991, cyclone *SIDR* in 2007, cyclone *AILA* in 2009 and flood of 1988, 1998, 2004 and 2007 were most devastating. Ministry of Disaster Management and Relief have been playing a vital role in disaster risk reduction and preparedness and post disaster rehabilitation management. To combat the disaster, the primary 'vision' of the government is to establish an emergency response system by enhancing the total management capacity of the institutions and by its empowerment to cope with a big scale disaster. For this, the poor and vulnerable peoples risk reduction will be ensured.

Actions/Initiatives Taken in Disaster Management

(A) Preparatory Activities

- Shifting from the culture of the traditional relief and rehabilitation and adoption of more modern risk reduction and preparedness techniques to ensure sustainable development.
- ICT based microzonation mapping helps in planning of urbanisation to reduce risk of earthquake. Microzonation map has been developed for 3 major cities e.g. *Dhaka, Chittagong and Sylhet*, considering the earthquake vulnerability and risk of these cities. Preparation of microzonation maps of six more cities e.g. *Mymensingh, Tangail, Bagura, Dinajpur, Rajshahi and Rangpur* completed. Survey and development of a database of buildings in *Dhaka* and *Chittagong* is also done.

(B) Activities Related to Act, Policies, Rules and Contracts

- To ensure effective disaster management and disaster risk mitigation administering the institutional recognition, making and planning of national and local planning, to protect disaster risk people's life, property and fundamental rights for providing appropriate legal framework, Disaster Management Act was approved in September, 2012 and published in Bangla. Disaster Management Rules is published in 2015.
- All ministries, departments, organisations and individuals related to disaster management in order to fulfill their duties and responsibilities and to make its own action plan, Standing Orders on Disaster has been amended in 1997. In those Standing Orders on Disaster, Standing Orders on Disaster (SOD) are amended by including

hazards like earthquake, tsunami and fire in disaster management at the National Disaster Management Council 2010.

- The Cyclone Shelter Construction, Maintenance and Management Guidelines 2011 were prepared for better maintenance, management and construction of shelters by different authorities.
- National Disaster Management Policy-2015 has been approved in September 2015 and published in Bangla.

(C) Actions Related to Preparation of Plans

- At World Conference on Disaster Risk Reduction held in March 2015 at *Sendai* city, Japan 187 countries adopted '*Sendai* Framework for Disaster Risk Reduction 2015-30'. Bangladesh is preparing the action plan based on the framework.
- Bangladesh has contributed in the preparation of SAARC Plan of Action for Disaster Management including the SAARC Member Countries policies and plans.
- Midterm evaluation on 'National Disaster Management Plan (2010-2015)' is completed. Now 'National Disaster Management Plan(2016-2020)' preparation is going on.
- National Contingency Plans have been prepared for early recovery from any disastrous event including earthquake. National contingency plans are prepared for different organisations responsible for emergency response such as Department of Disaster Management, Bangladesh Fire Service and Civil Defense, Armed Forces Division, Cyclone Preparedness Programme, City Corporation of *Dhaka, Chittagong and Sylhet* and for various service providers like electricity, gas, T&T, WASA and health. Spatial contingency plan and risk profile has been completed at 50 wards of Dhaka, Chittagong and *Sylhet* city.
- The inundation maps/risk maps for flood (for flood prone areas) and storm surge (coastal area) have been developed (up to *upazila* level) and uploaded in the DMIC website (www.dmic.org.bd/inmap). The map could be used to determine the safe plinth level for construction of houses, shelter, *kill*a, road, embankment and any other infrastructure.
- The formulation of guidelines on Incident Management System in Bangladesh is going on for better respond to disaster.

(D) Awareness Building and Lesson Learning Programmes

- The National Curriculum and Text Book Board (NCTB) have been supported to institutionalise Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) education. Incorporation of DRR & CCA issues in 35 text books from elementary to higher secondary curricula has been completed. 20 million students are able to gain knowledge.

- To develop a professional manpower with disaster management and climate change knowledge the issue of climate change and disaster management is included in educational and training institutions curriculum. Dhaka University, *Rangpur* Begum Rekey University, *Potuakhali* Science and Technology University and Bangladesh University of Professionals already started undergraduate honours courses and postgraduate courses on disaster management and climate change. Diploma/postgraduate courses have been introduced in 29 universities.
- A professional disaster management institutional network (BDMERT) has been formed with 31 educational and research institutions to exchange disaster risk reduction and climate change adaptation policy curriculum and other educational materials.
- CDMP worked with various public and private universities and training institutes for supporting institutionalisation of disaster management education and training profession. For this purpose, the following function has been taken: making syllabus, establishment of faculty, GIS-remote sensing and establishment of GPS laboratory, development of class rooms, partially education expense assistance, cost of research support, support for references and resources, to conduct different local, national and international educational seminars and workshops.
- A total of 944 persons have been given educational assistance where 277 people govt. officer and 677 private officers got partial educational assistance and research fund under Disaster Management Education Program, CDMP phase II project, Ministry of Disaster Management and Relief. Total of 399 students (government-130, private-269) have been completed courses in disaster management from various public and private universities and training institutes.
- 12 e-Learning (Electronic Learning) center on disaster management at public universities and training institutions and 1 center at every districts of the country total 64 resource centers have been established.

(E) Training Initiatives

- Foundation training for the DRRO's and PIO's of a period at two months are going on to enhance skills, especially the currents strategies to combat disasters.
- Advanced GIS training module is developed to establish a disaster risk reduction database with information, data, lifeline and emergency information and for emergency response.
- Yearly Conference of DRRO's are arranged for well coordination between field and Ministry.
- Members of Bangladesh police, *Ansar*, VDP , BNCC have been supported with in-country and foreign training on disaster management, preparation, response and recovery.
- Trainings have been imparted on GIS to 60 officers of *Titas* Gas, Armed Force Division, Fire Service and Civil Defense etc. who are the focal point for emergency response.

- Under CDMP II project, in collaboration with the Fire Services (FSCD) has developed 30,011 urban volunteers who have been trained up and have been provided with personal security materials. Moreover, 105 persons of cadet core and 650 volunteers of Bangladesh Scouts have been provided with training.
- Various initiatives have been undertaken to empower the local level disaster managers through training. In this regard, under harmonised training module, district, *upzila* and union level 3,200 officials have been trained on disaster management.
- Harmonized Training Module and training module for the trainers and trainee have been prepared for coordination and harmonization in the training programmes of government and non-government organisations.
- 950 members of *Upzila* Disaster Management Committee of 25 *upzilas* have been provided with training on the roles and responsibilities regarding disaster management as per the SoD.
- Training of 1,950 constructions professional on safe construction (considering earthquake risk) has been completed by HBRI.
- The project CDMP II is providing support to the Ministry of Education and Ministry of Primary and Mass Education to make schools safer through non-structural interventions. In coordination with these ministries CDMP II completed training of Primary and Secondary School Teachers and Instructors in 493 *upazilas* regarding earthquake safety. Moreover training manual for educating the students on climate change adaptation and disaster management has also been prepared.
- Damage and Needs Assessment (DNA) cell has been established in the Department of Disaster Management. The District Relief and Rehabilitation Officer (DRRO) and Project Implementation Officers (PIOs) of 13 districts have been provided with training on DNA software.
- In order to run mobile courts as per the Disaster Management Act 2012 and for awareness building in order to reduce launch/boat accidents, 350 officers and civil society representatives, journalists, representatives of launch/boat owners association, drivers association of *Munshiganj, Chandpur, Barisal, Patuakhali, Barguna, Jhalkathi, Bhola* have been provided with training.
- 245 Poursava mayors and representatives have been provided training on local government self- assessment toolkit to assess the capacity of disaster management.
- 4 National workshops on Lightning/ thunder Storms, flood, Earthquake and Cyclone were held to Ouate more awareness amongst the people.

(F) Actions Related to Disaster Reduction, Procuring Equipment and Structural Intervention

- Under the project *Procurement of Equipment for Search and Rescue Operation for Earthquake and Other Disasters*, after buying nearly Tk.69.00 crore materials for using rescue operations of earthquake and other natural disaster, it is given to Bangladesh Armed Forces Division, Fire Service and Civil Defense and the City Corporations. The purchase of further Tk.159.00 crore instruments is under implement at the second phase of this project.
- For emergency response 12 emergency motor vehicle and 6 water ambulance have been purchased for the cyclone prone coastal belt and procurement of 25 more small size rough sea aquatic boats is under process.
- Supported establishment of Disaster Management Cell in PM Office, procurement of equipment (Monitor, Digital sender, Projector) has been completed.
- Department of Agriculture Extension (DAE) has been supported in the establishment of Climate Field School and setting up plot for adaptive agriculture practice in 52 *upazila* of 26 districts. 10 Resilient Agriculture Model Village has been established jointly by DAE, DoF and DLS.
- CDMP is implementing rural risk reduction initiatives in 41 district covering 107 *upazila* and 339 unions. 2,371 small-scale schemes have been taken, 1,527 are already completed. Two Disaster and Climate Resilient Habitant has been established in *Aila* affected *Suterkhali* union under *Dacope upazila* of *Khulna* district to rehabilitate 203 families.
- Construction of 100 unit house has been completed under the 1st phase of DRH project at *Gopalganj* Municipality in association with UPPR and *Gopalganj* Municipality.
- 74 flood shelters have been built and project of building 156 more flood shelters have been implemented for the flood prone area. Moreover, 107 cyclone shelters have been completed. 64 shelters/killas have been rehabilitated and project of building 220 more cyclone shelters have been approved for the cyclone prone area.
- After the effect of cyclone *Aila* Government had built 6,186 houses under climate change trust fund. After 2013 Tornado in *Brahmanbaria* district 100 disaster resilient houses are under constructed under climate change trust fund.
- To ensure pure drinking water for the *Aila* affected disaster area 160 ponds have been excavated/re-excavated. 208 rain water harvesters have been constructed and 81 pond filters have been established. This ministry has procured 30 saline water treatment plants. It is expected that more will be procured.
- Construction of small bridge/culvert (not more than 15m length) project on earthen rural road is implemented by the Ministry of Disaster Management and Relief. The main objective of this project is to prevent water logging and to create better communication facilities in the rural area. A total of 4,641 bridges/culverts in plain land and 507 in hill

tracts area have been constructed. A total of 13,000 bridges/culverts will be constructed around 2020.

(G) Strengthening the Ability to Reduce the Risk

- Seismic risk assessment, Microzonation Mapping and Contingency planning of the country's earthquake hazard of 9 cities (*Dhaka, Chittagong, Sylhet, Mymensingh, Tangail, Rajshahi, Dinajpur, Rajshahi and Rangpur*) is completed considering into earthquake vulnerability and risk. Microzonation map and atlas has been prepared and published for mass people understanding. Also a database making works has been completed by doing a survey on the building of 112 wards (91 Dhaka, 21 Chittagong). Moreover, with the assistance of PDB, Dhaka Medical College Hospital building and effectiveness of retrofitting of the Secretariat buildings no. 1 and 4 has been completed.
- *Upazila* disaster management plan has been prepared at 10 districts and 48 *upazilas* to reduce all forms of hazards at union, *upazila* and district level with the participation of local NGOs.
- According to the official guidelines of Ministry of Primary and Mass Education, reduce of disaster hazard preparedness was held for single time among the country's 30,000 primary and 6,000 secondary schools. To support the trial program, two-day training has been provided to 14,000 primary school teachers, 1,200 education officers and inspectors.
- 1,200 pocket radios were provided at coastal region to broadcast about disaster by 14 community radio stations and to increase the audience of for awareness campaign.
- Union leaflet has been published and distributed for 1,700 union and DRR, CCA template has been prepared and given to NILG for including disaster hazard reduce and climate change adaptation issues at union development plan.
- Health crisis management center has been established for preparing work plan after earthquake, ensuring service after disaster under Department of Health, Ministry of Health.
- Financial assistance is giving for setting up 10 model fire station.
- Public Works Department has been providing necessary assistance to increase retrofitting by supplying necessary equipment and setting up retrofitting.
- Under LDRRF, CDMP project, 1,953 small scheme has been received to reduce disaster hazard at rural level of 40 districts, 109 *upazillas*, and 322 unions. Among this, 1,123 small schemes has been implemented and currently 830 small schemes is going on.
- 13 key ministries are supported to incorporate disaster risk reduction issues in their planning and budgeting process.
- FFWC-BWDB has been supported in extending the flood forecasting lead time to 5-days (earlier it was 3-days). Newly developed 5-day lead time deterministic flood forecast is now being disseminated to all 38 stations and the forecast is being uploaded daily in www.ffwc.gov.bd web site. A Bengali version of the web contents also prepared for the use of the wider audience.

Early Warning Signals and Emergency Response Activities

Bangladesh is a natural disaster prone country. Cyclone and flood occurs frequently. Early warning signals are helpful for disaster risk reduction or damage. Development in early warning signals reduces the loss and damages in natural disaster comparatively earlier. Following three systems are newly included to send disaster message:

- **Cell Broadcasting System (CBS):** CBS plays a vital and effective role in dissemination of warning message as mobile technology and network established in every corner of the country. Disaster related information, early warning signals and liaison messages will be seen in mobile screen in a specific geographical area. After the success of the pilot initiatives, another programme is to extend the coverage to 14 coastal districts with increasing the length of the message to 120 characters in Bangla.
- **Interactive Voice Response (IVR):** It is a much appreciated initiative of CDMP and received national and international award. The IVR system is now installed and connected with six mobile service providers. Technical training on the IVR has been provided to FFWC and BMD officials. Anyone can have hazard/disaster related update by dialing 10941 from the IVR system.
- **Mobile Short Message Service (SMS):** SMS helps in maintaining coordination among all the officers responsible for discharging all kinds of duties related to disaster, disseminating internal early warning signals and creating public awareness. Considering the immense potential of mobile phone use, a database is under preparation including the contact number of chairman and secretaries of union, *upazila* and district level disaster management committees by DDM. This facility provides the general public 24/7 access to fetch updated pre-recorded multi-hazard early warning messages collected from Flood Forecasting and Warning Centre (FFWC) and Bangladesh Meteorological Department (BMD). The system offers bilingual format of *Bangla* and English and is now covering all existing mobile telephone networks.

Disaster Management Information Center (DMIC): To establish an internet based information communication technology and infrastructure DMIC is build up to the office of DDM at 64 district and 485 *upazilas*. Initiatives have been taken to send disaster alert through SMS to Union Information Service Center from the DMIC.