

— B A N G L A D E S H —

ENVIRONMENT AND CLIMATE CHANGE



Bangladesh: Environment and Climate Change

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Introduction

Bangladesh is one of the world's most populated countries, being home to over 160 million. It has been placed at the 6th position among the countries vulnerable to natural disasters due to climate change. Cyclones, floods and droughts have long been part of the country's history and these occurrences have intensified in recent years.

Over the past few decades, rapid reduction of biodiversity has become a global concern and Bangladesh is no exception. Due to country's tremendous population pressure, rural poverty and unemployment problem, the natural resource base has been alarmingly decreasing. To alter this situation and to preserve the ecosystem and biological diversity, various strategies, policies and institutional initiatives have been taken by different government and non-government agencies. Bangladesh is signatory to many international treaties, laws, legislations and policies related to conserving biological diversity. Bangladesh has signed five major conventions and agreements related to biodiversity conservation. As a signatory to these conventions, the government has undertaken various initiatives to conserve the biodiversity in both the ecosystem and at the species level.

Bangladesh has placed confronting the challenge of climate change at the core of its development agenda through different policy initiatives. These initiatives, from climate change adaptation measures to ecosystem preservation legislation, mean that the current and the future generations of Bangladeshis are better prepared to address climate change risks and that they can reverse the impacts of environmental degradation. This publication covers sector wise achievements, key initiatives, progress in the Sustainable Development Goals and the major environmental challenges for the country.

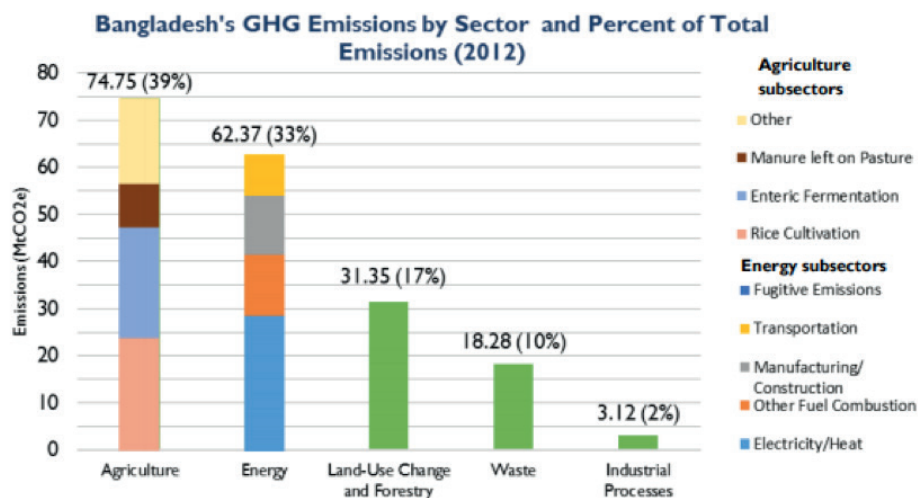
01

Bangladesh's Greenhouse Gas Emissions Profile

Bangladesh accounts for just **0.35% of global emissions**

6th most vulnerable to natural disasters due to climate change

Bangladesh has pledged an unconditional **5% greenhouse gas emissions cut** by 2030



Sources: WRI CAIT 2.0, 2015; FAOSTAT, 2015

02

Progress and Achievements

Champions of the Earth Award

In 2015, Prime Minister Sheikh Hasina received UN's highest environmental accolade – Champions of the Earth – in recognition of Bangladesh's far-reaching initiatives to address climate change and for her outstanding policy leadership role.

Through the award United Nations Environment Programme (UNEP) recognised Bangladesh's first-off-the-block initiatives to prepare the ecologically fragile country for the challenges it faces from climate change.

The Bangladesh government has made several strides to address the challenges of climate change. In 2005, Bangladesh was the first Least Developed Country to prepare the National Adaptation Programme of Action (NAPA), which documented the urgently needed adaptation actions. Moreover, Bangladesh is in the process of initiating the National Adaptation Plan (NAP).

CHAMPIONS OF THE EARTH



In 2009, Bangladesh Climate Change Strategy and Action Plan (BCCSAP) was developed, and published with great international appreciation. As the first country, Bangladesh developed the Climate Change Trust Fund (BCCTF), with its own resources, to tackle the adverse effects of climate change. Another fund called Bangladesh Climate Change Resilience Fund was initiated with funds from development partners. In 2014, Bangladesh also prepared the Climate Fiscal Framework which provides guidelines for planning and managing climate change related finance efficiently. Bangladesh had submitted the First and the Second National Communications to United Nations Framework Convention on Climate Change (UNFCCC). Third National Communication was submitted more recently. The National Communication (NC) is the report that the developing countries submit to UNFCCC every four years. Following the Paris Agreement, Bangladesh also submitted the first Nationally Determined Contributions (NDCs) in 2016 which describes Bangladesh's plan to tackle greenhouse gases (GHG).

Government Efforts in Conservation and Environmental Protection

1

'Bangladesh Climate Change Strategy and Action Plan' was prepared in 2009. 145 work plans and 44 programmes were taken up to face issues regarding food security, disaster management, infrastructure, research works, curbing emissions of greenhouse gases and capacity building.

2

Government has, by its own resources, established a US\$ 400 million Bangladesh Climate Change Trust Fund under which 440 projects are being implemented.

3

Bangladesh is a signatory to the United Nations Framework Convention on Climate Change. In its 21st convention that adopted the Paris Declaration for keeping the rise of temperature below maximum 2 degrees, or 1.5 degrees if possible.

4

18 million or about 11 percent of the population are getting the benefits of solar power. Solar water pumps are being encouraged in agriculture in place of diesel pumps. 2 million improved cooking burners have been distributed among villagers.

5

Coastal green belts were established in coastal areas for minimizing losses due to cyclones and tidal waves. The forestation activities are being done in the newly raised lands in seas and river mouths.



Kutubdia wind turbines, Bangladesh's first wind power generation project

Efforts from the Non-Government Sectors

A few key scientists and think tanks from Bangladesh provided the leaderships in United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC) from their inception in late eighties. They continued to give leadership in adaptation discourse, assessing vulnerability and impacts, highlighting issues of inequity and need for global climate justice. Several key scientists and institutions in Bangladesh continue to be global leaders in national, regional and global discourse, planning science and policy mobilization across the world, more particularly to Least Developed Countries and poor developing countries.

The NGOs in Bangladesh have incorporated climate change in most of their programmes. They have developed extensive training for local

government and communities across the country. These include wide-ranging efforts in food production, water and land management, agriculture, fisheries, forestry, energy efficiency, education and training, gender and child-sensitive adaptation practices, better ecosystem management and biodiversity production. Bangladesh government with support from its research, non-government organisations (NGO) and academic committees has developed a leadership role in climate change negotiations, global climate governance, and financial mechanism related discourse.

In 2008, the Executive Director of Bangladesh Centre for Advanced Studies (BCAS) Dr Atiq Rahman was honored with the highest UN-Environmental Award, the Champion of the Earth, in recognition of his outstanding and inspirational leadership and contribution globally, regionally, nationally and locally, to the protection and sustainable management of the earth's environment and natural resources.



Sustainable Development Goals: Bangladesh's Progress in Environment and Climate Change

Goal 6: Clean Water and Sanitation

Ensure availability and sustainable management of water and sanitation for all

Bangladesh has done remarkably well in ensuring access to drinking water and sanitation to its people over the years. Before testing positive for arsenic, the country enjoyed almost universal access to drinking water. Open defecation has become almost nil. As a result of such improvements, the casualty from enteric diseases has fallen rapidly.

High-Level Panel on Water (HLPW)

In November 2015, the United Nations Secretary-General's Advisory Board on Water and Sanitation (UNSGAB) recommended to form high-level alliances to tackle water-related challenges, as to convene a Heads of State/Government Panel on Water. The Panel would lead global advocacy for water resilience

and adaptation. The Honourable Prime Minister of Bangladesh Sheikh Hasina, was nominated as one of the important Asian members of the High Level Panel on Water (HLPW). The outstanding successes of Bangladesh in achieving the MDGs during the period of 2000-2015, catalyzed the hold of her strong position in the 11-member HLPW. The major task of the HLPW is to achieve SDG-6 particularly and other SDGs that rely on the development and management of water resources.

Indicator 6.1.1

Proportion of population using safely managed drinking water services

87% of the population is using safely managed drinking water services



Currently, the proportion of population using safely managed drinking water services stands at 87 percent (after making adjustments for arsenic contamination). Despite the remarkable progress made, at the beginning of the SDG era, Bangladesh had the 2nd lowest water supply coverage among the South-Asian countries. In the South Asian region, Bhutan has the highest percentage of population using improved drinking water source, followed by Maldives, and Sri Lanka.

Indicator 6.2.1

Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water

77% of the population is using improved sanitation facilities



According to the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) report in 2015, only 1% of the population are practicing open defecation, 10% of the population are using unimproved latrines, 28% of the population are sharing latrines and 61% of the population are using improved latrines. In Bangladesh, a nationwide baseline survey conducted for the first time in 2003 revealed that improved sanitation coverage was only 33% and 42% of the population had no latrine for defecation. This indicates that improved sanitation coverage in the country has increased by 28% since 2003. According to Bangladesh Bureau of Statistics and UNICEF (2014), 77 percent of the population of Bangladesh is living in households using improved sanitation facilities including shared facilities. Within this population 86.3% is in urban areas and 74.4% in rural areas. Residents of Barisal division are particularly less likely than others to use improved facilities (58.8 percent). Use of improved sanitation facilities is strongly correlated with wealth, 95.8% of the richest households use improved sanitation facilities whereas only half of the poorest households use improved sanitation. The percentage of population without any toilet facility, though overall low, is still significantly high among the poorest households, and in the Rangpur division.

Bangladesh has already identified hydro-geologically and socio-economically difficult areas (Hard to Reach Areas) and people while preparing the “National Strategy for Water and Sanitation in the Hard-to Reach Areas of Bangladesh, 2012”. The government investment in Water, Sanitation and Hygiene (WASH) has also been increasing over the last four years. WASH investment in geographically difficult areas like char, haor (wetland), coastal belt and hilly areas is much lower compared to other areas. There is also a gap in ensuring appropriate, affordable toilet technologies for differently abled people. The threat poses by climate change particularly in disaster prone areas also need serious attention in sanitation improvement (Department of Public Health Engineering, 2016). The sudden influx of almost a million Rohingya refugees in Teknaf area has put enormous pressure on drinking water and sanitation facilities. Arranging safe drinking water and proper sanitation in a geographically challenging area has been proven to be extremely difficult despite the best efforts by national and international agencies. Tubewells are becoming dry and latrines are overflowing, creating an unhygienic situation for the refugees.

Indicator 6.3.1

Proportion of wastewater safely treated



Since the formulation of Environmental Rules in 1997, Bangladesh has laws in place for safe disposal of wastewater. But many industries do not have waste water treatment facilities to comply with the set standards under these rules. Among the urban areas, only Dhaka city has wastewater treatment facility (which serves only 20% of the city). The relocation of tanneries in Hazaribag to Savar has been completed in 2019. Hazaribag has been in operation for last 60 years. This shifting was necessitated due to heavy pollution of Buriganga river from tannery wastes from Hazaribag. This is the first example of shifting an entire industrial unit in order to save a river from industrial pollution. A central Effluent Treatment Plant (ETP) has been established at Savar which will treat the effluents before discharging into Dhaleswari river.

Indicator 6.4.2

Level of water stress: freshwater withdrawal as a proportion of available freshwater resources



According to the General Economic Division (2015), the proportion of total water resources used in Bangladesh was 2.9 percent in 2010. Bangladesh is endowed with rich water resources. Internal renewable water resources are estimated at 105 km³/year (based on the National Water Plan Phase II), including 84 km³ of surface water produced internally as stream flows from rainfall and approximately 21 km³ of groundwater resources from within the country. Annual cross-border river flows that also enter groundwater are estimated at 1105.64 km³ and represent over 90 percent of total renewable water resources which are estimated to be 1210.64 km³. Total water withdrawal in 2008 was estimated at about 35.87 km³, of which approximately 31.50 km³ (88 percent) is used by agriculture, 3.60 km³ (10 percent) by municipalities and 0.77 km³ (2 percent) by industries. About 28.48 km³ or (79 percent) of total water withdrawal comes from groundwater and 7.39 km³ or 21 percent from surface water.

Indicator 6.5.2

Proportion of transboundary basin area with an operational arrangement for water cooperation



Bangladesh has 57 trans-boundary rivers. It shares 54 rivers with India and 3 rivers with Myanmar. Among these rivers, it has treaty for the Ganges River which was signed in 1996 and is effective till 2027. According to this treaty, the quantum of waters agreed to be released by India to Bangladesh will be at Farakka on the basis of an agreed upon formula for ten day periods from the 1st January to the 31st May every year. A Joint Committee was formed to monitor the flow below Farakka point. The Joint Committee is responsible for implementing the arrangements contained in this Treaty. It will also examine any difficulty arising out of the implementation of the arrangements and of the operation of Farakka Barrage. Any difference or dispute arising in this regard, if not resolved by the Joint Committee, shall be referred to the Indo-Bangladesh Joint Rivers Commission. The two Governments recognized the need to cooperate with each other in finding a solution to the long-term problem of augmenting the flows of the Ganges during the dry season. Guided by the principles of equity, fairness and no harm to either party, both the Governments agreed to include water sharing Treaties/Agreements with regard to other common rivers.

Indicator 6.6.1

Change in the extent of water-related ecosystems over time



Halda River Restoration Project - Halda river in Chattogram is an important riverine ecosystem of the country. It is the only tidal freshwater river in the world where major Indian carps spawn naturally. The fish egg collection has been dropping rapidly in recent years due to deterioration of the ecosystem - as a result of various human activities (such water abstraction for irrigation, illegal fishing, sand mining of river beds, industrial pollution etc). Recently Prime Minister's Office has formed a committee to restore the river and directed all concerned agencies and local government to take necessary steps. Various decisions have been taken and implemented. Some of the decisions are stopping sand lifting from the river, plying of mechanized boats, lowering the rubber dams, banning of fishing in a river stretch to save the broodfish and raising local awareness. As a result of such steps, 2018 has been a record year for fish egg collection in Halda.

Goal 7: Affordable, Reliable, Sustainable and Modern Energy

Ensure access to affordable, reliable, sustainable and modern energy for all

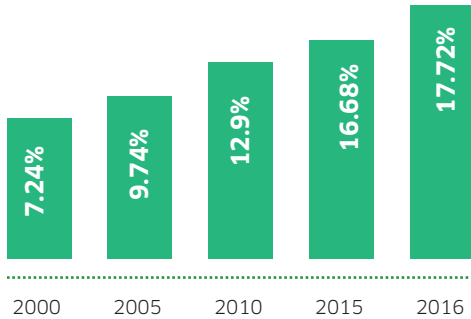
Access to electricity
has increased to about
93% in 2019 from
18% in 2000

Power generation
capacity has increased
21,419 MW in 2019
from 4005 MW in
2001

1.6 million - Clean and
improved cook-stoves
distributed across
Bangladesh (World
Bank)

Bangladesh has adopted both short-term and long term measures to increase electricity supply to meet the growing demand arising from accelerated economic growth and structural transformation of the economy. The installed generation capacity has increased to 21,419 MW in April 2019 from 4005 MW in 2001 and maximum generation reached 12,893 MW from 3033 MW during the same period. The proportion of households with access to electricity has increased to about 93 percent in 2019 from a mere 18 percent in 2000. This is an outcome of the relentless effort of the Government to reach power generation capacity of 24,000 MW and ensure electricity for all by 2021. Households in Bangladesh have depended

Proportion of population with access to clean fuels and technology for cooking



mostly on bio-mass fuels including fuel wood, tree leaves, crop residue, dung cake/stick and sawdust for cooking food. Kerosene stoves have also been used for cooking, while kerosene lamps have been used for lighting. These fuels create in-house air pollution and are a major source of health hazards for women and children. Both

supply and demand factors underlay the move towards use of non-biomass clean energy (such as natural gas, LNG, grid electricity, solar PV, storage cell and dry-cell battery for fuel and lighting). There has also been introduction of cleaner technology such as improved cookstove. According to the Bangladesh Bureau of Statistics, in 2017 the overall use of gas was only 20.5 percent. A major reason for such low use is lack of access to natural gas. Faced with depleting stock, increasing demand and lack of new discoveries of natural gas fields the Government ratifies new gas connections. Bangladesh has also attempted to diversify its energy sources by emphasizing generation of renewable energy, such as solar energy, wind energy, and hydro power. The proportion of electricity generated from renewable sources is still low.

The Government's ongoing efforts to ensure reliable energy supply to all households have been complemented by yet another effort to achieve SDG 7. The Ministry of Power, Energy and Mineral Resources has prepared SDG Action Plan to achieve the targets of SDG 7 - embracing universal access to affordable, reliable and modern energy services, increase in the share of renewable energy in total energy, and improving energy efficiency in the country. Key challenges will involve financing, pricing and subsidy, fuel mix, gas exploration and energy efficiency.



Indicator 7.1.1

Proportion of population with access to electricity



Electricity helps learning, facilitates household production and keeps agriculture, industry and businesses running. The proportion of population with access to electricity increased to 55.26 percent in 2010 from 31.2 per cent in 2000. It continued to increase reaching 75.92 percent in 2016 and has further increased to 85.3 per cent in 2017. About 20 percentage points increase between 2010 and 2016 and about 10 per cent points jump in the following year was possible because of heightened efforts of the government to increase supply through domestic production as well as imports. The present Government undertook immediate, short term and long term plan to enhance electricity supply. The sector was liberalised for private investment as well as foreign direct investment. Private sector was encouraged to generate electricity under Public-Private Partnership (PPP), rental power producer (RPP), and independent power plant (IPP) arrangements as well as captive power. Diversification of energy sources was planned to produce electricity from fossil fuels including coal, nuclear power and renewable sources. Simultaneously, demand side management is being done through measures including pre-paid metering, tariff adjustment, rationing of new connections and reduction of system loss. The Government has prepared an Action Plan up to 2030 to achieve SDG 7. Power System Master Plan 2016 has been prepared for managing the electricity sector up to 2041.

Indicator 7.2.1

Renewable energy share in the total final energy consumption



Traditional biomass is a major source of non-renewable energy used for cooking and parboiling rice in rural areas. Considering the depleting stocks of fossil fuel, volatility of imported fuels prices and long term environmental sustainability, the Government has taken initiatives to develop and promote renewable energy sources. Available renewable energy sources; including solar energy, biomass gasification, waste biogas, hydropower and wind; can be harnessed to provide affordable power supply to off-grid rural areas of the country as well as connect to national grid. Solar photovoltaic (PV) is becoming popular technology, mainly in off-grid rural, hill tracts, and coastal areas. The share of renewable energy sources; in total final energy consumption is estimated to be 2.79 percent in 2015. Bangladesh plans to produce 10 percent of total power generation from renewable sources by 2020. This target seems hard to achieve for two interrelated reasons. On the one hand, renewable energy supply has been increasing but at a slower rate and on the other hand, the supply of electricity from non-renewable sources is increasing at a much faster rate.

Indicator 7.3

Government efforts to ensure access to affordable, reliable, sustainable and modern energy for all

In the first decade of 2000, lack of investment in power generation, regular maintenance, and expansion of transmission and distribution lines in the face of growing demand resulted in power shortage, frequent outages and unstable supply with negative effect on economic growth and welfare of citizens. To overcome this situation and to support the accelerated growth targets in the medium to long term, the Government formulated Power System Master Plan 2010 which set a target to increase installed electricity generation capacity to 24,000 MW by 2021 and 39,000 MW by 2030. Accordingly, the Sixth Five Year Plan (2010-15) accorded highest priority to improving the supply of electricity in the country. A policy was formulated to encourage

private sector to generate electricity under public-private partnership (PPP), rental power producer (RPP), and independent power plant (IPP) arrangements. Diversification of primary fuel for electricity generation from overwhelming dependence on domestic natural gas to coal, petroleum products and nuclear energy has been emphasized. Measures were undertaken to enhance power sector efficiency and to reduce transmission and distribution losses. The Government announced Renewable Energy Policy in 2008 to guide power generation from these sources. Domestic supply-demand deficit was sought to be filled with energy imports from India. Bangladesh is contemplating investment in hydro power in neighbouring countries such as Nepal. It plans to import electricity from Nepal through India. Coordinated investment in transmission and distribution has been undertaken to reduce ensure uninterrupted power distribution and achieve the target of power supply for all. As part of the efforts to ensure access to cleaner and more sustainable energy, use of Improved Cook Stove (ICS) has been encouraged. The Ministry of Power, Energy and Mineral Resources has prepared the SDG Action Plan to be undertaken to achieve the relevant targets.



To ensure universal access to affordable, reliable and modern energy services by 2030, the following actions have been planned:

- 1 Increase power generation capacity to 23,000 MW by FY2020 (end of Seventh Plan); 24,000 MW by 2021; and 40,000 MW by 2030;
- 2 Raise the share of coal based power from only 3 percent (FY2015) to 21 percent by FY2020 and subsequently to 50 percent by FY2030;
- 3 Expansion/upgrade of electric distribution line; Construction/Upgrade of sub-station; switching station construction; River crossing tower construction; Replacement of Overloaded Distribution transformer ; Replacement of electromechanical/digital meter by pre-paid meter; Rehabilitation and Intensification of Distribution System; Establish Gas Allocation Policy (incl. LPG and Biogas Alternative Policy); Domestic Gas Exploration Policy; Domestic Coal Export Policy; Develop Energy Subsidy Policy; Promote Use of LPG in Domestic and Transport Sector; Import LNG Strategy; Planning for Import Coal Facilities
- 4 70, 00,000 new consumer connection and 30,000 Village electrification

To increase substantially the share of renewable energy in the global energy mix by 2030, the following actions will be undertaken:

- 1 500MW Solar Programme (340MW commercial purpose and 160MW social sector)
- 2 Commercial Projects: (a) Solar Park (grid connected); (b) Solar Irrigation; (c) Solar Minigrid/ microgrid; and (d) Solar rooftop
- 3 Social projects: (a) Rural health centres; (b) Remote educational institutes; (c) Union e-Centres; (d) Remote Religious Establishment.

To double the global rate of improvement in energy efficiency by 2030, the following actions will be undertaken:

- 1 Energy Efficiency and Conservation Programme;
- 2 Financial Incentive Mechanism for Improved Cooking Stove



Key Challenges

Bangladesh faces formidable challenges in attaining Sustainable Development Goal 7

Expanding supply of electricity at a faster rate to meet existing unmet industry, commerce and household demand and rising future demand.

Faced with the risk of complete depletion of existing gas reserve by 2023, expanding on-shore and off-shore exploration of gas field engaging public sector organizations as well as International Oil Companies (IOCs).

Addressing energy efficiency issue in the power sector through converting simple cycle power plants into combined cycle power plants, in the industrial sector (like adopting cogeneration system to utilize exhausted gas from broiler) and in the household sector through pre-metering.

LNG imports expose Bangladesh to international gas trade price which has several consequences. The weighted average of Bangladesh gas tariff is estimated to jump from US \$ 1.7 per gigajoules (GJ) to at least US \$ 3.1 per GJ. This price jump will escalate production cost in the industrial sector affecting competitiveness of industries.

Emphasis on coal-fired power projects to produce projected amount of electricity will require 60 million tonnes of coal per year. Building huge infrastructure including port, rail transport and coal stocking infrastructure to handle this massive volume of coal is a challenge.

Energy pricing (electricity, fuel and gas) and subsidies present a challenge to the economy. If electricity price is based on full cost of oil and the opportunity cost of domestic gas, the economic cost of electricity will be much higher and the resultant electricity price will also be higher. Power sector subsidy is estimated to be 2-3 percent of annual GDP of the country.

As coal fired projects come into being in the future sustainability of power and energy sector can be critical to achieve.

Way forward

The Government has been working relentlessly to ensure access to electricity for all and has been implementing policies and strategies towards this goal. The current policy environment needs to continue and new initiatives have to be undertaken.

In Bangladesh, the power sector has mostly dependent on natural gas. More than 90% of the generation capacity was based on gas-based power plant. Due to depleting gas reserve and the difficulties of domestic coal development, Bangladesh is moving towards imported fuel. As a result, keeping the generation cost at marginal level is a major challenge. The Government is introducing highly efficient power plants to the national power grid. Eligible single cycle power plants are being upgraded to combined cycle power plants. Some of the older power plants are in the process of repowering to increase its capacity with high efficient machines. All the upcoming coal power plants are being equipped with latest ultra-supercritical technology, gas desulphurization and electrostatic precipitator to minimize the impact on the environment. Adopting such technologies will ensure the proper use of resources to achieve efficiency in power sector. In order to meet the gas demand the Government has plans to import Liquefied Natural Gas (LNG). For this purpose, Floating Storage Re-Gasification Units (FSRUs) are under construction.

- Previously the power sector was mostly dependent on natural gas. More than 90% of the generation capacity was based on gas-based power plant. Due to depleting gas reserve and the difficulties of domestic coal development, Bangladesh is moving towards imported fuel. As a result, keeping the generation cost at marginal

level is a major challenge. The Government is introducing highly efficient power plants to the national power grid. Eligible single cycle power plants are being upgraded to combined cycle power plants. Some of the older power plants are in the process of repowering to increase its capacity with high efficient machines. All the upcoming coal power plants are being equipped with latest ultra-supercritical technology, flue gas desulphurization and electrostatic precipitator to minimize the impact on the environment. Adopting such proven and latest technologies will ensure the proper use of resources to achieve efficiency in power sector. In order to meet the gas demand the Government has plans to import Liquefied Natural Gas (LNG). For this purpose, Floating Storage Re-Gasification Units (FSRUs) are under construction.

- In line with the SDGs target, power sector utilities have taken initiatives to implement grid based renewable power generation projects. Under the initiatives some projects are in preparatory stage. To promote development of renewable energy the Government is giving assistance to private sector in terms of incentives for implementing renewable energy-based generation facilities. NGOs and private entities are playing a vital role in implementing solar home system (SHS) in rural areas. Renewable wind energy, mainly in the coastal areas, haors(wetlands) and offshore islands has to be emphasised.

- Mobilization of additional financing needed to implement SDG Action Plan will be a major challenge. Other than the conventional financing by GOB and Development Partners, Power Division will continue to explore innovative financing such as Export Credit Agency (ECA) financing, private sector financing in IPP projects, joint venture project financing and G to G financing.

- Bangladesh has been successful in making significant progress in increasing generation capacity as well as actual production and consumption of electricity and increasing access of consumers to electricity. This has been achieved by making higher public investment in electricity generation as well as transmission and distribution, attracting private investment, engaging in cross border power trade, reducing T

& D losses and managing demand side of the market. This strategy will continue. Two issues that need to be addressed are: (a) increasing cost of electricity production, and (b) continued operational deficits in the power sector.

- Efficient operation and maintenance of running plants have to be undertaken regularly to reduce capacity loss. The quality of power system has to be improved through the system enabling stable frequency and voltage with no unplanned fluctuation. Quality power supply will encourage private companies to substitute grid electricity for their own costly electricity from oil-based generators.

- The Government will have to finalize and adopt the National Energy Policy or develop an Energy Master Plan embracing (i) gas allocation policy, (ii) domestic gas exploration policy, (iii) domestic coal utilization, (iv) energy import, (v) demand side management and energy conservation, (vi) Improved Cooking Stove, and (vii) energy subsidy and pricing.

Goal: 13 Take urgent action to combat climate change and its impacts

Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population stands at 12,881

Bangladesh has a long history of natural disasters. Between 1980 and 2008, it experienced 219 natural disasters, causing over US\$16 billion in total damage.



Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 populations (Indicator 13.1.1) now stands at 12,881 with a target of 6,500 by 2020 and 1,500 by 2030. Given the track record of Bangladesh in disaster management, this target will not be difficult for her to achieve. Ministry of Disaster Management and Relief (MoDMR) has prepared Disaster Risk Reduction Strategies of Bangladesh (2016-2020) in line with the Sendai Framework which will be helpful in this regard. In facing the climate change scenarios, Bangladesh is well prepared with a number of climate change related strategies, plans and actions. Through Bangladesh Climate Change Trust Fund (BCCTF), it has spent around 27 billion BDT over last 8 years in climate change adaptation. Revision of Bangladesh Climate Change Strategy and Action Plan (BCCSAP) and preparation of National Adaptation Plan (NAP) is already underway. International cooperation and funding are also forthcoming. It has received grants from Green Climate Fund for two projects in 2018.

Indicator 13.1.1

Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population

The country is exposed to severe environmental hazards like river erosion, cyclones, droughts, tornadoes, cold waves, etc. In addition, climate change could substantially increase the frequency and intensity of existing climatic events. Impacts of climate change are visible in Bangladesh in the form of temperature extremes, erratic rainfalls and increased number of intensified floods, droughts, and prevalence of rough weather in the Bay. (General Economic Division 2015). The main disasters affecting Bangladesh are floods, cyclones, tornadoes and earthquakes among others.

Indicator 13.1.2

Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015- 2030

Ministry of Disaster Management and Relief (MoDMR) has prepared Disaster Risk Reduction Strategies of Bangladesh (2016-2020), in line with the Sendai Framework for Disaster Risk Reduction 2015-2030 and other international protocol ratified by the Government of Bangladesh.

Indicator 13.2.1

Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)

Bangladesh Climate Change Strategy and Action Plan (BCCSAP): BCCSAP (2009-2018) is the key climate change national plan and basis for climate investment in Bangladesh. BCCSAP provides an overall framework for action, recognizing the need for adaptation and highlighting the government's willingness to follow a low carbon pathway. BCCSAP is a strategy/plan and a basic reference for aligning investments with climate change objectives. Six thematic areas with 44 programs (and 145 actions) have been identified within these thematic areas. The thematic areas are (1) Food Security, Social Protection and Health; (2) Comprehensive Disaster Management; (3) Infrastructure; (4) Research and Knowledge Management; (5) Mitigation and Low Carbon Development; and (6) Capacity Building and Institutional Strengthening. A roadmap for developing the National Adaptation Plan (NAP) was prepared in 2015,





supported by the Norwegian Government. Institutional arrangements have been set up for the NAP process, through the formulation of an Inter-Ministerial Steering Committee, a Technical Advisory Committee and a core NAP formulation team. In terms of current work, both UNDP and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) are supporting the GoB in developing the National Adaptation Plan.

Climate Change and Gender Action Plan (ccGAP) 2013: The underlying principle of the ccGAP (2013) is the transformative nature of gender interventions. ccGAP also has the potential to enhance the effectiveness and efficiency of climate change and socio-economic development responses.

The Government of Bangladesh has prepared and enacted the Climate Change Trust Act 2010 to redress the adverse impacts of climate change. Bangladesh was the first government to set up a trust fund namely 'Bangladesh Climate Change Trust Fund' to create a national resource for climate change investments. The Trust Fund was created with the aim to support implementation of the BCCSAP.

Bangladesh Climate Change Resilience Fund (BCCRF) was created to provide funding for

climate change management, primarily adaptation, but also mitigation. Intended Nationally Determined Contribution (INDC): INDC (now National Determined Contributions - NDC), lays out adaptation and mitigation strategies to increase climate resilience. Bangladesh's mitigation contribution covers the power, transport and industry sectors. Under a 'business-as-usual' scenario, GHG emissions in Bangladesh in the sectors mentioned are expected to represent 69% of total emissions by 2030. Bangladesh is committed to reduce this GHG emissions in the three sectors by 5% by 2030 using domestic resources. If sufficient and appropriate support are received from developed countries, emissions can be reduced by 15% by 2030.

Indicator 13.b.1

Number of least developed countries and small island developing States that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change-related planning and management, including focusing on women, youth and local and marginalized communities

In 2018, Bangladesh received funding from Green Climate Fund (GCF) for the following two projects: Global Clean Cooking Program – Bangladesh; Removing barriers in the development of a sustainable market for the adoption of improved cook stoves in Bangladesh. About 66 percent of Bangladesh's population live in rural areas, where women predominantly do the cooking using traditional, wood fueled stoves. Burning wood for cooking releases carbon dioxide, methane and black carbon. It also leads to deforestation and negative health impacts, causing an estimated 46,000 casualties every year. Currently only 3 to 5 percent of households in the country use improved cook stoves. The scaling up of investment in improved cook stoves will increase demand and help extend the existing supply chain. The project will

provide technical assistance to support partner organizations and local entrepreneurs to produce improved cook stoves, raise awareness, and carry out research and development of the stoves. Total project investment is US \$ 82.2 million out of which GCF grant will be US \$ 20.0 million. The project has an estimated lifespan of 3.5 years. Approximate number of beneficiaries is 17.6 million and anticipated avoided tons of CO2 equivalent is 2.9 million tons Infrastructure Development Company Limited (IDCOL) will implement the project. Enhancing adaptive capacities of coastal communities, especially women, to cope with the impacts of climate-induced salinity. The coastal belt of Bangladesh is vulnerable to cyclones, storm surges, and sea-level rise, which is becoming more intense. Increased occurrence of these hazards is accelerating saltwater intrusion into the fresh water resources along Bangladesh's coastline. The strengthening of adaptive capacities in this project will reduce the adverse impacts on agricultural livelihoods that are freshwater dependent, and on the availability and quality of drinking water in vulnerable coastal communities. This community-based approach in planning and managing climate-resilient water supply targets the highly vulnerable, specifically women and girls. Total project investment is US\$ 33.0 million out of which GCF grant will be US \$ 24.0 million. The project has an estimated lifespan of 6 years.



Key Challenges

Over the years, Bangladesh has invested heavily in disaster management infrastructures such as flood embankments, flood shelters and cyclone shelters. The mortality rate has fallen significantly as a result. However, many of such structures are suffering from lack of proper operation and maintenance. As a result, when disaster strikes the structures fail to provide adequate protection. Rehabilitation of these structures after a disaster is becoming a major problem due to requirement of large funds. The time required to rehabilitate the coastal polders after Cyclones Sidr in 2007 and Aila in 2009 serves as examples. People within the polder had to suffer as the polders remained water congested. Such situations will become more common as cyclones and floods are expected to be more frequent due to climate change.

Way forward

Bangladesh is a signatory to Paris Climate Agreement. According to this agreement, Bangladesh can expect adaptation fund from industrialized countries. Significant funding will be required to build a disaster resilient future for the country. Some funding is being funneled through the Green Climate Fund, of which Bangladesh has been a recipient. In order to maximize the gathering and utilization of such highly competitive funds, the country places continuous efforts to build institutional capacity and mainstream climate policies.



Uttar Seral Government Primary School,
also serves as a cyclone shelter in Agulchara, Barishal

Goal: 14 Life below Water

Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Bangladesh has recently gained a vast swath of marine territory. This marine area is rich in natural gas resources and biodiversity. Exploitation of gas resources may pose grave danger to the biological resources. Sustainable management of these resources is now a big challenge for the country. In recent times, Bangladesh has declared two marine protected areas: one targeting Hilsa breeding ground and another targeting Cetaceans. Total protected area now stands at 2.05% (7.94% if the area protected for Hilsa spawning is included) of the marine area (Target 14.5). Major success has been achieved in Hilsa protection with production almost doubling in last 15 years.

The coastline extends 710 kilometers starting from St. Martin's island in the south-east to the Sundarbans mangrove in the south-west. The east coast is an important breeding ground for marine turtles. The only coral community is located on the east coast in association with high diversity and moderate density of marine algae and mollusks. The central coast has been identified as the stepping stone, staging ground and wintering ground of more than 100 species of migratory shore birds belonging to

East-Asia-Australasian and Central Asian flyways. Bangladesh coast supports more than 10 globally threatened migratory shorebirds (DOE, 2015). The west coast supports important mammals such as Royal Bengal Tiger and reptiles such as Salt Water Crocodile.

The forest coverage of the country now stands at 17.5%. The quality of the forest in terms of canopy coverage is becoming a major concern. Increasing tree density is therefore a major target under 7th Five Year Plan. In order to protect its very rich bio-diversity, the country has taken many steps among which are continuing moratorium on tree felling, creating special bio-diversity zones and creating two vulture safe zones. Strong implementation is required in order to safeguard the bio-diversity. Almost all of Bangladesh's marine fishing is carried out in shallow and shelf waters, beyond which no fishing is being currently done due to lack of vessel capacity and appropriate fishing technologies. The harvest of marine capture fisheries was 379,497 ton during 2000-2001 which increased to 626,000 ton in 2015-2016. The contribution of marine catch to the fisheries production stands at 16%. Hilsa shad (*Tenualosa ilisha*) is the largest and single most valuable species with annual catch of 395,000 tonn.

Bangladesh is in the process to assess the true potential of its offshore oil and gas prospects. So far, drilling for gas in the off-shore area has not been very successful. The shallow offshore blocks of Bangladesh adjacent to the Myanmar blocks are considered an area of particular interest because of the recent discoveries of several large gas fields (Shwe, Shwe phu, Mia) in the Arakan offshore of Myanmar (FAO, 2014).



Indicator 14.5.1

Coverage of protected areas in relation to marine areas



The Government has established the country's first marine protected area 'the Swatch of No-Ground Marine Protected Area' on 27 October 2014. This will safeguard whales, dolphins, sea turtles, sharks, and other oceanic species. The two Marine Protected Areas (MPAs), one in 'Swatch of No-ground' of Bay of Bengal, declared under Bangladesh Wildlife (Conservation and Security) Act, 2012 and another in 'Middle Ground and South Patches' of Bay of Bengal, declared under the Marine Fisheries Ordinance 1983 together comprise 243,600 hectares (2436 sq. km) constituting 2.05% of the total marine area 11,881,300 hectares (118,813 sq. km) of Bangladesh. If the area protected during the spawning season of Hilsa is included, then the share of protected area rises to 7.94%.

Indicator 14.3 Government efforts

Protection for Hilsa



Hilsa is the national fish of Bangladesh. In order to arrest the precipitating, fall in Hilsa production, five Hilsa sanctuaries and four major spawning grounds in the coastal and freshwater areas of the country have been established under the 'Protection and Conservation of Fish Act-1950' for the effective conservation of Jatka and brood Hilsa in the major nursery and spawning areas. A twenty-two-day fishing ban in the sea, coastal areas along with the rivers by all sorts of commercial trawlers under the Marine Fisheries Ordinance 1983 has been placed for the better spawning of Hilsa. Various conservation efforts including establishing sanctuaries have resulted in considerable increase of hilsa production over the years.

Key Challenges

Bidders and oil companies are most likely to drill on the shallow shelf sea due to relative easiness and cost-effectiveness. However, drilling in this area without extensive and overall environmental, socioeconomic and fisheries impacts analysis may prove to be harmful. Moreover, any potential oil spill near the coast, may have a far-reaching impact on fishery, fishing grounds, fish breeding and nursery grounds, salt-marsh ecosystems, coral reef, mangrove ecosystems, coastal tourism, salt industry, peoples' livelihood and health, which would reduce the exploitation of fossil fuels (FAO, 2014). Ship breaking and recycling industry is an important economic activity especially in Northern Chattagram coast. However, this industry has serious impact on the marine environment. The fisheries in and around the industries have been seriously depleted. The major environmental concern is entry of toxins released during ship breaking into the marine food chain. Marine biodiversity has declined sharply due to environmental degradation and numerous anthropogenic activities such as over-fishing of inshore fisheries, indiscriminate catching of juveniles, construction of barrages and dams, siltation, extensive use of pesticides, pollution etc. Increase in the human population and consequent increases in the demand for fish & fishing pressure is intensifying every year. This is believed to have caused over fishing of all stocks and populations of fishes and prawns by the use of even banned gears and methods. Collection of shrimp fry and soft shell crab is causing loss of post larvae, juveniles and pre-adults of many other species. Municipal waters, industrial pollution, oil pollution, and ship breaking are causing chemical and thermal pollution.

Way forward

A balance need to be maintained between protection of marine biodiversity and industrial activities in and around the coast. Sustainable management of fisheries requires keeping the fish catch within sustainable yield. The government has already imposed a 2 months



fishing ban in the Bay of Bengal during fish breeding season. In order to assess the fish stock of the Bay, a fish stock assessment has been initiated after nearly three decades. The assessment is expected to be complete by 2019. At the same time, a management or strategic plan on how to manage the marine stock for sustainable use will also be prepared.

Goal: 15 Life on Land

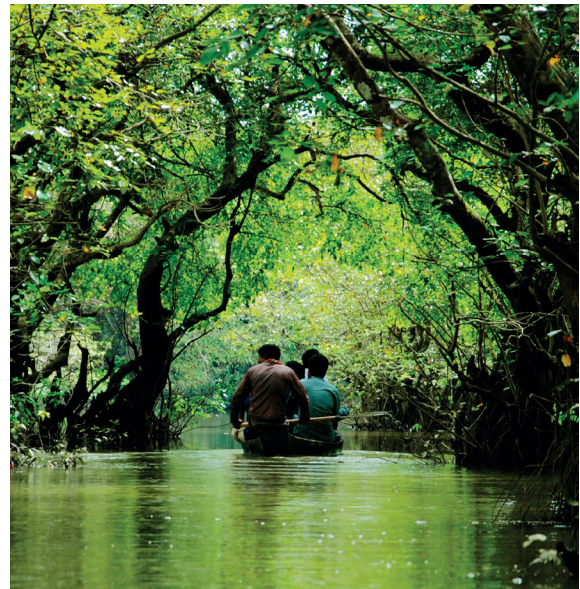
Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

■ Assessment of progress in Terrestrial Ecosystems

The ecosystems of Bangladesh are broadly clustered as terrestrial, inland waters, coastal and marine ecosystems. The major terrestrial forest types in Bangladesh are: 1) Tropical Wet Evergreen Forests; 2) Tropical Semi-Evergreen Forests; (3) Tropical Moist Deciduous Forest (Sal Forests); (4) Mangrove Forests; (5) Freshwater Swamp Forest; (6) Homestead Forests; and (7) Plantation Forests. Almost half of the total area of Bangladesh is wetlands. These ecosystems are made up of a wide variety of habitats, including the main three rivers (the Ganges, the Brahmaputra and the Meghna) and their 700-plus tributaries and distributaries and their floodplains; about 6300 beels (permanent and seasonal shallow lakes in floodplain depressions); at least 47 major haors (deeply flooded depressions in the north east), baors (oxbow lakes); vast areas of seasonally flooded land; and fish ponds and tanks. Biogeographically, the country is located at the cross roads of the Indo-Himalayan and Indo-Chinese sub-regions under the Oriental region. Thus, this country acts as an important merging and sharing habitat, land bridge and biological corridors of the flora and fauna between these sub-regions. This strategic

location makes Bangladesh as one of the most ecologically significant and biologically diverse landscapes in terms of migratory species, stepping stones, staging ground and flyways for wildlife movements of the region. Consequently, a large number of plant and animal species traverses in habitats, thereby maintaining a wide range of gene pool.

Indicator 15.1.1 Enhance forest area as a proportion of total land area to 18%



Total forest area in Bangladesh is 2.58 mha which is 17.5% of the country. Out of this area 10.5% forest area is managed by the Forest Department and rest are unclassified and village forest.

The Sundarbans, the single largest tract of natural mangrove forest in the world, is located in the south western part of the country. It is a Ramsar as well as World Heritage Site. Bangladesh has successfully brought large swath of newly accreted coastal lands under afforestation. Currently 140,000 ha of land is under mangrove plantation. Coastal afforestation program has been accelerated to bring more lands under afforestation.

Indicator 15.1.2

Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type

Bangladesh currently has 40 Protected Areas (PA) locations. Among these, 38 are forest based and managed by the Forest Department. These include 17 National Parks, 20 Wildlife Sanctuaries and 1 Special Biodiversity Conservation Area. A total of 21 PAs (7 National Parks, 12 Wildlife Sanctuaries, 1 Marine PA and 1 Special Biodiversity Conservation Area) have been marked to conserve wildlife and their habitats since 2010. All 38 forest PAs now cover about 10.55% of total forest area, which is 1.8% of the total area of the country.

mammals and fishes are facing greater threats. On the brighter side, currently there is reduction in the Least Concern Category, from 53% in 2000 under Not Threatened Category versus 50% as Least Concern in 2015. Eleven resident bird species have been identified and 2 mammal species (among 11) have been reported to be extinct in 2000 has been discovered in 2015. Biodiversity National Assessment 2015 discusses some of the direct threats to biodiversity. Human population has become a threat to the PAs as well to other parts of the country. Expansion of human settlement and agriculture, shifting cultivation, habitat degradation and destruction are the major threats to biodiversity in Bangladesh. Over-exploitation of natural resources, like fishes, freshwater mollusks, corals, turtles, frogs, snakes, birds, and swans is also a threat to biodiversity. Terrestrial and aquatic ecosystems are polluted by discharges of untreated industrial effluents, domestic organic and inorganic wastes, agro-chemicals (i.e pesticides), insecticides, herbicides and organic fertilizers.

Indicator 15.5.1

Red List Index (RLI)

The Red List Index (RLI) expresses the extinction risk of a particular group of species, globally or regionally, by a number between '1' and '0'. Here, '1' is the best-case scenario, where all species of a group are out of extinction danger or they are in the Least Concern category. On the other hand, '0' is the worst-case scenario, where all species of a group are extinct from the world or the said region. On a global scale, for example, the latest RLI for mammals is 0.86, birds 0.91, amphibians 0.75, and corals 0.81. Over the last couple of decades, the RLIs of these four groups have been showing alarming declining trends. For Bangladesh, the RLIs of birds, amphibians, fishes and crustaceans are higher than 0.80, indicating relatively moderate conditions for these groups. But the RLI of mammals calls for serious conservation concerns as it is close to the 0.50 mark. The RLIs also indicate grim conditions for butterflies and reptiles. It has been indicated that among the animal groups,

Government efforts

Moratorium on tree felling: The moratorium on tree felling in reserve forests has been extended till 2022. The ban was extended for better conservation of environment and biodiversity.

Ecologically Critical Areas (ECAs): Bangladesh has declared 13 wetlands areas of biodiversity importance as ECAs under the Bangladesh Environment Conservation Act, 1995. The total area of ECAs managed by Department of Environment is 384,529 hectares or about 2.60% of the total country

Special Biosphere Reserve - Ratargul swamp forest is a small freshwater swamp in the haor basin of north-east region of Bangladesh. It is the last stronghold and refuge of fresh water swamp forest biodiversity in the country. The ecosystem is a typical freshwater wetland forest that remains dry in winter but inundated to a depth of about 8 feet during monsoon. In order to protect the forest's environment and ecosystem, the government declared Ratargul a Special Biosphere Reserve in 2015.

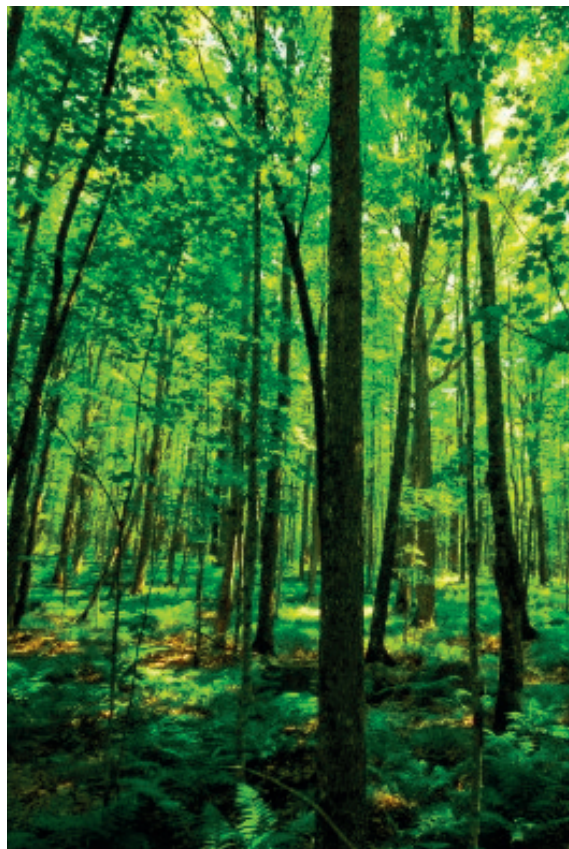
Vulture safe zone - Two Vulture Safe Zones have been declared by the Forest Department in 2014 in the Sylhet and Khulna regions. In Sylhet

region, the total area of safe zone within Bangladesh is 19,663 sq. km and core area is 7,459 sq. km. while in Khulna region. the total area of safe zone within Bangladesh is 27,717 sq. km. and core area is 7,846 sq. km.

Key challenges

The major challenges in meeting targets of forest area are absence of proper documentation and conspicuous demarcation of forest lands and lengthy procedure of disposing of land related cases; demand for timber, fuel wood, poles and saplings, mainly as fuel wood mainly for cooking, brick burning and tobacco curing, making huts, thatches and sheds of betel leaf plantations; land tenure conflict in Chittagong Hill Tracts; and inadequate human resources and logistics. In addition to above challenges, recent influx of the forcibly displaced Rohingyas from Myanmar is putting tremendous pressure on remaining forests in Teknaf-Cox's Bazar belt. Already, about 6,000 acres of forest land belonging to Forest Department has been allotted for temporary housing of the Rohingyas. The Rohingyas are also collecting fire woods for cooking further depleting the forest resources in the region. Forest Department identified number of threats to the protected areas. Within the human disturbance regime, deliberate vandalism and/or destructive activities are the major contributing factor for the Sundarban South Wildlife Sanctuary (WS) and Kaptai National Park (NP). In Sundarban South WS, human intrusion during the Rashmela (cultural event) has been identified as a major threat. Among various biological resource use categories, logging is the highest threat, followed by hunting and killing of terrestrial animals and collection of terrestrial plants. In agriculture and aquaculture category, Madhupur NP faces the highest threat coming from annual and perennial crop cultivation, plantations (rubber and acacia) and livestock grazing inside the park. Residential and commercial development is also a major threat to Madhupur NP. Many of the 38 PAs are popular tourist destinations. The negative impact of overuse of the PAs is that there is a general lack of awareness among the members of the public about decorum of visiting a wildlife sanctuary or a national park. Their action sometimes directly hampers the animals or plants or indirectly interfere with the natural lives of the animals and plants.

Way forward



Recognizing that tree density of the forests are not satisfactory, the 7th Five Year Plan targets increasing the tree density by more than 70%. The Forestry strategy of the plan includes continuing moratorium on tree felling in the natural forests, increasing tree density of the existing forests and older plantations through 'enrichment planting', 'assisted natural regeneration', and intensification of plantation activities in coastal zones. An estimated 50,000 ha. land of hill forest and 5,000 ha. of plain land forest will be planted during the planned period. Productivity of plantations will have to be increased manifold. Multi-purpose trees will receive special attention to increase the productivity of land under forest. The existing coastal afforestation and enrichment plantation will also be continued. The existing mature coastal plantations will remain for reinforcing green belt. An area of 30,000 ha. will be planted and replanted in the coastal areas.



04 Financing Climate Change: Bangladesh Government Energy Targets

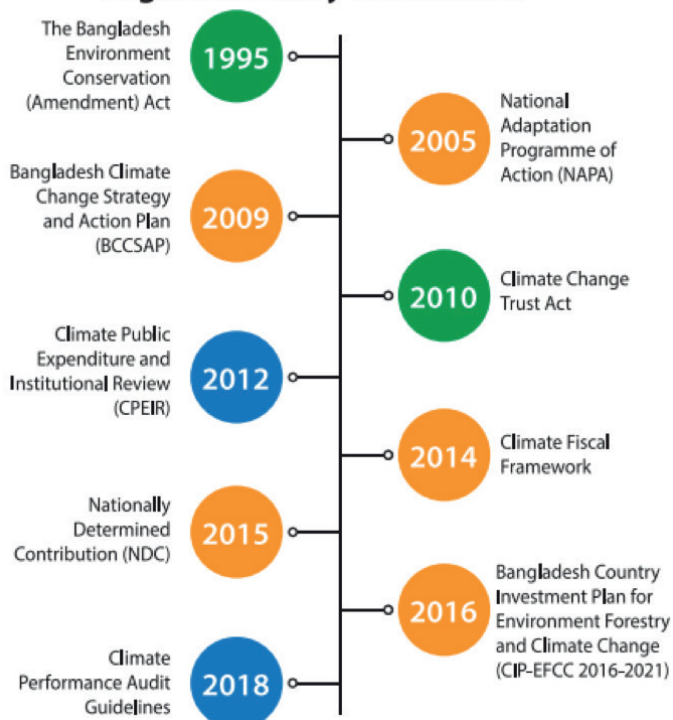


Highest climate related budget allocated between FY 2015 – FY 2019

8.82%

of the total FY 2018-19 budget for 20 ministries/divisions was climate related

Legal and Policy Framework



Source: Bangladesh Citizen's Climate Budget Report 2018-19

Climate public finance tracking is one of the set of climate related financial planning and management tools designed to extract data and information to understand how much a country can afford to commit resources to address the adverse effects of climate change. Tracking and reporting financial flows that support actions for climate change mitigation, adaptation, building trust, accountability with regard to climate finance commitments, monitoring trends and progress in climate-related investment are becoming increasingly important.

The key objectives of this exercise are to: report on climate finance flows aligned with national climate strategies and plans, improve the governance of climate finance, facilitate the assessment of results from climate investments and support better project design.

These include ensuring alignment of climate finance with the Bangladesh Climate Strategy and Action Plan (BCCSAP), reporting of climate finances in the government's budget allocation, suggesting where further financing is necessary, as well as identifying areas that need to be reviewed and calibrated. In addition, the most significant long-term and sustainable impact of this exercise is enhanced awareness of the policy makers and planners on climate change actions. These are included in the climate budget report for FY 2018-19 which brings to light the fact that 8.82 per cent of the total budget for 20 ministries/divisions was climate-relevant.

Bangladesh has also adopted a hybrid approach that can be better described as 'Objective-Based Cost Component Approach' to reap the maximum advantages from both the approaches. This approach not only classifies the climate relevance of projects and programmes, but also uses scientific methods to track the allocations made for those projects/programmes. The tracking tool has been designed to help address challenges such as a lack of awareness, together with the difficulty of planning, identifying and reporting climate related expenditures. This will provide support in identifying, classifying, weighing and marking climate-relevant allocations in the budget system, enabling the estimation, monitoring and tracking of the expenditures. This includes the process of attaching a climate budget marker, such as a tag or account code to budget lines or groups of budget lines.

Renewable Energy and Energy Savings System

10% of the total electricity from renewable sources by 2020 targeted

There are targets to generate 10 percent of the total electricity from renewable sources by 2020. In order to promote electricity generation at the roof-tops of private buildings using solar home system, a "Net Metering Guideline" has been prepared. Steps have been taken to install solar system panels at the rooftops of all educational institutions.

Bangladesh Delta Plan

Water Resource Management and Tackling Climate Change

2.5% of total GDP required for Climate Change related expenses

Bangladesh is at the 6th position among countries most vulnerable to natural disasters due to climate change. Therefore, the government has formulated an adaptive, long-term, integrated and macro-level mega plan - 'Bangladesh Delta Plan 2100', with the vision of 'achieving a safe, climate change resilient and prosperous delta'. The main objectives of the plan are to ensure sustainable use of water resources and better manage natural disasters.

Implementation of this mega plan will require a huge investment, which is approximately 2.5% of the total GDP from which 35 percent of the total investment will be spent in flood control, preventing river erosion, river excavation, dredging, river training and navigation. In the first phase, a total of 80 projects have been proposed under the Delta plan.

Flood, Drought, River Erosion and Land Reclamation

US\$ 125 million allocated to facilitate rehabilitation of the people affected by river erosion

Steps have been taken for managing water resource, land use, and mitigating effects of the environment and climate change by re-excavating small rivers, canals and wetlands in 64 districts and assimilation of Climate Smart Integrated Coastal Resource Database (CSICRD). The government has undertaken various plans to increase navigability of rivers, dredging of 510 km of rivers (by 2022 to prevent river erosion and ensure supply of water during the lean season), digging and re-excavation of 4,883 km of irrigation canals, construction and repair of 200 irrigation structures to extend irrigation facilities, construction of 3 barrages and rubber dams, construction of 250 km flood protection and coastal embankment to reduce flood, salinity and water logging, renovation of 1,040 km flood protection embankment and coastal embankment, construction and renovation of 590 flood protection and drainage infrastructure, excavation and re-excavation of 1,325 km drainage canals, and conservation work of 195 km border river banks and 6 cross-dams. A 20-year Haor Development Master Plan and Database has been prepared for development of Haor (wetlands) areas. Under this, steps have been taken in the haor areas to develop infrastructure, re-excavate rivers, canals, and haors, and fostering socio-economic development of the people of the concerned areas.

Combating Climate Change and Protection of Environment

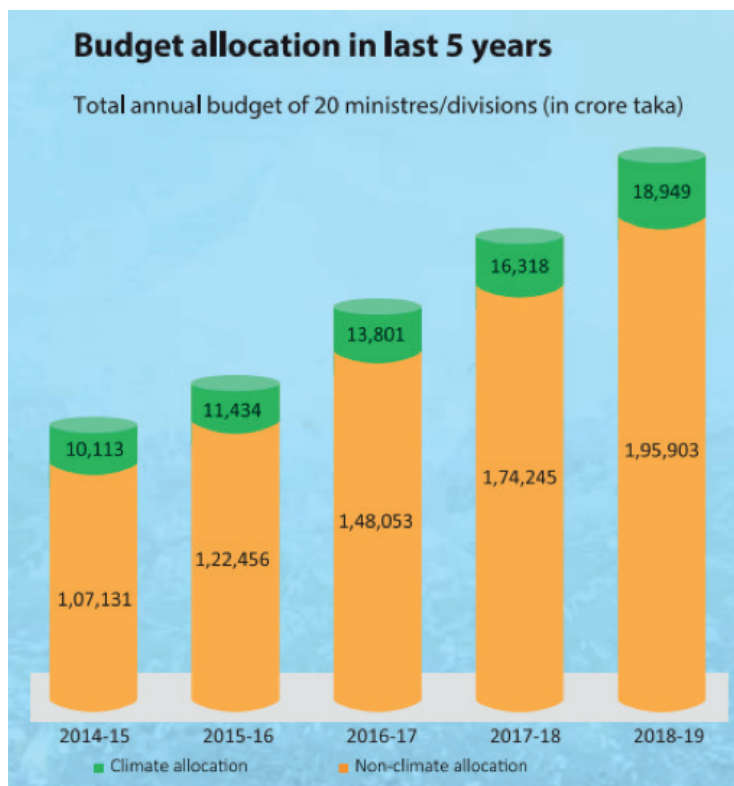








To ensure sustainable development through the protection of environment, containing pollution, protection of bio-diversity and tackling the adverse impact of climate change, government has formulated the 'National Environment Policy 2018'. It has allocated tasks among different ministries/divisions and departments to ensure their implementation. Steps have been taken to conduct research for projection of sea level rise in coastal areas of Bangladesh and its impact on agriculture, water resources and infrastructure. The government has enacted Brick Making and Kiln Establishment (Control) Act, 2019 to reduce air pollution. Steps will be taken in the near future for the protection of Halda river including declaration of the river as an Ecologically Critical Area (ECA), and introduction of eco-tourism in various protected areas.

Source: 'Bangladesh on a Pathway to Prosperity Time is Ours, Time for Bangladesh' Budget Speech 2019-20

Climate Finance Tracking

Climate public finance tracking being a broader package of reforms is meant to help operationalise national climate change policies and action plans. It is an important component of Climate Fiscal Framework (CFF) adopted by the government in 2014 which has the broader scope of providing a comprehensive overview of domestic and international climate finance linking climate change policies with planning and budgeting, prioritising climate actions, and developing appropriate modalities to manage climate finance in an effective and transparent manner.



BCCSAP thematic areas	Fiscal Year				
	2014-15	15-16	16-17	17-18	18-19
 Food security, social protection and health	57.41%	53.53%	51.13%	49.91%	46.01%
 Comprehensive disaster management	14.79%	13.21%	12.59%	9.69%	9.70%
 Infrastructure	12.69%	13.58%	16.22%	22.49%	28.43%
 Research and knowledge management	4.36%	4.90%	5.82%	5.89%	4.57%
 Mitigation and low carbon development	4.48%	8.36%	6.05%	7.01%	6.61%
 Capacity building and institutional strengthening	6.27%	6.42%	8.19%	5.00%	4.68%

Source: Bangladesh Citizen's Climate Budget Report 2018-19





05

Bangladesh Towards Clean Energy

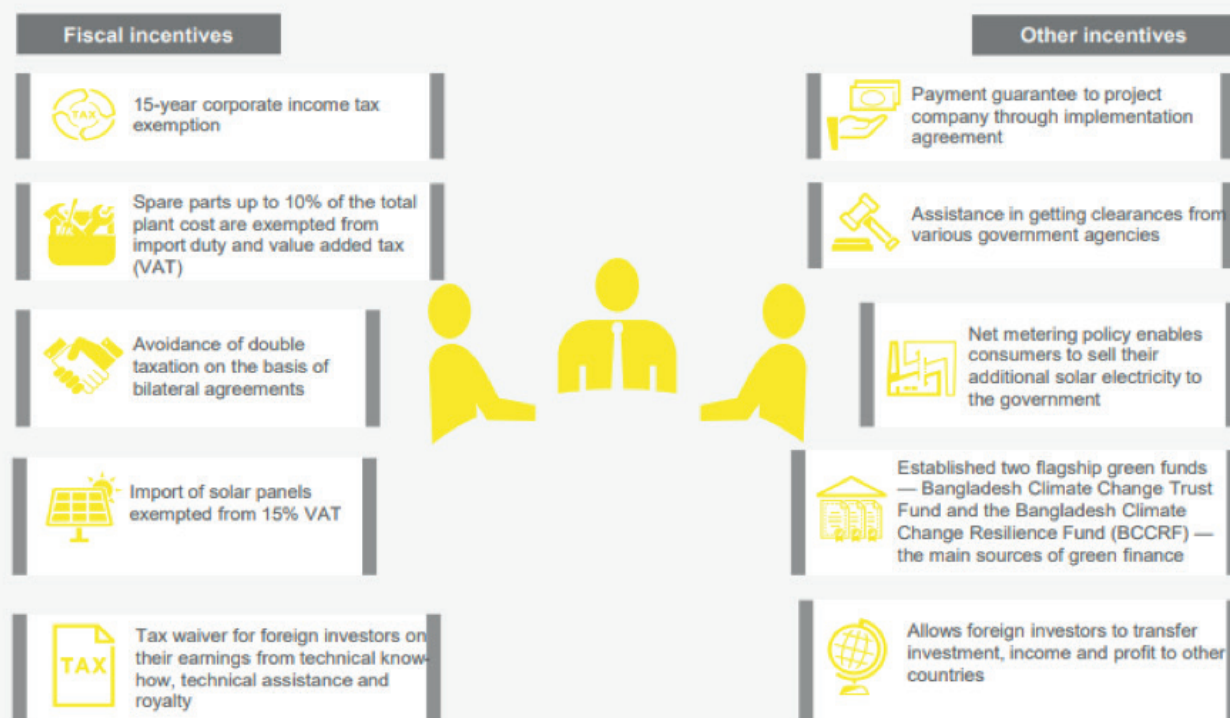


10% of the total
electricity from
renewable sources by
2020 targeted

The Government of Bangladesh has implemented several policies and measures to facilitate both public and private sector investment in solar energy projects to scale up the contribution of renewable energy-based electricity production. The Government adopted the Renewable Energy Policy in 2008 which aims to source 10% of electricity from renewable sources by 2020. However, the contribution of renewable sources to electricity generation currently stands at merely 3%, much below the target. This indicates that a stronger policy support from the Government is needed to boost this sector.



Key incentives provided by the Government of Bangladesh to attract investment in solar energy projects



Source: Sunnyside Up: Scaling up solar photovoltaics in Bangladesh – Bangladesh Clean Energy Summit 2019

Solar Power Success

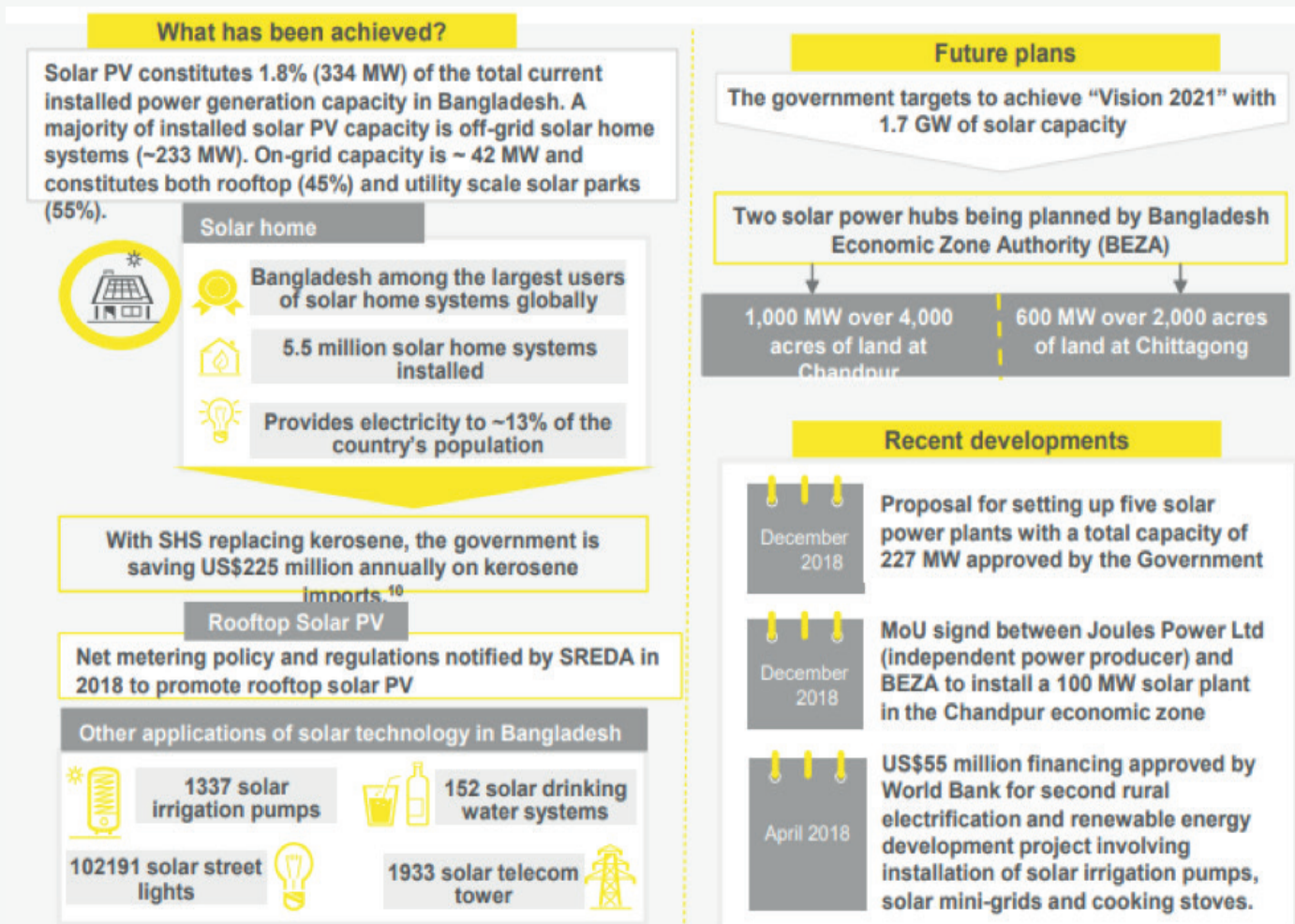
Bangladesh is among the largest users of solar home systems globally

5.5 million Solar Home Systems provide electricity to nearly 13% of the population

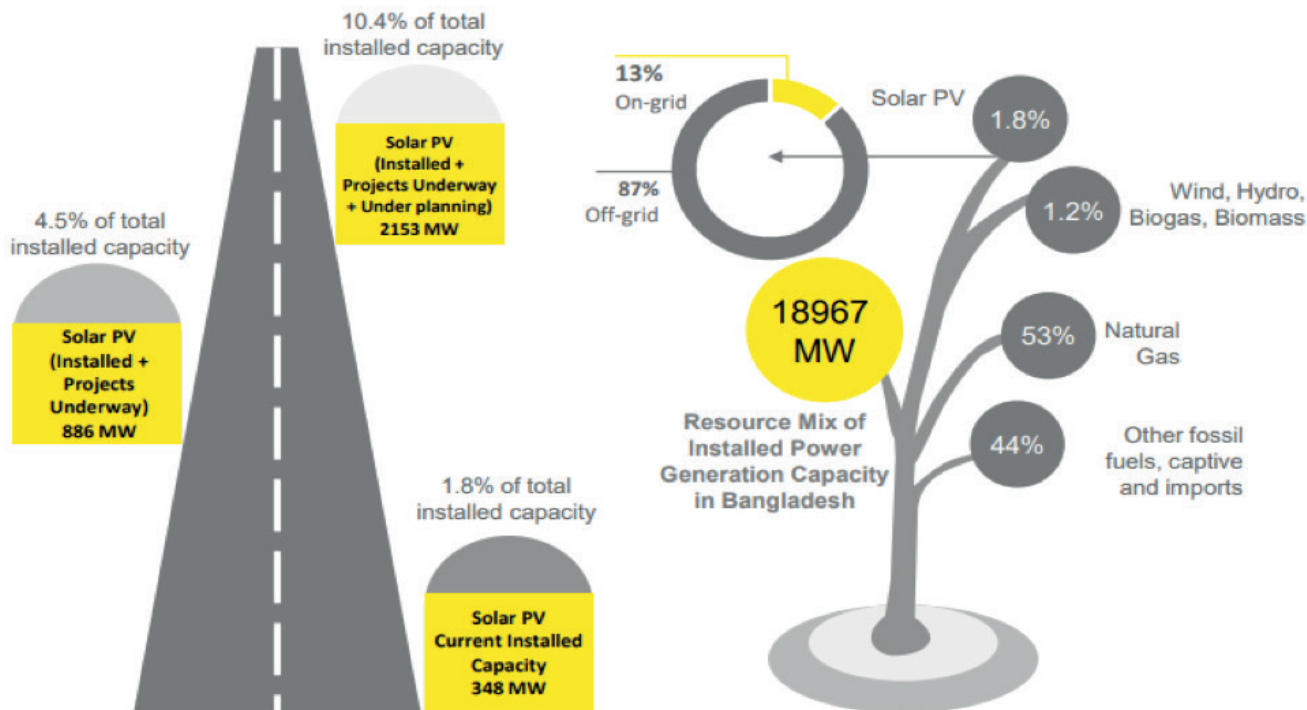
The Government of Bangladesh has targets to install 1.7 GW of solar capacity by 2021 through the solar home systems (SHS) program and on-grid solar power plants. Bangladesh has been successful in developing off-grid rooftop solar power (solar home systems). Presently, the country's solar power capacity is largely dominated by off-grid projects accounting for nearly 86% of the total installed solar capacity. Solar PV constitutes 1.8% (334 MW) of the total current installed power generation capacity in Bangladesh. A significant majority of this is currently off-grid solar home (SHS) systems. Grid tied Solar PV capacity is 42 MW and constitutes both rooftop (45%) and utility scale solar parks (55%). Once the projects already underway get commissioned, the share of Solar PV in the total installed power generation capacity is poised to increase to 4.5%. This is further expected to increase to 10.4% if the projects under planning materialises.

Bangladesh is among the largest users of solar home systems globally. Through 5.5 million SHS installed in remote locations, it provides electricity to nearly 13% of the population. With

the emergence of solar home systems, kerosene imports have reduced bringing down the country's fiscal burden. The government has also installed several solar irrigation pumps, solar drinking water systems, solar street lights and solar telecom towers benefitting the community people. So far, large scale on-grid solar power generation capacity in the country has been growing. The momentum has also picked up as the Bangladesh Economic Zone Authority (BEZA) has drafted a plan to develop two solar power hubs with a cumulative capacity of 1600 MW in two districts. Moreover, the government has already approved the proposals for establishing 19 on-grid solar power parks with a cumulative capacity of 1070 MW.



Source: Sustainable and Renewable Energy Development Authority (SERDA)



Source: Sustainable and Renewable Energy Development Authority (SERDA)



Clean Energy Innovation

Bangladesh aims to reduce energy intensity by 20% by 2030

Primary energy intensity improving at over 11% since 2005

Bangladesh has been making rapid progress in the adoption of off-grid solar home systems, solar irrigation, cogeneration and energy efficient industrial drives etc. Future policy, funding impetus, research and development, seed and venture capital institutions would have to renew focus on building innovation capacity that can overcome country specific adoption challenges.

Bangladesh's Intended Nationally Determined Contribution (INDC) within the framework of Paris Climate Agreement commits unconditionally to reduce its Green House Gas (GHG) emissions by 5% below BAU emissions by 2030. With international support, the country aims to reduce GHG emissions by 15% below BAU emissions by 2030 in these sectors. Further, the 'Energy Efficiency & Conservation Master Plan' aims to reduce energy intensity (per GDP) by 20% by 2030 compared to 2013 levels. Scaling up adoption of clean technologies combined with innovation and robust standards is vital to achieve these goals and beyond. In the recent past, Bangladesh has been making rapid progress in the adoption of clean technologies, particularly solar PV, Combined Heat and Power (CHP)/co-generation and energy efficient drives in the manufacturing sector.

The primary energy intensity in Bangladesh has been improving at a rate over 11% since 2005. This is on par with the global energy intensity trend. This means, energy use and economic development have been decoupling with gross domestic product (GDP) growing at a faster pace than primary energy use. Recognising the need for strong energy efficiency policy to realise national energy goals, the government has set

targets and laid out a clear roadmap for market transformation. The Energy Efficiency and Conservation (EE&C) Master Plan aims to achieve global best energy intensity in manufacturing and building sectors by 2025. It also aims to accelerate penetration of high efficient and super-efficient appliances in the residential sector by 2030.

Electric Vehicle (EV)



**Electric bikes
on road**



**E-rickshaw
stock**



**Hybrid vehicles sold
in 2017-18**

Bangladesh's transport sector is set to experience a paradigm shift with efforts aligned towards improving fuel economy, reducing harmful gas emissions, and promoting a sustainable and environment friendly national vehicle policy. Bangladesh's mobility paradigm is set to shift at a rapid pace. As with any other developing nation, Bangladesh's electric mobility landscape is dominated by last mile connectivity vehicles, comprising majorly of electric bikes and rickshaws(three wheel passanger cart).

Legalizing electric vehicles: Bangladesh Road Transport Authority (BRTA) has issued draft guidelines on the electric vehicles, making registration, fitness certificate and tax token mandatory. The draft policy also specifies the

lifespan of various modes of electric mobility – two wheelers, three-wheelers, and light and heavy-duty vehicles.

Recently, the government has been promoting hybrid vehicles by providing substantial tax incentives, apart from having various tax exemptions for electric two wheelers and three wheelers. Additionally, the Bangladesh Energy Regulatory Commission (BERC) has introduced a new tariff category for charging stations – setting energy charge of 7.70 Tk./KWh along with an additional demand charge of 40 Tk./KW/month. In addition, Bangladesh Rural Electrification Board (BREB) is installing solar powered charging stations, hence promoting renewable energy for EV charging stations.





Environmental Friendly Manufacturing

Bangladesh holds a leading position in sustainable green industrialisation among the world's top ranked Green factories.

Bangladesh's RMG sector worth \$28.5 billion, established 67 eco-friendly green buildings - the highest number in the world.

13 RMG factories are LEED Platinum rated

Over 280 factories are registered with USGBC for LEED certification

Bangladesh Garment Manufacturers and Exporters Association (BGMEA) in association with U.S. Green Building Council (USGBC) and GBCI launched the "LEED Green Factory Award". This recognises Bangladesh's RMG sector's strides in green industrialization. A total of 13 best green building factories of Bangladesh were honoured with "LEED Green Factory Award" to recognize their efforts in sustainability by achieving LEED Platinum certification. Bangladesh, the second largest ready-made garment exporter in the world, has taken a leading position in sustainable green industrialization with the world's several top ranked Green factories. According to the U.S. Green Building Council (USGBC), Bangladesh's RMG sector now has 67 Leadership in Energy and Environmental Design (LEED) green factories. Among them 13 are LEED Platinum rated while more than 280 factories are registered with USGBC for LEED certification.

06

Issues and Challenges



7th

Bangladesh ranked seventh among the countries most affected by extreme weather events
- Global Climate Risk Index 2019

6.7%

Rising temperature and erratic rainfall driven by climate change could cost Bangladesh 6.7% of gross domestic product or GDP by 2050

Source: 'South Asia's Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards' - World Bank 2018



CLIMATE CHANGE VULNERABILITY IN BANGLADESH

Bangladesh ranks sixth among the countries most affected by climate change due to following climatic events



Flash Flood



Monsoon Flood



Landslide



Cyclone



Salinity Intrusion



Drought



Unpredictable Rainfall



River Bank Erosion



Storm Surge

Source: Bangladesh Citizen's Climate Budget Report 2018-19

Effective and efficient management of water resources requires thorough identification of issues and challenges. The issues and challenges of water resources in Bangladesh can be classified under three broad categories: issues related specifically to water (e.g. water related disaster, water availability, etc.); institutional capacity, management and coordination and knowledge gap.

are locally called haors, baors (oxbow lake), and beels (depressions), are disappearing due to population pressure and ill planned infrastructures. The total area of wetlands in Bangladesh is estimated to be 7 to 8 million hectares, or about 50% of its total land surface. However, wetlands are reducing at an alarming rate making it crucial to conserve these wetlands from further deterioration.

Water Related Issues

While some issues and challenges are prevalent and dominant in the specific hotspots of the country namely: Coastal Zone, Barind and Drought Prone Areas, River Systems and Estuaries, Haor and Flash Flood Areas, Urban Areas, Chittagong Hill Tracts and Cross-cutting Area. Some issues and challenges are required to be addressed at the national level. Moreover, spatial location of the hotspots over eight hydrological regions of Bangladesh facilitate the strategy formulation process.

Wetland Conservation

Wetlands play a crucial role in maintaining the ecological balance of ecosystems, flood management and work as retention basins in the wet season. Wetlands contain very rich components of biodiversity of local, national, and regional significance; and they also support millions of people's livelihood. Wetlands, which

Flood Risk Management

Bangladesh is one of the most flood prone countries in the world. Bangladesh experiences four different types of floods which are categorized based on spatiality, timing, intensity and duration. The four groups are flash floods, river floods, rain fed floods and storm surge inundation. The floods of Bangladesh can be further classified into categories based on the frequency and level of impacts, high frequency floods with local impact; annual monsoon floods and water logging; urban flooding (local drainage congestion) and low frequency floods with national impact (i.e. River floods due to simultaneous rise of rivers and high tide); cyclone-induced tidal floods (pre- and post-monsoon) and heavy rainfall in combination with high water levels at the rivers, which prevents drainage. Different hotspots and hydrological regions of the country face different types of floods at different period of the year. Northwest, North-central and Southwest region is more susceptible to river flooding. Whereas Northeast and Eastern Hilly region are vulnerable to flash floods (during

April-May and September-November). Rain fed flooding occurs in many parts of the country but is mainly prevalent in the South Western part of the country. Coastal flood mostly occurs along the coastal zone of Bangladesh. Floods are annual events and generally have different return periods. More devastating flood reoccurs with more return periods.

Dry Season Water Availability and Irrigation Management

At the national level, agriculture provides employment to approximately 47% of the labour force and contributes some 15% in the GDP. Water availability and habitat quality, especially in the dry season, and water quality, notably salinity, are key issues for the agriculture sector. Agriculture sector is already under pressure both from increasing demands for food, and decreasing of agricultural land and water resources depletion. In addition to this, the impacts of climate change on food production are national as well as global concerns. Bangladesh needs to increase the rice yield in order to meet the growing demand for food emanating from population growth. Most of the

droughts primarily occur in pre-monsoon and post-monsoon seasons, but in some extreme cases the pre-monsoon droughts extend on to monsoon season due to delayed onset of the monsoon rains. The southwest and northwest regions of the country are most vulnerable to drought. In Bangladesh, drought is normally defined in terms of drought and severe drought, expressed as number of days without rainfall (10 and 20 days respectively). Moreover, it is important to further distinguish seasonal drought, even in the monsoon season, when overall rainfall is abundant and exceeds crop water requirements. Three types of droughts occur during the monsoon season: early-season, mid-season, and end-of-season.

River Management

Most of the water related challenges are related to the mighty rivers that are both blessings and threats to its society and economy. Reduction of dry season flows in Bangladesh due to increasing upstream withdrawal is causing severe water shortage across the country, and in the Southwest region in particular. Reduced stream flow is also accelerating salinity intrusion and environmental degradation. Restoration of major rivers and their offtakes, as well as



enhanced regional cooperation in the Ganges- the Brahmaputra- the Meghna basins, will ensure availability of more flow in dry season. However, these strategies will help to mitigate the negative impacts such as droughts and water scarcity affecting the dry season irrigation initiatives, excessive extraction of ground water and ground water depletion in northcentral hydrological region; salinity intrusion of southcentral and southwest region and will enhance domestic water supply sources of the north-west hydrological region. The larger rivers being the backbone of the country's hydraulic system, the formulation of a long term strategy for these rivers is of national importance.

Coastal Zone Protection and Management

The coastal zone covers the south-west, south-central and south-east areas of Bangladesh. In its natural state, the coastal zone is often subjected to inundation by high tides, saline water intrusion, cyclonic storms and associated tidal surges. Most of the coastal areas are protected by coastal polders, however, their vulnerability in the long term due to climate change is subjected to hazards. Water supply for domestic and other purposes is severely restrained, and the coastal zone's sanitation coverage is below the national average. Poor communication, lack of education and health care facilities, prolonged absence of safe drinking water and insufficient cyclone shelters contribute to the vulnerability. Furthermore, increasing population pressure increases the competition for limited resources. On the other hand, the coastal zone has a tremendous potential to create opportunities of national importance through intensification of agriculture, aquaculture and marine fishery, exploration of gas and oil resources, development of the ship building industry, ecotourism, renewable energy and deep sea port development.

In order to control flood and resist salinity intrusion towards agricultural activities, polderisation was started in the 1960s. Polders played significant role as strategic instruments through prevention of salinity intrusion in the

agricultural lands. However, overtime the polders have been dilapidated due to erosion and lack of proper maintenance. It began to affect the coastal rivers' drainage capacity and siltation in the delta region. At the polder level, land subsidence and water logging also occurred with time. This impact is further exacerbated by population growth and urbanization.

Moreover, the coastal zone, especially the flat and unprotected areas are prone to impact from cyclones and storm surge event. The zone is further climate change induced problems like sea level rise, heavy monsoon downpour, availability of fresh water and saltwater ingress. Due to the sea level rise, the salinity frontier of the country is predicted to move upstream gradually over the years. Changes in the landward boundary and seasonal distribution of saline water and changes to tide levels may result from the combined effect of sea-level rise and climate change on intra-polder channel configuration and future water management schemes including possible river flow augmentation. Therefore, the management of all such issues depends greatly on the proper management of the polders concerning storm surge, sea level rise and salinity intrusion.

Several areas in the coastal zone, especially the western part and Noakhali mainland suffer from extensive and permanent water-logging. The problem of water-logging is severe in the coastal polders, particularly in the Satkhira, Jashore, Khulna, Bagerhat and Noakhali districts. Reasons behind water-logging are complex and differ between regions. Drainage capacity of the area and the peripheral-rivers is a main concern. This is expected to be heavily impacted in future conditions. Water logging within the polders, backswamps lead to unproductive land, large nuisances, health issues and livelihood insecurity for the inhabitants.

Fresh Water Supply

Bangladesh is on the road to development, driven by a robust industrial sector and the resilience of its population and labour force in the country and abroad. Economic sectors such as agriculture, industries, fisheries and transport depend on the availability of sufficient, clean and reliable fresh water. However, Bangladesh's water supply system is vulnerable both in terms of quality and quantity.

A reduction in freshwater inflows from the Ganges River, siltation of the tributaries of the Ganges, and siltation of other rivers following the construction of the coastal polder system has resulted in a significant increase in river salinity during the dry season. Salinity in the coastal zone increases steadily from December to February, reaching a maximum in late March and early April. Surface water salinity in coastal Bangladesh is also related to salinity of the Bay of Bengal and the circulation pattern of the coastal waters induced by the ocean currents and the tidal currents in the coastal waters. Salinity now reaches as far as Khulna, and affects the supply of both potable water and fresh water for industrial use, particularly for cooling water use. Salinity is also a problem for Chattogram when there are no releases from Kaptai Lake, as the saline front approaches the abstraction point for the city water supply.

Large areas (mostly western) in the coastal zone suffer from a deficit of freshwater availability, mostly in the dry season. Fresh water supply is a severe problem for southwestern regions creating shortages of fresh water for agricultural production as well as for domestic purpose. Projected decreases of transboundary freshwater inflows, sea level rise, as well as possible unprecedented increases in specific demands make freshwater availability an important key issue for the coastal zone.

The salinization front in the coastal zone may further move north and eastwards in the Ganges tidal flood-plain, with unreliable and decreasing the Ganges and the Brahmaputra dry season flows. Sea level rise can further aggravate the situation, making the southwest region particular difficult to live in. The biodiversity within the Sunderbans is also threatened by the sea levels rise. Increased water demands (domestic, industrial, agricultural) will make the situation more difficult.

Access to safe drinking water in Bangladesh is limited due to wide spread contamination of arsenic in groundwater and pollution of surface water. Most of the people in rural areas depend on groundwater for drinking. In major cities like Dhaka, Khulna, Rajshahi, Barishal, Chattogram and Sylhet; people have piped water supply system. In villages and urban slums people also suffer from lack of water for sanitation that

leads to hygiene problems. Besides, there is a huge demand for industrial water usage that are mostly met through surface water sources. In this scenario a sustainable water supply system for domestic and industrial purpose is necessary throughout the country. Pressure on ground water and natural water sources need to be lessened by incorporating reuse of water in domestic, commercial and industrial purposes. Moreover, the combination of salinity, arsenic, and relative poverty, makes the coastal zone particularly vulnerable.

On the other hand, both ground and surface water in Bangladesh has become susceptible to pollution in various degrees. Ground water is largely contaminated by arsenic that makes it unsuitable for drinking and the surface water sources like river, canals, and estuaries are being heavily polluted by industrial sources. The major causes of water pollution are related to land based activities, including industrial effluents, agrochemical, fecal pollution and oil and lubricants spillage. Since the rivers are frequently used as dumps, overall inland surface water quality drops below the permissible limit of DoE standards in the dry season whereas it improves in the wet/ monsoon season. Most of the major rivers around the big cities like Dhaka, Khulna, Chattogram, Rajshahi, Sylhet; are under severe pollution. Buriganga, Shitlakhya, Rupsha, Karnafuli, Karotoa and Surma rivers water quality has severely degraded and most of them have dissolved oxygen below standard level. Many of the wetlands remains at serious environmental risk due to pollution, encroachment, and disconnection between wetlands and the river system, particularly relevant for the northwest hydrological region.

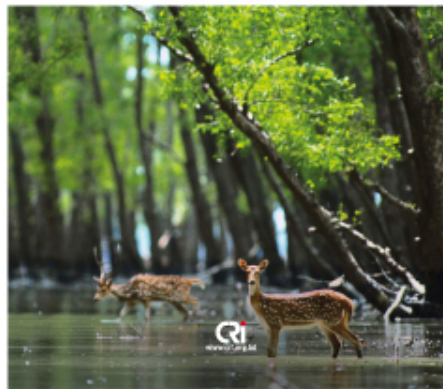
Conclusion

The Bangladesh Delta, the largest delta of the world, along with a large and growing population base presented many advantages that the people and policy makers converted into opportunities to secure the above development gains. Among the countries adversely affected by climate changes, Bangladesh is among the top ten. The position of Bangladesh and the steps taken by it in facing the challenges of climate changes, global warming, and the protection of environment have been highly acclaimed by the world community. Addressing climate change is a national priority in Bangladesh. It has received international recognition for its cutting-edge achievements in addressing climate change. Honourable Prime Minister Sheikh Hasina stressed the need for collaboration and cooperation among neighbouring countries to minimize damages caused by natural disasters. In general, Bangladesh contributes little to climate change, but it is one of the worst-affected countries due to its geographical location, which is highly prone to natural disasters such as cyclones, floods, landslides, and earthquakes.

Over the years, greater collaboration and coordination among various public and private sectors have ensured that policies are more aligned to promote sustainable development. The government has been working with various multi-sectoral groups thereby ensuring that mainstreaming environmental protection programmes are conducted seamlessly. Bangladesh has screened large-scale public investments using poverty-environment and climate criteria, resulting in large government-funded investment projects that better address the concerns of the poor and have increased budget allocations for this purpose. The annual budget on climate change adaptation has increased significantly, three-quarters of the expenditure on climate change adoption is currently supported by the government.

Despite the considerable progress that the Government of Bangladesh and the Bangladeshi people have made, they face continuous challenges associated with climate change. Bangladesh is advancing towards national resilience, guided by the Vision 2021 and the Vision 2041 to contribute to global commitments. The country is now working towards fulfilling its Sustainable Development Goals targets.

— BANGLADESH —
ENVIRONMENT AND CLIMATE CHANGE



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