Climate Adaptation and Resilience (CARE) for South Asia Project

Water Sector Policy Frameworks in Bangladesh

REVIEW REPORT

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Executive Summary

Asian Disaster Preparedness Center (ADPC) and the Regional Integrated Multi-Hazard Early Warning System (RIMES) are jointly implementing a five-year (2020-2025) regional project called 'Climate Adaptation and Resilience (CARE) for South Asia', with support from the World Bank. The overall objective of the project is to contribute to an enabling environment for climate resilience policies and investments in the agriculture, transport, water, policy and planning, and finance sectors in South Asia. Initially, national-level activities are being implemented in Bangladesh, Nepal, and Pakistan. The project has two parallel but distinct components. RIMES is implementing the first component, which focuses on promoting evidence-based climate-smart decision-making; ADPC is implementing the second component which focuses on enhancing policies, standards, and capacities for climate-resilient development in South Asia.

Bangladesh is the only downstream riparian country in the Ganges-Brahmaputra-Meghna river basins (GED, 2020). These three rivers, including their catchment areas, are commonly known as the GBM basin system. The country's surface water resources have developed at the lower end of this GBM basin system. Only about 7 percent of the total basin area of 1.72 sq. km falls within the country boundary (GED, 2020). More than 700 rivers flow in the country, including 57 transboundary rivers. These rivers constitute the surface water system of the country, and are fed by the runoff from upstream and hydrological regions within the national boundary.

On the other hand, groundwater is a renewable and dynamic natural resource in Bangladesh (Mojid et al., 2019). It provides an essential supply for domestic, irrigation, and industrial use in the country. Despite having a fairly abundant surface water resources system, the country's water usage pattern is heavily dependent on groundwater supply. Annually, an average volume of 32.0 cubic kilometers is withdrawn to meet the nation's water demand for agriculture, industry, and household needs (Shamsudduha et al., 2019). This amount is equivalent to approximately 4 percent of global groundwater withdrawal (Hanasaki et al., 2018).

In terms of consumption, agriculture is the primary user of groundwater. According to World Bank statistics (2017), irrigation accounts for more than 87 percent of total groundwater withdrawal in the country. Estimated present (2011) and future (2030) water demands in the countryare listed in **Table 1**. The government has been trying to increase the share of surface water supply for irrigation, in order to limit excessive abstraction of groundwater through the deep tube wells. Other than the natural systems, the country has limited options for water resources development such as rainwater harvesting (RWH), installing surface reservoirs, and wastewater reclamation. The governing water consumer in the country is the agriculture sector.

Table 1: Estimates of Water Demands in Different Sectors (Source: World Bank, 2015)

Sector/ Use	Demand (withdrawal, bcm)	
	Year 2011	Year 2030
Agriculture (irrigation, fisheries, and livestock)	32.3	46.3
Only irrigation	23.6	34.5
Domestic	2.4	4.2
Industry	0.1	0.2
Instream Demand or Environmental Flows	106.2	106.2

Water resources are at the center of the economy and development in Bangladesh, and are obviously linked with the sustainability of other governing sectors such as food and agriculture, industry, and infrastructure. Water policies play a crucial role in managing extraction, treatment, supply, demand, distribution, and allocation of water for various purposes. With the growing concern for climate change

and its impact on water security, the government has to closely monitor and update these policy instruments to ensure the country's water needs are met and maintain a sustained balance on the basin- or regional-scale.

This report presents a summary of the findings of a review of the water sector policy framework in Bangladesh. The study was performed under Component 2 of the CARE for South Asia project, which aims at developing or enhancing climate-resilient standards for the subject sector at both national- and South Asian Regional (SAR) levels.

There are several legal, institutional, policy, and regulatory instruments at both national and regional scales to support water resources management and conservation in the country. Bangladesh, being one of the largest deltas in the world, has a long history of managing water resources that required the formulation of different policy frameworks over time. In addition to sector-specific policy frameworks, the country has prepared a number of short-, medium- and long-term national plans which also include strategies for integrated water resources management (IWRM). All these policy instruments, along with the institutional structure of the government, facilitate the required environment for water governance.

Additionally, the assignment explored the history of water governance in the country along with the government's institutional form in different periods. It is anticipated that the form of water management in Bangladesh has evolved from a flood control approach to the concept of water governance over time. The Ministry of Water Resources (MoWR) is the government's mandated institution related to the water resources development sector in Bangladesh. It is supported by a number of implementation partners, including the Water Resources Planning Organization (WARPO), Bangladesh Water Development Board (BWDB), and the Department of Bangladesh Haor and Wetlands Development (DBHWD). In addition, water-related service sectors such as water supply and wastewater drainage, as well as water, sanitation and hygiene (WASH), are managed by the Local Government Division (LGD) and its implementation partners, e.g., Water Supply and Sewerage Authorities (WASAs), Department of Public Health Engineering (DPHE), City Corporations, Local Government Engineering Department (DPHE), and other local water management bodies.

There are several other water institutions, technical and development partners, and organizations from other sectors such as the Ministry of Agriculture (MoA), Ministry of Shipping (MoS), Ministry of Environment, Forest and Climate Change (MoEFCC), etc., which contribute to the nation's water governance system.

There are a number of policy instruments used by different ministries and their implementation partners who are connected with the water sector of Bangladesh. More than 40 prevailing policy instruments from different sectors were reviewed in this study. Among them, a total of 33 instruments were summarized in this document. The policy instruments include acts, rules, policies, strategies, plans, guidelines, treaties, etc. Among the reviewed documents, there were 14 and 8 policies from the water and agriculture sectors. In addition, three national-level policies for climate adaptation and mitigation, and three national plans, i.e., the Bangladesh Delta Plan 2100, Perspective Plan 2041, and the Eighth Five Year Plan (2021-2025) were reviewed in this assignment. The reviewed climate policies were the National Adaptation Program of Action 2009 (NAPA 2009), Bangladesh Climate Change Strategy and Action Plan 2009 (BCCSAP 2009), and the Intended Nationally Determined Contributions 2015 (INDC 2015). Additionally, some local adaptation plans and measures were also explored with information of relevant projects and case studies.

A review of the water sector policy framework of Bangladesh yielded the following findings from this assignment.

Status of Water Resources

- Despite having a fairly abundant surface water resources system, the consumers of water are heavily dependent on groundwater supply in Bangladesh. The largest consumer is the agriculture sector.

- Executing agencies from not only MoWR but other ministries such as MoLGRD&C and MoA are engaged in water resources development.
- The government has been trying to shift the water balance toward surface water.
- The transboundary inflow occupies almost 75% of total water volume which indicates the country's dependency on regional availability and cooperation on WRM.
- The main issue associated with the availability of water resources is its abundance in the wet season; and shortage in the dry season. Water storage potential still remains unharvested. The government has been trying to promote rainwater harvesting as a renewable and alternative source of supply through its different policy instruments.
- The coastal zone is the most critically affected hydrologic region in terms of access to safe water due to arsenic (As) contamination, climate vulnerabilities, and salinity intrusion.
- A water reclamation option could be a viable source for industrial and agricultural applications, and a solution for reducing stress on the excessive abstraction of groundwater. However, this study did not find reliable information on the status of water reuse in the country. Even, there is no policy instrument found that promotes the adoption of resource recovery and reuse for water applications.

Status of Water Governance

- Water governance in Bangladesh demonstrates a complex and participatory arrangement with a network of water institutions, both at the central government, and local government levels.
- Although MoWR is the focal ministry for water governance, the groundwater supply infrastructure and operations are managed by the DPHE under the MoLGRD&C. Therefore, agricultural water use is linked with operations of both MoWR and MoLGRD&C.
- The water organizations follow the policy instruments designed by the MoEFCC to address the climate actions in their development programs.
- Though the policy instruments suggest a basin-scale practice of WRM, the existing institutional setups such as water management committees include administrative boundaries for IWRM.
- The country has fairly adequate information on the technical, hydrological and operational aspects of water management. Yet, the practice of evidence-based decision-making and access to the use of supporting tools for information management are not present to a satisfactory level.

Review of the existing policy frameworks

- The governing policy instruments on water resources are the National Water Policy 1999, National Water Management Plan 2001, Water Act 2013, Water Rules 2018, and the IWRM Guidelines 2020. The Water Policy 1999 and the Water Management Plan 2001 shape the country's development in water resources and flood control infrastructure. Yet, these instruments have not been updated since their first publication.
- In the context of transboundary river management, Bangladesh has only one bilateral treaty with India. The government has been trying to formulate another treaty for the Teesta river with India. However, no policy instrument was found to address trans-boundary aquifer management.

- The sector development policies are generally adopted by the LGD with a focus on water supply and sanitation.
- The water sector policies are supported and enhanced with input from the national level plans and strategies such as the Delta Plan 2100, Eighth Five Year Plan 2021-2025 (8FYP), etc.
- Many of the water sector policies address the impact of climate change but only a few of those provide directions toward formulating specific adaptation and resilience measures.
- Relevant policies in the agriculture sector focus on enhancing irrigation efficiency and technologies but there is a gap in the linkage with the information on water resources.
- The subsectors of fisheries and livestock have no specific policy instruments to provide directions on the use of water resources. Currently, these sectors use instruments supplied by MoWR and MoA.
- There is a lack of adequate and well-formulated legal capacities on monitoring and regulations identified in the existing policy instruments of the water sector. It is essential to address the deficiency in policy compliance and protectnatural water resources.
- The recent policy instruments, such as the 8FYP, are encouraging the establishment of a decentralized water management practice. If it could be implemented successfully, water governance in the country would experience a noticeable shift in the near future.

The review findings and information on water sector stakeholders were further analyzed to identify noticeable gaps and sectoral needs in the policy framework, as listed below.

- Water governance in Bangladesh strictly follows a top-down approach. It leaves the lower level and community-based water organizations with a knowledge gap on policy implementation to a certain extent. Coupled with this challenge, the locally adopted best management practices are also frequently found absent in these policy instruments.
- There is evidence of data duplication and a lack of an appropriate data management and sharing protocols among the stakeholders. Therefore, it may be quite challenging to acquire the right data at the right time from the right authorities. Many agencies use IT-enabled platforms to store and manage their data but the systems are not favorable for instant and easy access. Also, the quality of metadata is unsatisfactory. The implementation programs are producing a wealth of information every day, but those are not properly stored and archived to support data analytics and decision-making.
- There is a lack of advanced and IT-enabled M&E systems in place to support water governance. Many of the implementation projects still adopt traditional and manual M&E processes, leading to limited governance, as compared to expectations. Fortunately, the 8FYPformulated a development plan for a digital and result-based M&E system to support the implementation of the BDP 2100. This example needs to be demonstrated as much as possible in every sector and program.
- Many of the requirements of the policy instruments appear ambitious compared to the current status of implementation and resources capacity of the executing institutions. For example, the SDGs targets are incorporated in many policy instruments but the local level institutions are not ready yet to deliver the intended results. There is a significant need for capacity building, particularly for local-level (rural and municipal) water institutions. There is further scope for conducting an extensive capacity needs assessment for the water sector agencies.
- At present, there is no decision-support framework institutionalized to support water accounting and water auditing at the governance level.

- The National Water Policy 1999 and the National Water Management Plan 2001 could not be updated due to various challenges including the resource limitation at WARPO. The same scenario applies to many other policy instruments. For instance, the last policy framework in the livestock sector was developed in 2007. It reveals that some government institutions are unable to maintain a regular update on the policy instruments and implementation status.
- IWRM requires a participatory approach, yet there is only one policy instrument available at present to provide proper directions on this and ensure an enabling environment for all stakeholders. There is a lack of understanding, clarity, and accountability on roles and responsibilities of the individual institution in the existing setup.
- MoWR does not have any dedicated policy instrument to support the protection and enhancement of water quality in the existing water resources.
- The sub-sectors of fisheries and livestock are very important in the context of IWRM, but there were no well-designed policy instruments found in these sectors to support an efficient use of water resources.
- Considerations for an integrated balance of surface water and groundwater resources are essential in the operating policy frameworks as well as among the participating water institutions from different ministries. There is a coordination gap sensed between the policy frameworks adopted by the MoWR and the LGD at present.
- A well-designed policy instrument on the use of IT-enabled platforms, geospatial technologies, remote sensing, simulation, and analytics tools need to be formulated with considerations for sector-specific water application and climate actions.

The assessment findings also helped establish the following linkages with the planned activities of the CARE for South Asia project.

- The CARE for South Asia project will develop a climate-informed water accounting framework for agricultural water management. The framework will essentially provide evidence-based decisions on water use for agricultural production and support water accounting and auditing by MoWR and its partner organizations.
- The 8FYP recommends the development of a Result-Based M&E (RBM&E) system following the principles outlined in the BDP 2100. ADPC and RIMES have been working on developing necessary guidelines for this M&E framework and an online portal to access the framework in consultation with GED and MoWR.
- An extensive capacity needs assessment will be performed for the selected water institutions and the project will arrange appropriate training for the staff of those agencies.
- Essential technical assistance will be provided on enhancing water sector policy instruments used by MoWR, WARPO, and BWDB. The policy instrument will be selected in consultation with the sector focal points from MoWR, WARPO, and BWDB.
- Adequate training will be provided on the frameworks, and decision support systems designed through the project, in order to ensure the sustainability of the use of project outputs and improved capabilities for water governance.

The policy support interventions in the CARE for South Asia project will assist the stakeholders with managing water resources in a better way, and incorporate essential adaptation and resilience measures on climate change, both at national and regional scales.

Contents

Figures

Tables

Abbreviations

8FYP	The Eighth Five Year Plan (2021-2025) of Bangladesh
ADB	Asian Development Bank
ADP	Annual Development Plan
ADPC	Asian Disaster Preparedness Center
AIS	Agricultural Information System
As	Arsenic
AWM	Agricultural Water Management
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BBS	Bangladesh Bureau of Statistics
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BCCT	Bangladesh Climate Change Trust
bcm	Billion cubic meters
BDP 2100	Bangladesh Delta Plan 2100
BEZA	Bangladesh Economic Zones Authority
BIWTA	Bangladesh Inland Water Transport Authority
BIWTC	Bangladesh Inland Water Transport Corporation
BMD	Bangladesh Meteorological Department
BMDA	Barind Multipurpose Development Authority
BPC	Bangladesh Planning Commission
BRRI	Bangladesh Rice Research Institute
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CARE	Climate Adaptation and Resilience for South Asia
CEGIS	Center for Environmental and Geographic Information Services
City Corp.	City Corporation
CRI	Climate Risk Index
CSIRO	Commonwealth Scientific and Industrial Research Organization, Australia
cusecs	Cubic feet per second
CWP	Crop Water Productivity
DAE	Department of Agricultural Extension
DBHWD	Department of Bangladesh Haor and Wetlands Development
DLS	Department of Livestock Services
DoE	Department of Environment
DoF	Department of Fisheries
DoS	Department of Shipping
DPHE	Department of Public Health Engineering
DSS	Decision Support System
DWASA	Dhaka Water Supply and Sewerage Authority
EbA	Ecosystem-based Adaptation
ECNWRC	Executive Committee of the National Water Resources Council
EIA	Environmental Impact Assessment

ET	Evapotranspiration
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FAP	Flood Action Plan
FFWC	Flood Forecasting and Warning Center
FY	Fiscal Year
GBM	Ganges-Brahmaputra-Meghna basin system
GCF	Green Climate Fund
GED	General Economics Division
GEF	Global Environment Facility
GHG	Greenhouse Gases
GIZ	German Development Agency
GPP	Guidelines for People's Participation
ICCCAD	International Center for Climate Change and Development
IIED	International Institute for Environment and Development
INDC	Intended Nationally Determined Contribution
INGO	International Non-Government Organization
IsDB	Islamic Development Bank
IT	Information Technology
IUCN	International Union for Conservation of Nature
IWFM	Institute of Water and Flood Management
IWM	Institute of Water Modelling
IWRM	Integrated Water Resources Management
JRC	Joint River Commission
LAPA	Local Adaptation Plans for Action
LGD	Local Government Division
LGED	Local Government Engineering Department
LIPRF	Legal, Institutional, Policy and Regulatory Framework
LoGIC	Local Government Initiatives on Climate change
LPAD	Legal and Parliamentary Affairs Division
M&E	Monitoring and Evaluation
MoA	Ministry of Agriculture
MoD	Ministry of Defense
MoDMR	Ministry of Disaster Management and Relief
MoEFCC	Ministry of Environment, Forest and Climate Change
MoFL	Ministry of Fisheries and Livestock
MoLGRD&C	Ministry of Local Government, Rural Development and Cooperatives
MoP	Ministry of Planning
MoS	Ministry of Shipping
MoWR	Ministry of Water Resources
NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
NbS	Nature based Solution
NGO	Non-Government Organization
NRCC	National River Conservation Council

NWMP	National Water Management Plan
NWRC	National Water Resources Council
NWRD	National Water Resources Database
O&M	Operation and Maintenance
PP 2041	Perspective Plan 2041
PSB	Policy Support Branch
RBM&E	Result Based Monitoring and Evaluation
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
RRI	River Research Institute
RWH	Rainwater Harvesting
SDG	Sustainable Development Goal
SDP	Sector Development Plan
SIDA	Swedish International Development Cooperation Agency
SoB	Survey of Bangladesh
SPARRSO	Bangladesh Space Research and Remote Sensing Organization
SREDA	Sustainable and Renewable Energy Development Authority
UN	United Nations
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USACE	U.S. Army Corps of Engineers
USAID	United States Agency for International Development
WA	Water Accounting
WARPO	Water Resources Planning Organization
WASA	Water Supply and Sewerage Authority
WASH	Water, Sanitation and Hygiene
WB	World Bank
WHO	World Health Organization
WMP	Water Master Plan
WRM	Water Resources Management
WSS	Water Supply and Sanitation

1. Introduction

Asian Disaster Preparedness Center (ADPC) and the Regional Integrated Multi-Hazard Early Warning System (RIMES) are jointly implementing a five-year (2020-2025) regional project called 'Climate Adaptation and Resilience (CARE) for South Asia' with support from the World Bank. The overall objective of the project is to contribute to an enabling environment for climate resilience policies and investments in agriculture, transport, water, policy and planning, and finance sectors in South Asia.

Initially, the national-level activities are being implemented in Bangladesh, Nepal, and Pakistan. The project has two parallel but distinct components: RIMES is implementing the first component which focuses on promoting evidence-based climate-smart decision-making; ADPC is implementing the second component which focuses on enhancing policies, standards, and capacities for climate-resilient development in South Asia.

This report presents a summary of findings following a review of the water sector policy framework in Bangladesh. There are several legal, institutional, policy, and regulatory instruments at both national and regional scales to support water resources management and conservation in the country. Bangladesh, being one of largest deltas in the world, has a long history of managing water resources that require the formulation of different policy frameworks over time. In addition to the sector-specific policy frameworks, the country has prepared a number of short-, medium- and long-term national plans which also include the strategies for integrated water resources management (IWRM).

Water resources are at the center of the economy and development in Bangladesh, and are linked with the sustainability of other governing sectors such as food and agriculture, industry, and infrastructure, obviously. Water policies play a crucial role in managing extraction, treatment, supply, demand, distribution and allocation of water for various purposes. With the growing concern for climate change and its impact on water security, the government has to closely monitor and update these policy instruments to ensure the country's water needs and maintain a sustained balance on the basin- or regional-scale.

This assignment explored the status of the governing water sector policy framework along with the fundamental structure of water governance in the country. Relevant policy instruments of other important thematic areas such as agriculture and industry were additionally investigated to assess their relation and linkage with the water sector policy framework. However, the review focused on only the recent and governing policies in order to accurately predict the existing institutional and operational forms of water governance. There are many ancient and ancillary instruments left unassessed in this assignment.

2. Water Resources in Bangladesh

2.1 Surface Water

Bangladesh is the downstream riparian country in the Ganges-Brahmaputra-Meghna river basins (GED, 2020). These three rivers including their catchment areas are commonly known as the GBM basin system (**Figure 2.1**). The country's surface water resources have developed at the lower end of this GBM basin system. Only about 7 percent of the total basin area of 1.72 sq. km falls within the country boundary (GED, 2020). More than 700 rivers flow in the country which include 57 transboundary rivers. These rivers constitute the surface water system of the country, and are fed by the runoff from upstream and hydrological regions within the national boundary. Majority of the transboundary rivers, 54 among 57, are shared with India (Joint River Commission of Bangladesh, 2019). The hydrological regions of Bangladesh are depicted in **Figure 2.2**.

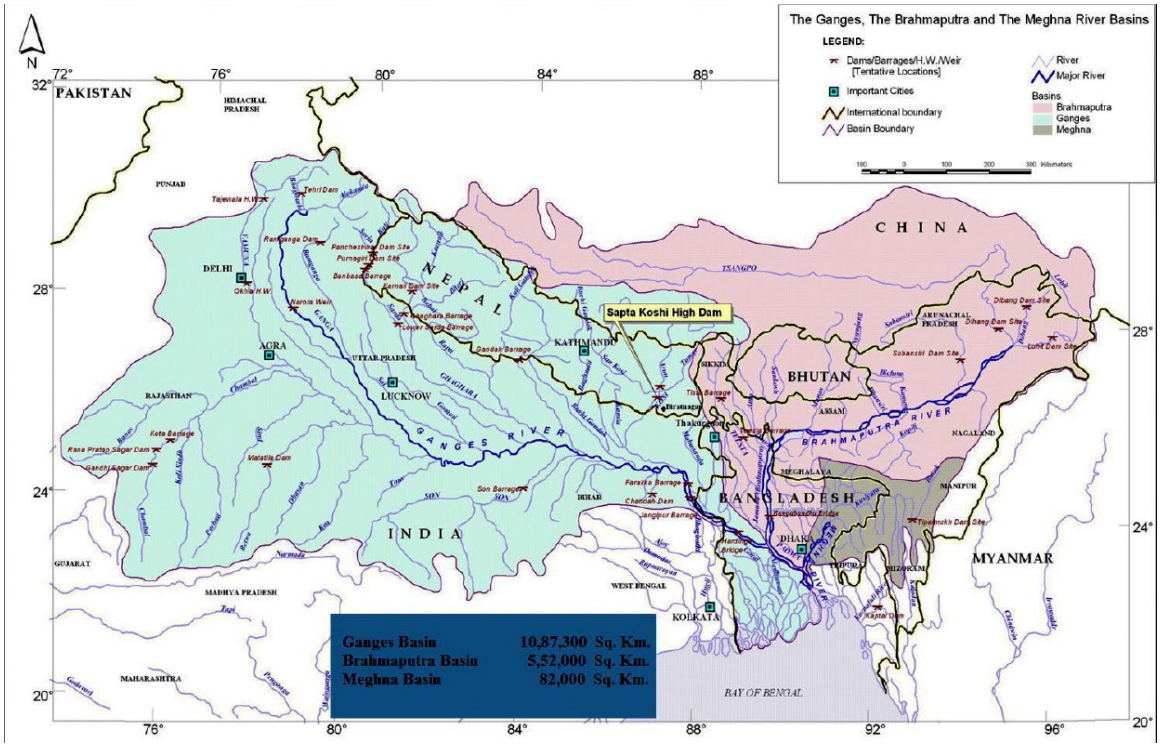

Figure 2.1: Ganges-Brahmaputra-Meghna (GBM) Basins (Source: Joint River Commission of Bangladesh, 2019)

Annually, the cross-border river flows entering into the country's surface water system are estimated to be 1,200 billion cubic meters (bcm), 78% of which is contributed by the three main rivers: Padma or Ganges, Brahmaputra or Jamuna and Meghna (GED, 2020). The contribution of inflow from the major rivers are 31%, 54%, and 14% respectively. About 85% of the river flow occurs during the monsoon and post-monsoon period of June-October. While there is an abundance in flow during this period, the country receives only 15% of total transboundary river flow (about 148 bcm) during the dry season.

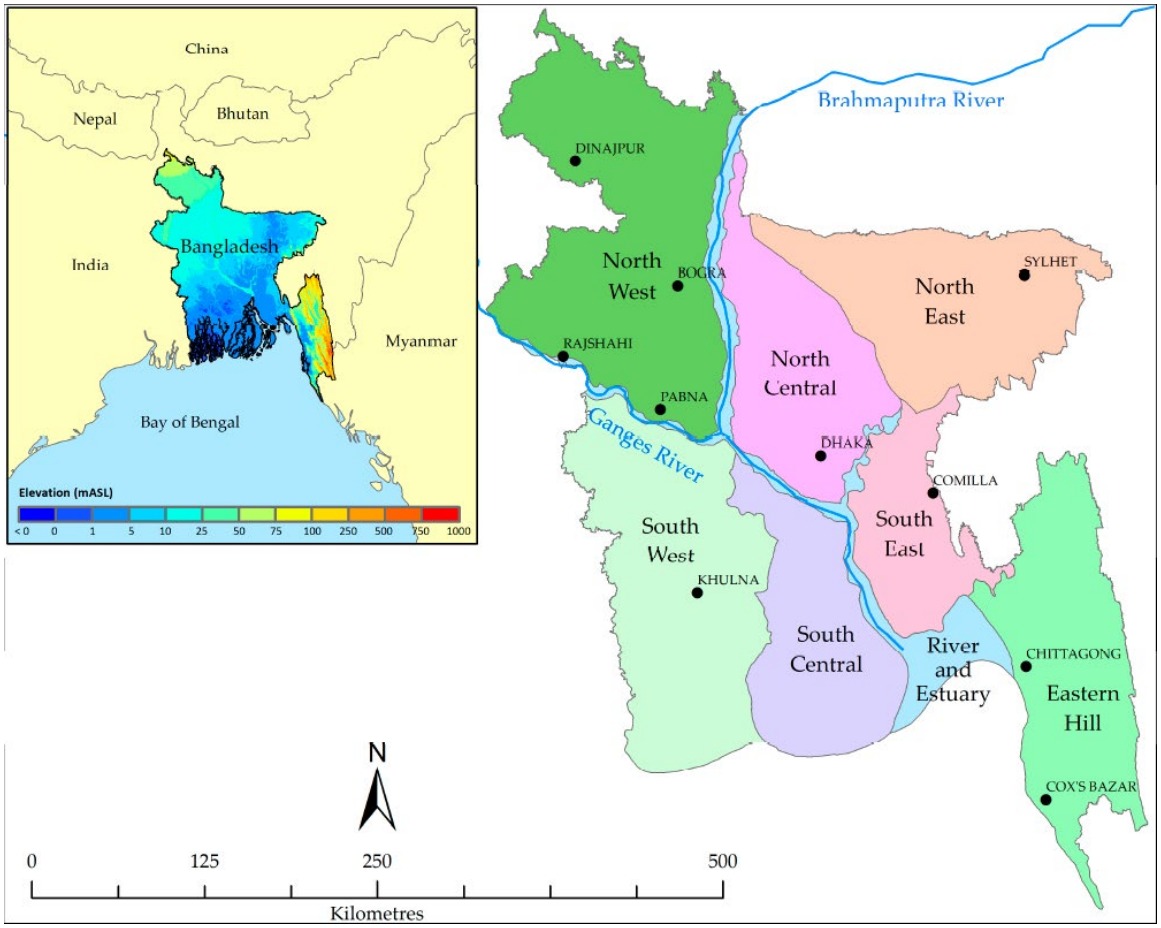

Figure 2.2: Hydrological Regions in Bangladesh (Source: Mojid et al., 2019)

2.2 Groundwater

Groundwater is a renewable and dynamic natural resource in Bangladesh (Mojid et al., 2019). It provides an essential supply for domestic, irrigation, and industrial use in the country. Despite having a fairly abundant surface water resources system, the country's water usage pattern is heavily dependent on groundwater supply. Annually, an average volume of 32.0 cubic kilometers is withdrawn to meet the nation's water demand for agriculture, industry, and households (Shamsudduha et al., 2019). This amount is equivalent to approximately 4% of global groundwater withdrawal (Hanasaki et al., 2018). **Figure 2.3** illustrates the region-wide status of groundwater withdrawal in Bangladesh.

Apparently, groundwater is addressed as a separate source although it is also fed by the recharge from surface water or the rainfall-induced surface runoff in the country's hydrological territory. The geological formation of the country consists of sedimentary alluvial and deltaic deposits of the three major rivers (Ahmed and Roy, 2007). These alluvial deposits helped form a fairly abundant aquifer system beneath the ground surface. There is a complex and spatially different pattern of recharge behavior observed in this aquifer system. However, the governing recharge takes place during the wet or monsoon season (June-September) due to the availability of excess runoff and inundated floodplains.

About 98% of drinking and 80 percent of dry-period irrigation supplies come from groundwater at shallow depths less than 150 m below the ground level (Shamsudduha, 2018). However, the availability of groundwater sources is gradually dwindling, threatened by some critical hydrological and socioeconomic factors: e.g., excessive abstraction, climate change, and chemical contamination. Water governance also has the scope for substantial improvement to ensure the conservation and sustainability of safe groundwater resources. It is estimated that about 26 percent of tube wells are affected by arsenic (As) contamination of shallow aquifers (Shamsudduha et al., 2019).

Nevertheless, the access to water supply has been always blessed by the availability of groundwater resources across all hydrological regions in the country. There are about 1.6 million and 17 million tube wells installed by the Department of Public Health Engineering (DPHE) of the government and owned by private entities respectively (Shamsudduha et al., 2019).

In terms of consumption, agriculture is the primary user of groundwater. Irrigation accounts for more than 87% of total groundwater withdrawal in the country according to the World Bank statistics of 2017 (available at the following web link: https://data.worldbank.org/indicator/ER.H2O.FWAG.ZS?locations=BDhttps://data.worldbank.org/indicator/ER.H2O.FWAG.ZS?locations=BD).

The government has been trying to increase the share of surface water supply for irrigation in order to limit the excessive abstraction of groundwater throughdeep tube wells. At present, 73 percent of total irrigated land is served by groundwater; which the government aims at reducing to 70 percent by 2030 (*The Daily Star*, March 18, 2021).

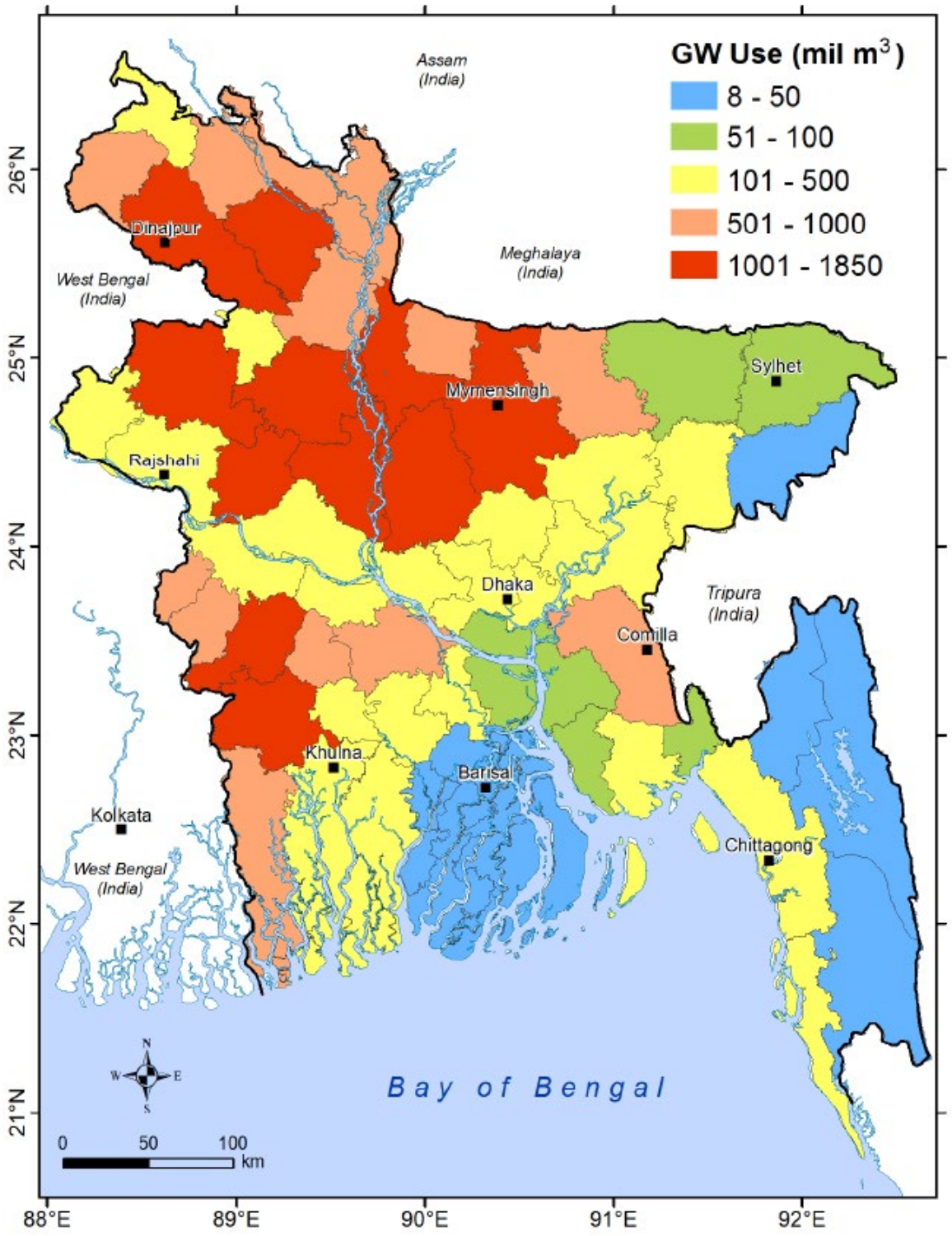

Figure 2.3: Estimates of Groundwater Withdrawal for Domestic Use and Irrigation (Source: Shamsudduha et al., 2019)

2.3 Status Summary on Water Resources

Ahmed and Roy (2007) reported distribution of 74 percent, 24 percent and 2 percent for transboundary inflow, rainfall-induced runoff, and groundwater respectively. One of the main issues associated with surface water resources in Bangladesh is disproportionate availability in wet and dry seasons. A study conducted by the Bangladesh University of Engineering and Technology (BUET, 2004) reported acute problems of abundance (or flooding) in the wet season and scarcity in the dry season.

Groundwater, on the other hand, is fairly available to a varying extent in every hydrological region in the country. However, the main issue associated with groundwater is chemical contamination such as arsenic (As) and salinity. Additionally, a long history of groundwater abstraction, with growing water demand, has been threatening aquifer sustainability.

2.4 Resources Development Potential

Theoretically, application or surface storage through the construction of reservoirs or rainwater harvesting could be potential supply options during the dry season. In addition to water shortage in the dry period, the southern and coastal regions of the country are facing an extreme challenge for a safe water supply due to increasing arsenic and salinity problems in the groundwater – inferred in several investigations made on groundwater by DPHE and other water organizations.

Rainwater harvesting (RWH) is an ancient technology to avail water supply for various use (WaterAid, 2019). However, there are inadequate infrastructure and institutional setups to support harvesting the full potential of this technology in Bangladesh. Numerous research works have been performed over the last decade to identify and estimate the RWH potential at various locations in the country. The harvesting potential varies depending on the characteristics of the catchment area and the type of instruments used for collection and use.

In recent years, RWH has gained significant attention particularly in the densely populated urban areas like Dhaka and other divisional cities to address the growing water demand, stress on groundwater abstraction and water logging problems during the rainy season. For domestic use, it is estimated that RWH can reduce the stress on groundwater supply by more than 50% (Choudhury and Sultana, 2010). To promote the use of rainwater and conserve the sustainability of groundwater aquifers, the government has also incorporated requirements for the installation of RWH facilities in the national building code as well (BNBC, 2020).

In the coastal areas, in addition to the option for household RWH facility, the government is actively looking for the installation of surface water reservoirs to capture rainwater and utilize it during the dry period. The Ministry of Water Resources (MoWR) has already initiated groundwork on this matter.

Inindustrial use, stress on water requirements can be reduced by applying the principles of wastewater reclamation. Although there is a national policy framework for 3R strategy (reduce, reuse and recycle), it is not formulated to the full potential to address wastewater reuse in the industrial sector. Sharmin (2016) depicted that a decentralized wastewater management system (such as the reuse of treated effluent inagricultural fields) can help reduce stress on groundwater abstraction to a certain extent. Unfortunately, the potential of wastewater reclamation is yet uncertain and unknown, and there are only a few investigations made so far. During this assignment, no reliable statistics were found to predict the amount of resource recovery and reuse.

2.5 Current and Projected Water Demands

It is stated in **Section 2.2** that agriculture is the primary consumer of freshwater in Bangladesh. Annually, the sector accounts for the withdrawal of about 32.0 bcm water, which also includes sub-sectors of fisheries and livestock (World Bank, 2015). Apart from agriculture, frequently reported consumers are the households and the industry. The estimated water demands for these sectors are listed on **Table 2.1**.

Table 2.1: Estimates of Water Demands in Different Sectors (Source: World Bank, 2015)

Sector/ Use	Demand (withdrawal, bcm)	
	Year 2011	Year 2030
Agriculture (irrigation, fisheries, and livestock)	32.3	46.3
Only irrigation	23.6	34.5
Domestic	2.4	4.2
Industry	0.1	0.2
Instream Demand or Environmental Flows	106.2	106.2

The environmental flows consider water requirements for navigation and fisheries, salinity control, pollution control, and the environment (NWMP, 2001).

2.6 Impact of Climate Change on the Water Resources

Climate variability and climate change have effects on the basin hydrology, water security, and water governance of any country and Bangladesh is no exception. In fact, the country is one of the most vulnerable countries to climate change and ranked at 7th position on the list of global Climate Risk Index (CRI) by Germanwatch (www.germanwatch.org) in 2019. Climate change affects temperature and rainfall, and thereby impactsevapotranspiration, crop-water demand, runoff, and recharge (World Bank, 2015). The status of water resources balance in the hydrological environment is altered accordingly.

Kirby et al. (2014) investigated the impact of climate change in the hydrological regions of Bangladesh to a certain extent. The analysis was conducted for wet and dry seasons, and for the horizons of 2030 and 2050. The following key findings were obtained from the study.

- Surface water availability is expected to increase by 11% in both 2030 and 2050 from the base scenarios during the wet season. On the other hand, it will reduce by 2% in 2030 during the dry period.
- In the wet season, the irrigation water demand is likely to reduce by 9% and 1% in 2030 and 2050 respectively. On contrary, it will increase by 4% during the dry season in 2030.
- Analysis with a set of climate variability scenarios concluded that it has a more dominant impact on the country's water resources than the effect of climate change scenarios. However, there are still many uncertainties, data limitations, and knowledge gaps on climate change and the water balance condition. The study recommended conducting rigorous investigations and studies on climate change, at regular intervals.

2.7 Challenges for Water Resources Management

The Eighth Five Year Plan (2021-2025) or the 8FYP published by the government of Bangladesh reported the following major challenges for water resources management in the country.

- *Flood risk management* – The north-west, north-central, and south-west regions experience river flooding, whereas the north-east and eastern-hilly regions are vulnerable to flash floods during the wet season. Flooding is a regular phenomenon in Bangladesh, and it causes extensive damages to life, livelihood, and development (GED, 2020).
- *Availability of water in the dry season* – Though there is an abundance in water flow in the wet season, the country faces water scarcity particularly in drought-prone areas during the dry season. The most critically affected sectors are agriculture and food production.

- *River water management* – The main challenge associated with river water management is the severe water shortage in the instream flow during dry periods due to various reasons. Reduced stream flow during this period causes increases in salinity intrusion, excessive stress on groundwater sources, environmental degradation, and reduction in crop yield.
- *Coastal zone protection and management* – The governing challenges are inundation by high tides, salinity intrusion, and storm-surges.
- *Wetlands conservation* – The total wetlands area is approximately 7 million hectares: substantially important for ecological balance. The main challenge is to protect these wetlands from human-induced development and water pollution.
- *Climate change* – The 8FYP depicts the coastal zone to be most severely affected by the adverse impact of climate change. The unanticipated change in temperature and rainfall induced by climate change has been disturbing the balance of water resources, and affecting food production and water security.
- *Population growth* – The Bangladesh Delta Plan 2100 (BDP 2100) forecasts an estimated increase in domestic water demand by 50% by the year 2030. An increase in population will, additionally, create stress on agricultural water requirements and food production. Also, a considerable portion of water use is linked with the sanitation system of the country, which is likely to increase along with the population.
- *Upstream development* – Since the country is located at the downstream of the GBM basin, the availability and hydrological response of water resources are affected by development activities upstream of the basins. The reduction in the flow from the Ganges river has detrimentally affected freshwater supply and the ecology of the Sundarbans. Transboundary river management issues have been always a major challenge on the regional scale.
- *Institutional capacities* – Inadequate resources capacity at water governance is one of the major challenges for implementation and management activities in the water sector. Despite having a fairly large number of water organizations in the government, limitations in the policy framework, technology, finance, skilled human resources, and infrastructure are the major barriers to efficient water resources management.

It is acknowledged by the government in the 8FYP that effective water governance equipped with a well-designed policy framework, advanced information technology, human and legal capacities are essential to address and resolve the current challenges and operationalize an integrated water resources management (IWRM) system in the country.

3. Water Governance in Bangladesh

3.1 History of Water Governance in Bangladesh

Water governance in Bangladesh originates a while ago:in the sixth decade of the last century, after the country experienced two consecutive devastative floods in 1954 and 1955 (Gain et al., 2017). Realizing the need for an effective flood control mechanism and intending to protect agriculture, the authorities designed a 20-year master plan, in the wake of the aftermath of the two devastating floods. Thus, water management at the governance level in Bangladesh evolved out of a need for flood control. Later, the government recognized the need for an institutional setup and essential reforms, with policy framework to create an enabling environment for IWRM. Gain et al. (2017) summarized the evolution of water governance in Bangladesh in four distinguished phases as follows.

- 1960s, when a master plan and structural engineering measures were formulated for flood control,
- 1970s and 1980s, when the governance moved toward building water management through the installation of institutions and policy tools
- 1990s and 2000s, when the focus gradually shifted toward implementing IWRM. In the country context of Bangladesh, the IWRM consists of seven strategic dimensions such as: integrated management of water resources, river basin-wide development schemes, functional legal and policy framework to support water governance, application of a multi-stakeholder and participatory approach on water sector development, economic development, gender, equity and social inclusiveness, and conservation of ecology and environment
- After the 2000s, the transition gradually takes account for linkage with livelihood, water economy, climate change, and delta development and aims at establishing an effective water governance system

There are a number of policy tools designed to support water governance after the independence in 1971. The evolution of the water sector policies can be divided into four eras, with some distinguishinng characteristics as listed in **Table 3.1** (Chan et al., 2016). However, the findings from the study of Chan et al. (2016) do not include some groundbreaking policy tools; such as the Bangladesh Delta Plan 2100 (BDP 2100), National Perspective Plan 2041 (PP 2041), etc., which were prepared afterwards.

Table 3.1: Evolution of Water Policies in Bangladesh (Source: Chan et al., 2016)

Era	Laying the Foundation of Water Institution (1947–1988)	Establishing the Flood Action Plan (1989–1994)	Restructuring the Water Sector (1995–1998)	Evolution of Water Governance (1999 to Date)
Main Concerns/ Goals	Establishment of key institutions (e.g., BWDB) of water management	Strategy formulation for controlling and managing floods	Overhaul the water management systems, particularly, decision-making process	Developing calibrated policy instruments to face water challenges
Main Issues	Increasing agricultural production	Controlling floods, particularly saving crop cultivation	Integrated planning and management and preserving water resources	Managing water demand and crisis by leveraging science and technology
Main Instruments	A 20-years Water Master Plan (WMP)	The Flood Action Plan (FAP)	The Guidelines for People's Participation (GPP) for water development projects	The National Water Policy and National Water Management Plan (NWMP)
Key Features	Preparing WMP was the initial step of water planning. It overemphasized surface water interventions and overlooked ground water management. In this era, water management was followed mainly "sectoral approaches" and "structural engineering solutions" that raised much criticism. Broadly, water management was based on flood control and drainage and irrigation management, and decision-making was BWDB-centric.	Due to the devastating floods in 1987 and 1988, flood control received international attention and donors' support. However, NGOs, civil societies criticized FAP, since it discouraged decentralized decision making. Minor irrigation (e.g., shallow tube wells) was flourished in this time owing to the privatization of irrigation technology business and a substantial reduction of government taxes.	Water management was based on flood control and drainage, albeit water crisis in the dry season and droughts were becoming an increasing concern. Enacting Upazila (Sub-district) Parishad Act 1998, formulating LGED guidelines on how to involve local people in water projects, strengthening local government institutions and provisioning impact assessment and applying EIA practice in approving projects were the main issues of this era.	Several strategic initiatives were taken such as facilitating partnerships and devolutions of power. The government had approved a 25-year NWMP and developed other instruments, namely BWDB Strategic Plan 2009–2014, National Water Act 2013, and Haor (flooded tectonic depressions) Master Plan 2012–2032. However, the challenges lie in the implementation of these instruments as the country has a shortage of resources and political will.

3.2 Current Structure of Water Governance

Water is at the center of the national economy and development in Bangladesh. Therefore, it is a cross-cutting theme across various sectors. This has created quite a complex form of water institutions within the government. There are more than 35 central government organizations, affiliated with around 13 ministries/ divisions, which are somehow linked with water sector activities and development (GED, 2020).

The National Water Resources Council (NWRC) is the highest body of the government on water governance in Bangladesh which is headed by the Prime Minister. At the sectoral level, the MoWR is the mandated ministry on water resources management (WRM). In context to the IWRM, there are two connected ministries, namely, the Ministry of Agriculture (MoA) and the Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C).

At the execution level, the Water Resources Planning Organization (WARPO) and the Bangladesh Water Development Board (BWDB) under the MoWR are the core institutions for policy formulation and implementation respectively. However, the BWDB deals with mainly surface water resources. On the other hand, the Department of Public Health Engineering (DPHE) under the MoLGRD&C develops and manages groundwater resources for domestic and agricultural use across the country. The Local Government Engineering Department (LGED) under the MoLGRD&C and the Barind Multipurpose Development Authority under the MoA implement many small-scale water resources development projects to support irrigation and drainage. Other important institutions that support IWRM, navigation, information management, conservation of water resources, climate actions, etc., include, but are not limited to the Ministry of Shipping, Ministry of Environment, Forest and Climate Change (MoEFCC), Ministry of Planning (MoP), and the Ministry of Defense (MoD).

An important component in water governance is the connection with technical and development partners. Although the government's agencies are responsible for decision-making and the implementation of any water project, many of their decisions are supported by and shaped through input from these external partners. Academic institutions and NGOs play a crucial role in technical assistance and knowledge acquisition on IWRM. On the other side, bilateral or multilateral development organizations provide essential assistance on financing, implementation, and supervision.

The country's overall structure on water governance is provided in **Figure 3.1**.

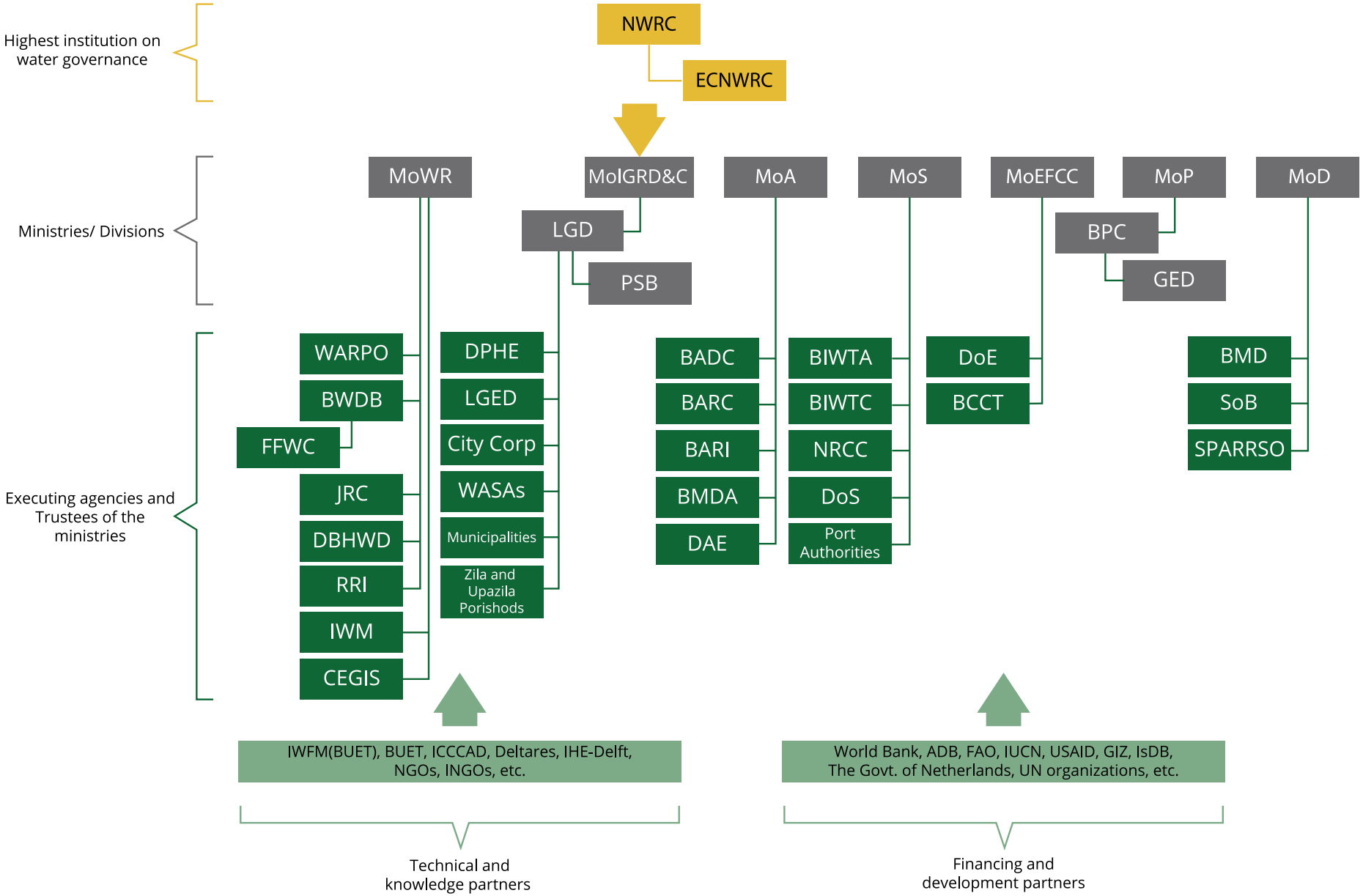

Figure 3.1: Current Structure of Water Governance in Bangladesh

The above diagram (**Figure 3.1**) is derived from the BDP 2100 and the government's organogram for different ministries and departments. Full names of individual institutions are provided on the following list.

ADB	Asian Development Bank
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BCCT	Bangladesh Climate Change Trust
BIWTA	Bangladesh Inland Water Transport Authority
BIWTC	Bangladesh Inland Water Transport Corporation
BMD	Bangladesh Meteorological Department
BMDA	Barind Multipurpose Development Authority
BPC	Bangladesh Planning Commission
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CEGIS	Center for Environmental and Geographic Information Services
City Corp.	City Corporation
DAE	Department of Agricultural Extension
DBHWD	Department of Bangladesh Haor and Wetlands Development
DoE	Department of Environment
DoS	Department of Shipping
DPHE	Department of Public Health Engineering
ECNWRC	Executive Committee of the National Water Resources Council
FAO	Food and Agriculture Organization of the United Nations
FFWC	Flood Forecasting and Warning Center
GED	General Economics Division
GIZ	German Development Agency
ICCCAD	International Center for Climate Change and Development
INGO	International Non-Government Organization
IsDB	Islamic Development Bank
IUCN	International Union for Conservation of Nature
IWFM	Institute of Water and Flood Management
IWM	Institute of Water Modelling
JRC	Joint River Commission
LGD	Local Government Division
LGED	Local Government Engineering Department
MoA	Ministry of Agriculture
MoD	Ministry of Defense
MoEFCC	Ministry of Environment, Forest and Climate Change
MoLGRD&C	Ministry of Local Government, Rural Development and Cooperatives
MoP	Ministry of Planning
MoS	Ministry of Shipping
MoWR	Ministry of Water Resources
NGO	Non-Government Organization
NRCC	National River Conservation Council
NWRC	National Water Resources Council
PSB	Policy Support Branch

RRI	River Research Institute
SoB	Survey of Bangladesh
SPARRSO	Bangladesh Space Research and Remote Sensing Organization
UN	United Nations
USAID	United States Agency for International Development
WARPO	Water Resources Planning Organization
WASA	Water Supply and Sewerage Authority

4. Legal, Institutional, Policy and Regulatory Frameworks

This section provides a summary of the review findings on the existing legal, institutional, policy, and regulatory frameworks (LIPRFs) for water governance in Bangladesh. There are numerous policy instruments available to support sector-specific responsibilities in the context of IWRM and overall water governance. Many of these instruments have evolved over the last four decades to address the needs for water resources management, water sector development, and water security for various use. It was not intended in this assignment to cover every single LIPRF. Rather, focus was given to identifying and reviewing only contemporary or prevailing policy instruments of the government. Additionally, considerations for climate adaption and resilience, IWRM, and delta development plans were made for screening and analyzing the policy documents. The list of reviewed frameworks is provided in **Appendix-I**.

In Bangladesh, the weight and level of policy instruments vary in accordance with the diagram shown in **Figure 4.1**.

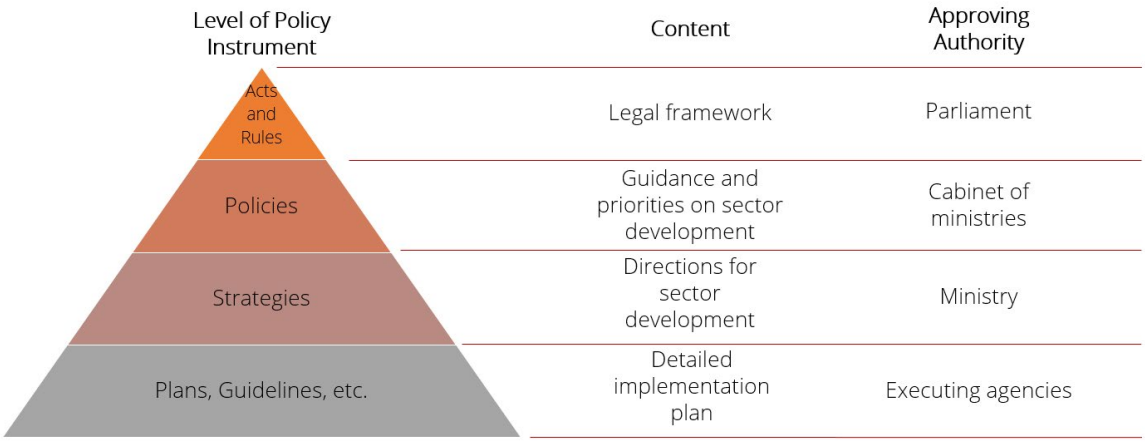

Figure 4.1: Levels of Different Policy Instruments in Bangladesh (Source: LGD, 2014)

On the coarse level, the existing LIRPFs can be classified into two categories such as those for the water sector and those for other linked areas, e.g., agriculture, climate change, environment, industries, etc. The water sector policies can be grouped into two types such as:

- The policies used by the MoWR and its executing agencies
- The policies used by the LGD and its executing agencies

The main difference between the above two groups is that the policies used by the MoWR focus on water resources development, management, and conservation, whereas the policies used by the LGD concentrate on water supply and sanitation, WASH, water utility and infrastructure, etc. The groundwater resources are managed by the DPHE under the LGD with necessary policy instruments. The MoWR deals chiefly with surface water resources.

4.1 Policy Frameworks Used by the Ministry of Water Resources

4.1.1 National Water Management Plan 2001

The National Water Management Plan 2001 (i.e., NWMP 2001) is the principal policy framework for water resources management in the country. The Plan was formulated in alignment with the National Water Policy 1999 (i.e., NWPo 1999) with the following objectives:

- Rational use and management of water resources

- Ensuring equitable, safe, and reliable access to water for production, health and hygiene
- Ensuring adequacy of clean water for various purposes and conservation of aquatic and water-dependent ecosystems

The NWMP 2001 was designed with three distinguished phases of WRM, e.g., for short-term (2000-2005), medium-term (2006-2010), and long-term (2011-2025). A total of 84 programs were designed over the period running from 2000-2025 under the Plan, to accomplish the intended objectives and national goals for water management. It provided essential assessment and planning for the demands, supply, distribution, and use of water resources for selected hydrological and socio-economic zones. The NWMP 2001 was recommended regular monitoring, with updatesevery five years. Unfortunately, the Plan has not been updated since its formulation. Yet, the document provides the key policy instrument for the activities of MoWR and its executing agencies.

4.1.2 Bangladesh Water Act 2013

The Bangladesh Water Act 2013 (i.e., BWA 2013) provides a necessary legal foundation for the management and conservation of water in the country, and it is the prevailing instrument with which to support water governance. The Act provides essential provisions for integrated development, management, abstraction, distribution, use, protection and conservation of water resources in the country (BWA 2013). It covers every potential water resource including surface water, groundwater, marine water, rainwater, and water in the atmosphere.

BWA 2013 provides the legal basis for the establishment of the NWRC and its executive committee (i.e., ECNWRC) along with power and responsibilities. The functions of the NWRC were extended beyond the national territory and included roles in international and regional cooperation on water management in this Act. Additionally, under the Act, the NWRC was given authority to adopt water policies at the national level to meet the needs for IWRM and water governance.

4.1.3 Bangladesh Water Rules 2018

The Bangladesh Water Rules 2018 (i.e., BWR 2018) builds on the Water Act 2013 and provides the necessary administrative framework for water resources management by the designated organizations of the government, particularly by MoWR and its executing partners. The administrative framework includes procedural requirements for implementing water resources activities and infrastructure development along with the list and role of responsible authorities from the government. The Water Rules 2018 suggests a number of standard templates for water administration for various purposes, and to support monitoring and auditing after task implementation.

4.1.4 IWRM Guidelines 2020

The WARPO formulated the IWRM Guidelines 2020 for the district, Upazila-, and Union-level administrations. It is built upon the Water Rules 2018 and it provides direction for water governance to the assigned management committee. This policy instrument leaves the operational jurisdiction for water governance to the administrative boundaries at three levels as mentioned above.

4.1.5 National Water Policy 1999

The National Water Policy 1999 (i.e., NWPo 1999) is the active and guiding policy document that provides direction to all agencies working with the water sector, and institutions that relate to the development, management and utilization of water resources in the country. The policy document places an emphasis on the development and utilization of safe groundwater and surface water resources to meet the country's water demand, and ensure water security across different socio-economic levels. Additionally, the NWPo 1999 aimed at bringing institutional changes to support decentralized water management and gender inclusion.

4.1.6 Coastal Zone Policy 2005

The Coastal Zone Policy 2005 (i.e., CZPo 2005) provides essential guidance for the development and management of the coastal zone, with water at the center of its focus. It includes development and management plans for water supply sources and their distribution and accessibility. Additionally, it emphasizes the importance of the application of mathematical modeling, remote sensing, and GIS for the management of the resources information and planned interventions. The coastal region in the country is much more vulnerable to climate change, arsenic (As), and salinity contaminations in the water sources. Thus, CZP has set instructions and instruments to support the conservation and development of safe water resources.

4.1.7 Guidelines for Participatory Water Management 2000

The Guidelines for Participatory Water Management 2000 (i.e., GPWM 2000) was prepared within the framework of NWPo 1999. This guideline provides a definition and participatory roles of different implementing water organizations in the countr, towards project implementation and water sector development. The instrument was recommended for application in all public sector water resources development projects including flood control, drainage, irrigation, etc. It provided a detailed operational framework for establishing and increasing stakeholder participation in water management.

4.1.8 Haor Master Plan 2012-2032

This is a 20-year master plan prepared for the development and management of the haor areas in Bangladesh with a focus on the water sector. Haor is the local name for a large, depressed, and flat floodplain located in the seven districts of Sylhet and Mymensingh divisions in the country. The master plan identified a total of 373 haors in the above-mentioned districts which comprise an area of about 859, 000.0 hectares (DBHWD, 2012). The Haor Master Plan was formulated using the common principles of IWRM, and it included implementation plans in the three phases such as short-term (2013-2017), medium-term (2018-2022) and long-term (2023-2032). The Plan aimed at developing the haor areas with an appropriate utilization of natural and human resources.

4.1.9 The Ganges Water Sharing Treaty 1996

The Ganges Water Sharing Treaty between the governments of Bangladesh and India was formulated in 1996, and it is the only regulatory framework available in the country for transboundary flow management. The Joint River Commission (JRC) under the MoWR deals with the transboundary river flow issues with the participating nations, and arranges essential bi- or multi-lateral dialogues. According to the Ganges Water Sharing Treaty 1996, the flow of Ganges river is shared between the two nations at the Farakka dam following the amounts as mentioned in **Table 4.1**.

Table 4.1: Share of the Flow (cusecs) of the Ganges River between Bangladesh and India (Source:Ganges Water Sharing Treaty 1996)

Availability at Farakka	Share of Bangladesh	Share of India
70,000.0 or less	50%	50%
70,000.0 – 75,000.0	35,000.0	Balance of flow
75,000.0 or more	Balance of flow	40,000.0

Notes: Subject to the condition that India and Bangladesh each shall receive guaranteed 35,000.0 cusecs of water in alternate three 10-day periods during the period March 11 to May 10.

4.2 Policy Frameworks Used by the Local Government Division

4.2.1 National Policy for Safe Water Supply and Sanitation 1998

The National Policy for Safe Water Supply and Sanitation 1998 (i.e., NPSWSS 1998) was formulated to support the government's goal to ensure access to safe water and sanitation at an affordable cost. It focused on the domestic water supply and utilization of surface water and groundwater sources. The NPSWSS 1998 aimed at making the water supply and sanitation (WSS) sector equitable and sustainable through implementation of its policy actions.

4.2.2 Sector Development Plan for Water Supply and Sanitation Sector of Bangladesh (2011-2025)

The Sector Development Plan (SDP 2011-2025) is the guiding and most comprehensive national plan for WSS. It focuses on the domestic or community water supply. The objectives of the SDP were to provide a framework for planning, implementing, coordinating and monitoring all activities in the WSS sector. The Plan was developed for a period of 15 years in three phases. The implementation outlines of these phases are illustrated in **Figure 4.2**.

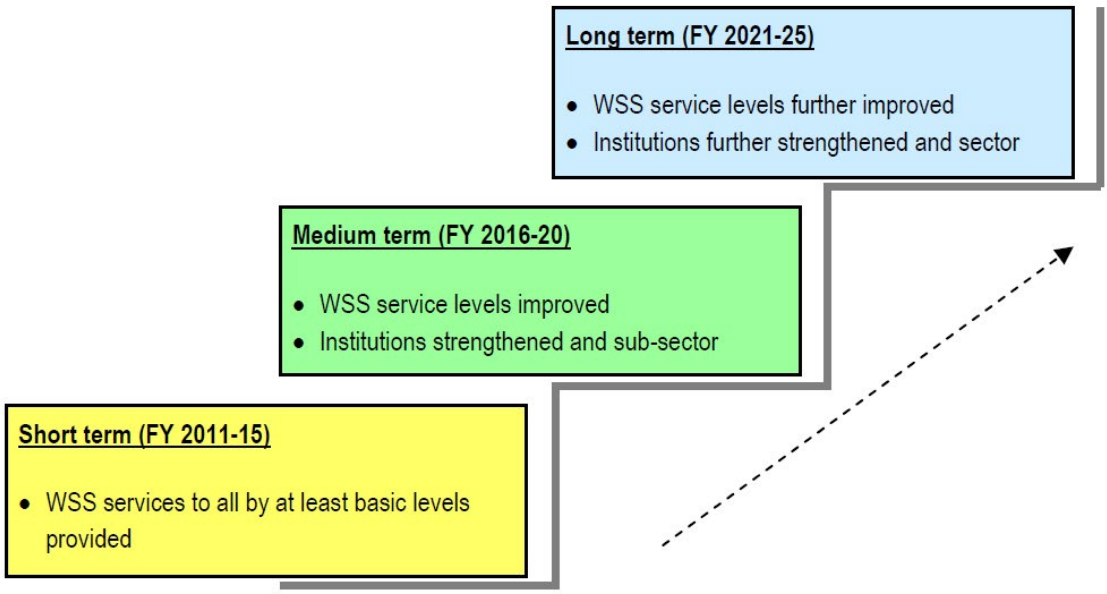

Figure 4.2: Implementation Roadmap of the SDP 2011-2025 (Source: LGD, 2011)

4.2.3 National Strategy for Water Supply and Sanitation 2014

The National Strategy for Water Supply and Sanitation 2014 (i.e., NSWSS 2014) was prepared by following the frameworks of the SDP 2011-2025 and the National Policy for Arsenic Mitigation 2004 with an aim to set essential directions for development of the WSS sector. Furthermore, the strategy incorporated required actions to support accomplishment of the sustainable development goals (SDGs) of the United Nations. This National Strategy for Water

Supply and Sanitation translated these goals and directions into action including the further development of different guidelines to suit the specific needs of the sector (LGD, 2014). The instrument included a total of 17 strategies under three themes as illustrated in **Figure 4.3**.

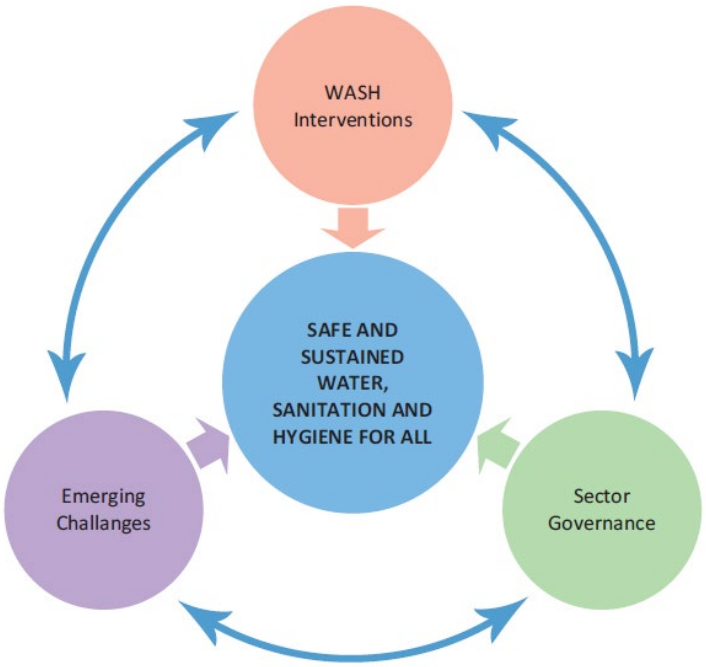

Figure 4.3: Three themes of the NSWSS 2014 (Source: LGD, 2014)

4.2.4 Water Safety Framework in Bangladesh 2011

The Water Safety Framework 2011 (i.e., WSF 2011) was prepared by employing the water safety framework approach of the World Health Organization (WHO) and in consultation with the sector representatives in order to ensure the safety of drinking water (LGD, 2011). There are three components in the framework such as the health-based targets, water safety plan, and surveillance. The instrument accommodated a risk-management approach in the value chain of water supply system from the source to the end user. The WSF 2011 provided essential guidelines for both piped and non-piped water supply systems. The architecture of the WSF 2011 is illustrated in the diagram shown in **Figure 4.4**.

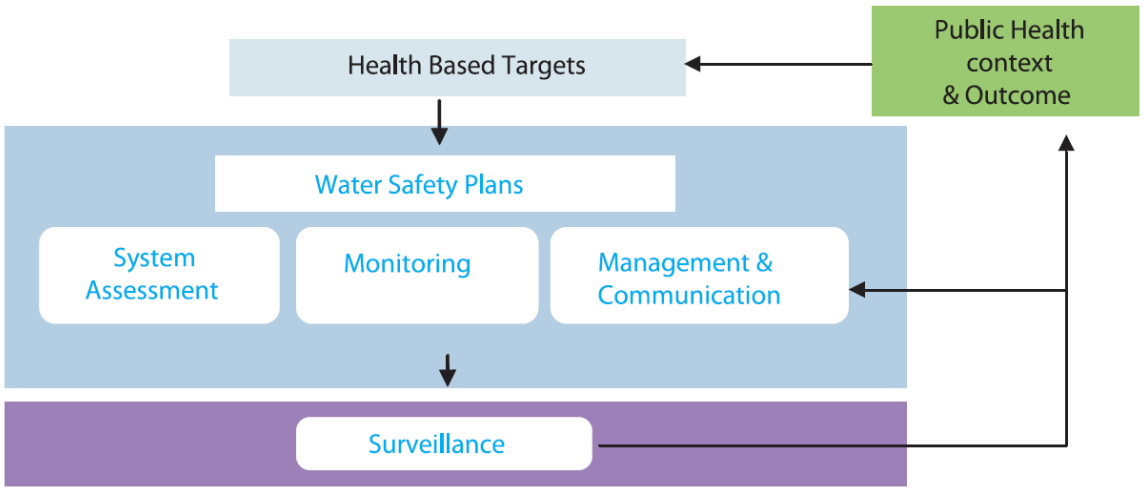

Figure 4.4: System Architecture of the WSF 2011 (Source: LGD, 2011)

4.2.5 Water Supply Master Plan for Dhaka City 2014

This is a 50-year master plan up to year 2060 prepared for the water supply services of Dhaka WASA. The plan provides direction and strategies for the water supply and distribution in the Dhaka megacity. It provides detailed information on existing and future water supply, demand, sources and distribution mechanism. The Plan was formulated to support attainment of the SDGs

in the water supply sector, and establishment of essential institutional and financial frameworks for a sustainable O&M. It additionally prepared a priority list of investment projects for the period of 2010-2020.

4.3 Relevant Policy Frameworks Used in the Agriculture Sector

4.3.1 National Agriculture Policy 2018

This is the guiding document for the agriculture sector in Bangladesh. The policy statements target a sustained development of the sector and food security under the changing climate. The instrument focused on infrastructure and hardware components in the sector. Additionally, it promoted research and development of resilient and more-productive crops. The policy objectives, among many, include requirements for effective coordination and active participation in water resources management as well as an efficient utilization of all natural resources used in agriculture.

4.3.2 National Agriculture Extension Policy 2020

The National Agriculture Extension Policy 2020 (i.e., NAEP 2020) aims at ensuring food security and managing and expanding a sustained development of the agriculture sector. The policy emphasizes on use of surface water for irrigation. Additionally, it promotes use of GIS, remote sensing and geospatial database for agricultural information management and planning. NAEP 2020 also encourages application of appropriate adaptation and mitigation measures to maintain and enhance the food security.

4.3.3 Groundwater Management Act 2018 For Agricultural Use

The Act provides the legal framework for a safe use of groundwater in the agriculture sector. It included essential provisions for a safe abstraction of groundwater, impact on nearby other sources, and environmental sustainability. The Act formulated Upazila-level management committee for execution, monitoring and regulation of the groundwater use for agriculture, and procedural requirements for installation and operation of tube wells.

4.3.4 Integrated Micro-Irrigation Policy 2017

The Integrated Micro-Irrigation Policy 2017 aims at reducing irrigation cost through modernization of the existing irrigation systems and capacity building, and thereby ensuring food security and alleviating poverty. Specific objectives of the policy, among others, included reasonable use of water resources for irrigation, expansion of sustainable technologies to assure an efficient use of water, discouraging excessive use of deep tube wells and introduction of water-saving irrigation means, utilization of rainwater, etc.

4.3.5 Medium-Term Strategy and Business Plan 2012-2016

This strategy document provided directions for investments and programs to sustain the development of agriculture sector for a period of 2012-2016. Additionally, it stated the policies and plans to mitigate the existing and potential challenges for agricultural development. The instrument included strategies for irrigation and more utilization of surface water resources.

4.3.6 Master Plan for Agricultural Development in The Southern Region 2013-2021

The Master Plan for Agricultural Development in the Southern Region 2013-2021 was prepared by the MoA in collaboration with the Ministry of Fisheries and Livestock (MoFL), MoWR, and with technical assistance from the Food and Agriculture Organization of the United Nations (FAO). It is a regional level policy instrument that included three hydrological regions: south-central, south-west and south-east of the coastal zone in the country. The objective of the Plan was to provide a roadmap for an integrated development of agriculture in the selected areas and thereby to ensure food security, poverty reduction, and livelihood development. It included essential plans for

improving water management, increasing surface water irrigation facilities, and developing climate resilient infrastructure for the period of 2013-2021.

4.3.7 National Aquaculture Development Strategy and Action Plan 2013-2020

The National Aquaculture Development Strategy and Action Plan was developed by the MoFL with technical assistance from the FAO. It is the guiding policy document for development of the aquaculture sector in Bangladesh for the period of 2013-2020. The policy framework included a total of 16 outputs under four distinguished objectives in order to improve the welfare of the resource-poor people depending on the aquatic resources, reduce poverty, conserve the natural resources, and promote a sustainable development. The instrument suggested necessary strategies for utilization of water resources to support aquaculture development.

4.3.8 Pond Development Act 1939

This Act provided the legal framework for development of the ponds for the purpose of fish cultivation and irrigation. It included necessary provisions for development and restoration of ponds, right to use of pond water, legal and operational capacities of the pond owners and communities, etc.

4.4 Supporting Other Policy Frameworks

4.4.1 National Environment Policy 2018

The MoEFCC formulated the National Environment Policy 2018 with a vision to ensure sustainable development for the nation through environmental conservation, pollution control, conservation of biodiversity and climate actions. Specific objectives of this policy instrument, among other, included expansion of climate adaptation measures, reduction in emission, and sustainable management of natural resources including water. It suggested policy actions for rainwater harvesting, flood control measures, pollution control in the water resources, limiting groundwater abstraction, maintaining a functional IWRM, adoption of a participatory water management, and economic valuation of all water resources.

4.4.2 National Industry Policy 2016

The National Industry Policy 2016 adopted the Water Act 2013 and the Environmental Conservation Rules 1997 to ensure protection of water resources from industrial contamination. Additionally, the framework recommended reduced emission from various industries for environmental conservation and climate resilience.

4.4.3 National Renewable Energy Policy 2008 and the Power System Master Plan 2016

These policy documents were reviewed to explore the provisions for hydropower potential made in the energy sector of the country. The National Renewable Energy Policy 2008 set targets of the renewable energy share to 5% and 10% of the total installed capacity by 2015 and 2020 respectively. Unfortunately, the potential for hydropower is very low in Bangladesh. The Power System Master Plan 2016 concluded that the targets cannot be achieved with the limited renewable sources, and the government may extend the time period to 2041 to accomplish the 10% share of renewable energy. The Sustainable and Renewable Energy Development Authority (SREDA) under the Ministry of Power, Energy and Mineral Resources (MoPEMR) reported a target of only 4 MW from the hydropower by 2021.

4.4.4 Environmental Conservation Act 1995 and Environmental Conservation Rules 1997

The Environmental Conservation Act 1995 (ECA 1995) and the Environmental Conservation Rules 1997 (ECR 1997) provide the legal framework for conservation measures and pollution control for all human interventions on the natural systems in Bangladesh. The ECA 1997 provides criteria for

environmental clearance for any development program, and standards for water quality indicators of the existing resources and water consumption.

4.4.5 Bangladesh National Building Code 2020

The Bangladesh National Building Code 2020 (i.e., BNBC 2020) was enacted in 2021 in order to provide a legal obligation for complying structural design standards in construction. The code incorporates design criteria, methodologies and standards for installation of rainwater harvesting facilities in the households. Additionally, the code provides structural design requirements for the household water supply, sanitation and drainage equipment.

4.5 Policy Frameworks on the Climate Actions

4.5.1 National Adaptation Plan

The National Adaptation Plan (NAP) is the key strategic process undertaken by the government of Bangladesh which will identify adaptation needs, and facilitate incorporation and integration of climate change adaptation into relevant national policies and development programs. NAP is currently under execution with support from the United Nations Development Program (UNDP) and the Green Climate Fund (GCF), and is expected to be completed by the end of 2022 (GED, 2020). For a sustained and effective adaptation, NAP provides attention on the Nature-based Solution (NbS) and Ecosystem Based Adaptation (EbA) measures.

Water resources has been listed at top among the priority sectors of NAP process. Therefore, the Ministry of Water Resources and its partner organizations are the key beneficiaries of NAP.

NAP is built upon the National Adaptation Program of Action (NAPA, 2009) and Bangladesh Climate Change Strategy and Action Plan (BCCSAP, 2009) with necessary improvement to establish a systematic adaptation process in all levels of national planning. The NAP formulation project has the following two key objectives (UNDP):

- Formulate the NAP with a focus on medium-to-long term adaptation investment, and
- Enhance national capacity for integration of climate change adaptation in planning, budgeting, and financial tracking processes.

It is expected that NAP will have the following four outcomes.

(a) Outcome 1: Strengthened institutional coordination and climate change information and knowledge management capacities to support medium-to-long term planning
(b) Outcome 2: Adaptation options appraised and prioritized, and the NAP formulated
(c) Outcome 3: Developed and piloted climate risk-informed decision-making tools at national and sectoral levels
(d) Outcome 4: Established appropriate mechanism for adaptation investment tracking and financial plan for mid- and long-term adaptation measures

The key objectives and adaptation priorities of NAP is reflected in the governing national plans such as the 8FYP (2020-2025), PP 2041 and BDP 2100. A strong institutional coordination, cooperation and collaboration are integral to the success of NAP formulation.

As of April 2021, NAPA (2009) and BCCSAP (2009) are two important milestones achieved during the NAP formulation process. These two documents provide information and strategies for adaptation at national level. A general overview on these two documents with a focus on the water sector is provided in following.

4.5.1.1 National Adaptation Program of Action 2009

Originally, the National Adaptation Program of Action (NAPA) was developed by the MoEFCC in 2005 with support from the Global Environment Facility (GEF). Later, the document was updated in 2009 as a part of the NAP formulation process. The objectives of NAPA were to identify the adaptation needs across different sectors in response to climate change, and formulate appropriate projects.

Water resources and agriculture (including subsectors: crop, fisheries and livestock) were identified as the critically affected sectors due to the adverse impact of climate change. Extreme flooding, droughts and increased salinity intrusion are the governing events resulted from climate change that will threaten the water and food security, if appropriate adaption measures are not implemented on time. The degree of adaptation requirement depends on the nature and magnitude of adverse effect imposed by the climate change.

There are some important barriers addressed in NAPA to implement the adaptation measures, such as:

- *Deficiency in awareness building* – despite implementing a lot of awareness building initiatives, these attempts have failed to trigger large scale implementation. Climate change and its results are often uncertain and not well-recognized at the mass level. There is much space for learning in this field for connecting people with the adaptation activities.
- *Lack of incorporation of climate change impact in the national development policies* – Many climate-sensitive sectors such as water, agriculture and disaster management lack inclusion of climate-informed decisions in their development activities. However, this scenario is improving over time as the government has placed a praiseworthy commitment for climate actions.
- *Inadequate resources to support climate actions* – There are limited resources available to people and governance on climate actions such as tools, knowledge base and methodologies. These resources are essential to equip governance with adequate capabilities for adaptation measures. At the same time, these resources should be comprehensive enough for the policy makers to be easily understood and shared across the critically impacted sectors.

Examples of some successful adaptation measures are provided in NAPA which demonstrated effectiveness in recent times. These actions are:

- Construction of cyclone shelters and coastal embankments
- Green belt project (a reforestation program in the coastal region)
- Rainwater harvesting
- Floating agriculture
- Development of salinity tolerant crop (paddy) species by BRRI and BARI

Additionally, to cope with the uncertain and dynamic nature of climate change, NAPA (2009) provides an outline of potential adaptation measures which include the following:

- Modeling the likely hydrological impacts of climate change on the GBM basin system to assess likely future system discharges and river levels in order to derive design criteria for flood-protection embankments
- Filling the climate change knowledge gap for water resources planning, designing and implementation of project

- Reviewing and revising, where appropriate, all government policies (sector by sector) to ensure that they take full account of climate change and its impacts
- Mainstreaming climate change in national, sectoral and spatial development planning (in government ministries and agencies, local government, the private sector, civil society and communities) and ensuring that impacts on vulnerable groups and women are prioritised in plans
- Building the capacity of key government ministries and agencies to take forward climate change adaptation
- Executing capacity development for water sector managers for designing structural adaptation
- Formulating land and water zones for climate change adaptation in Bangladesh

Finally, NAPA suggested necessary criteria and indicators for prioritizing adaptation measures for implementation.

4.5.1.2 Bangladesh Climate Change Strategy and Action Plan 2009

The Bangladesh Climate Change Strategy and Action Plan 2009 (BCCSAP 2009) was developed by the Ministry of Environment, Forest and Climate Change (formerly named as Ministry of Environment and Forest) to support implementation of the immediate and urgent adaptation needs which were outlined in NAPA (2005). It is a living document of the government that allows incorporation of necessary changes along with the experience gained from climate actions and climate-informed decision making.

The climate change strategy of BCCSAP follows the Bali Action Plan (2007) which included four building blocks for sustainable development as listed below:

- Adaptation to climate change
- Mitigation
- Technology transfer, and
- Adequate and timely flow of funds for investment

The above building blocks were provided in a framework of food, energy, water and livelihood securities.

The climate change action plan of BCCSAP is a 10-year program (2009-2018) that supported capacity building of the country for adaptation and resilience through implementing the projects identified in NAPA (2005). The action plan included considerations for the poor and vulnerable people including women and children (BCCSAP 2009).

There are six pillars in the action plan of BCCSAP in its first five-year period (2009-2013) as listed below. All programs and sub-programs for implementation are grouped under these six pillars.

1. Food security, social protection and health
2. Comprehensive disaster management
3. Infrastructure
4. Research and knowledge management
5. Mitigation and low carbon development
6. Capacity building and institutional strengthening

Actions for adaptation for water sector have a direct or indirect linkage with five pillars among the above-mentioned six pillars. Appendix-II provides the complete list of programs which were designed under the six pillars.

To support implementation of the action plan, the government established a National Steering Committee on Climate Change under the National Environmental Committee. The institutional structure that will implement BCCSAP action plan is illustrated in Figure 4.5. For financing the action plan, the government established the National Climate Change Fund. The fund is open for all development partners and donor agencies. Financing for the projects listed under the action plan were kept separated from other annual development programs.

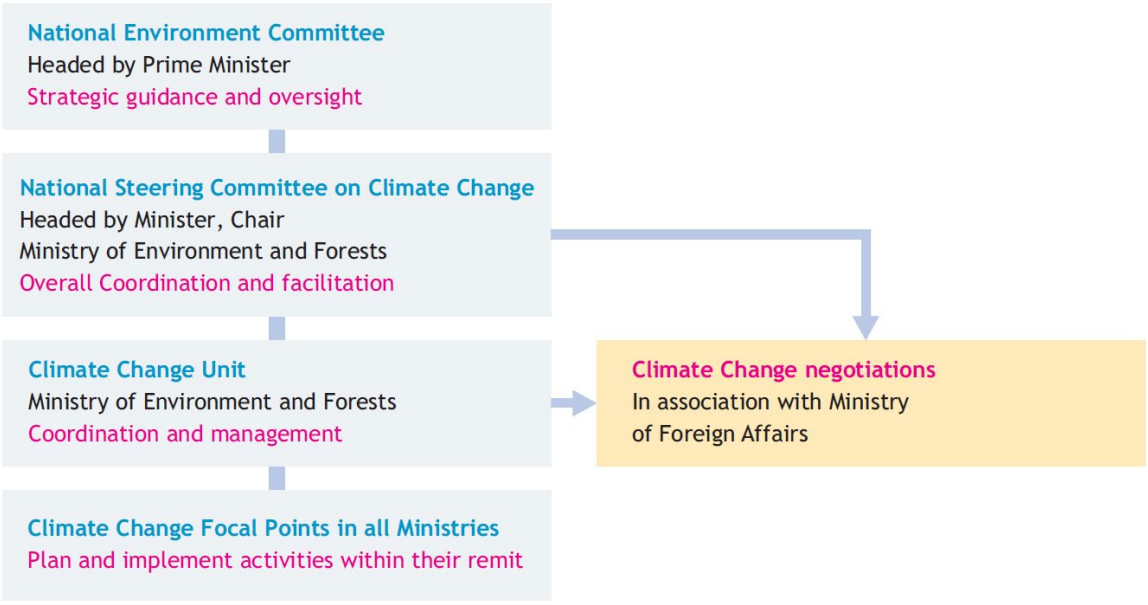

Figure 4.5: Institutional Structure for the BCCSAP Action Plan (Source: BCCSAP, 2009)

4.5.2 Local Actions for Adaptation

Bangladesh has a long history of successfully adapting to natural disasters and adverse impact of climate change with local or community-based actions. Cyclones, floods, and heavy storms are frequent phenomena which severely affect the northern, southern and coastal regions of the country. Additionally, the north-eastern region (e.g., haor area in Sylhet Division which has a unique hydrological setting and a diverse ecosystem) is critically affected by flash-flood. Complementing the national level policies and strategies, these community-based action plans have always helped people recover from the disaster and adapt their way of living and dealing with the disasters. The government supports or administers the local actions through several Local Government Initiatives (LGIs) and by applying a multi-stakeholder approach.

Local adaption strategy differs from the national strategy in a way that it follows a bottom-up approach. However, it helps connect the on-ground or local strategies, practices, and lessons-learned to the national-level planning and eliminate information gap. In recent years, the local adaptation in Bangladesh has been greatly inspired by the national framework of Local Adaptation Plans for Action (LAPA) which is designed and developed by the Government of Nepal. LAPA is |defined as a participatory, contextual, and inclusive bottom-up planning process which is developed to operationalize the policy objectives outlined in NAPA and BCCSAP (Islamic Relief Bangladesh, 2017).

The LAPA Consortium in Bangladesh defines specific objectives of LAPA in the country as follows:

- To strengthen capacity of local government Institutions and government authorities on LAPA
- To initiate an all-inclusive, participatory, bottom-up planning process for scaling out and scaling up
- Leverage international funding from climate funds

LAPA was first designed and piloted in ten districts of Bangladesh in 2010 with support from the International Institute for Environment and Development (IIED) and local NGOs. More than seventy LAPAs have been prepared since 2014 to address local adaptation measures (Islamic Relief Bangladesh, 2017). The LAPA Consortium was formed with participation by several INGOs and NGOs to help the government implement several LAPA initiatives, and integrate its application with the national development plans.

Steps involved in the LAPA process which are adopted by several implementing partners such as Islamic Relief Bangladesh are illustrated in **Figure 4.6**. The process is derived from the LAPA framework of Nepal with necessary adjustments to suit the local context of Bangladesh.

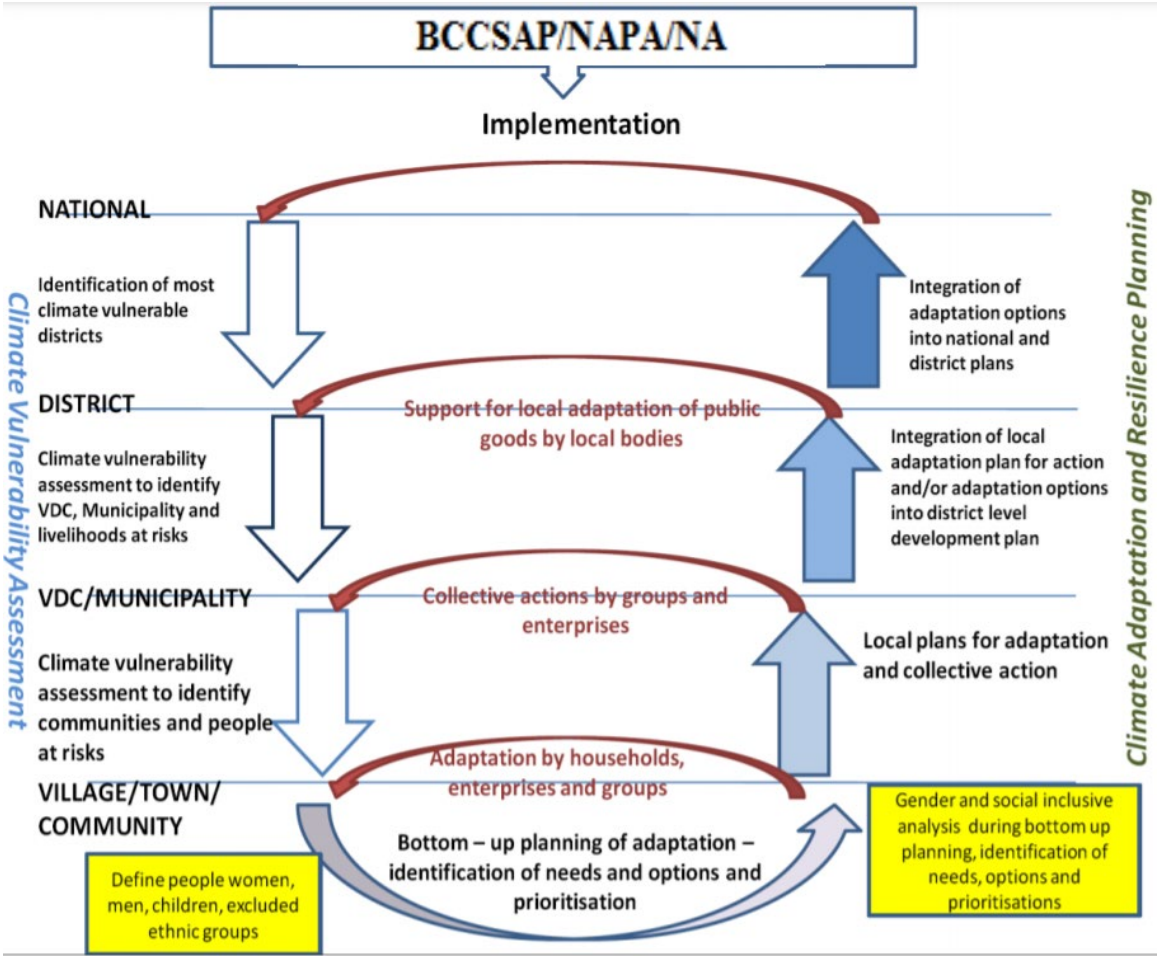

Figure 4.6: LAPA Implementation Process (Source: Islamic Relief Bangladesh, 2017)

Among several ongoing local adaptation programs, it is worth mentioning that the Local Government Initiatives on Climate change (LoGIC), a four-year duration (2016-2020) project financed jointly by UNDP, UNCDF, EU and SIDA, has been implemented by the Local Government Division (LGD). This project is a classic example of how the local government is supporting the communities building effective adaptation and resilience against the impact of climate change. The project was designed to support local and most vulnerable communities from 72 unions in 7 districts (UNDP, 2016). The objective of LoGIC was to facilitate improved and inclusive local level planning and a strengthened financing mechanism for community-based climate change adaptation solutions through local government (UNDP, 2016). More information about the LoGIC project can be found at: https://open.undp.org/projects/00085984.

4.5.3 Intended Nationally Determined Contribution

The Intended Nationally Determined Contribution (INDC, 2015) is a living policy document that addresses the commitment or contribution of the government of Bangladesh to the global efforts for climate actions with particular focus on the mitigation measures. These mitigation actions are

expected to help reduce the country's GHG emission. The INDC 2015 sets the core mitigation actions for the power, transport and industry sectors. Although there is a separate component for adaptation, but the governing actions and roadmap was developed to address the mitigation in this policy framework.

The INDC 2015 was prepared under the frameworks of BCCSAP 2009 and other relevant national level policies of the energy and industry sectors. The targeted contributions were categorized into two types: unconditional and conditional. Targets set forth in these contributions are reduction in greenhouse gases (GHG) emission by 5% and 15% respectively with respect to the base scenario by the year of 2030. The conditional contributions required additional support from the international bodies on climate actions.

Since the core contribution areas included power, transport and industry sectors, this INDC does not explicitly address actions or targets for the water sector. However, rainwater harvesting was recommended as a conditional contribution for the housing sector (commercial) to adopt and promote water conservation.

4.6 Governing National Development Plans and Policy Instruments

4.6.1 Bangladesh Delta Plan 2100

Bangladesh Delta Plan 2100 (i.e., BDP 2100) is a long-term comprehensive vision document for managing the water resources and land assets of the country and is expected to serve as a reference to overall development targets until 2100 (GED, 2018). BDP 2100 is built upon the core vision for sustainable and climate resilience water resources management which is integral to natural resource management and ecosystem-based livelihood of the people. With three high-level and six specific national goals, BDP 2100 adopted a flexible and adaptive strategy to manage uncertainties and link short-term, medium-term and long-term expected outcomes, and to cope up with the future dynamics of water, climate change and other environmental issues.

The plan is developed with support from the Government of the Netherlands and using the extensive experience of the Netherlands' delta management. The General Economics Division (GED) under the Bangladesh Planning Commission (BPC) is the responsible authority for coordination, facilitation and M&E for implementation of the plan. The investment plan of BDP 2100 initially has a total of eighty (80) projects in the pipeline which will be implemented by different ministries by 2030. The estimated total investment cost for the initial phase is approximately 37.0 billion USD (GED, 2018). Many of the listed projects will be implemented by the Ministry of Water Resources (MoWR) and its partner organizations. GED will work in coordination with these ministries, perform M&E and evaluate the outcomes of the projects against the targets of the BDP 2100.

4.6.2 Perspective Plan 2021-2041

The Perspective Plan 2021-2041 (i.e., PP 2041) is the key policy instrument to support accomplishment of the government's vision for 2041 and transforming Bangladesh into a middle-income country. The Plan focused on controlling air and water (surface water) pollution, application of geospatial data analysis, and conservation and enhancement of biodiversity. Additionally, with realization of the impact of climate change, the instrument recommended adoption of essential adaptation and mitigation measures in different sectors. The Plan sets strategies in alignment with the BDP 2100 to achieve the national goals and ensure sustained growth.

4.6.3 Eighth Five Year Plan 2021-2025

The Eighth Five Year Plan 2021-2025 (i.e., 8FYP) was published in December 2020 to provide strategic directions for development for a period of 2021-2025. The 8FYP provides essential guidance on initiating implementation of the BDP 2100 from 2021 onward. The vision of the government toward building a climate resilient delta is well-reflected in this 8FYP. To support IWRM,

the 8FYP allocates an investment of US$ 21.7 billion in 2021 prices for 47 new projects. The line ministries or sectors assigned for implementation of these projects are MoWR, LGD, MoA, BIWTA, MoFL, MoEFCC and the Ministry of Disaster Management and Relief (MoDMR). More than 50% of the total investment plan of the 8FYP is allocated to MoWR since it is the focal ministry to deal with water resources. The 8FYP recommended a basin-wide water resources development approach and suggested formulation of a decentralized water governance structure. Additionally, to support implementation of the projects listed under the BDP 2100, the Plan suggested commencing development of a Result-Based Monitoring and Evaluation (RBM&E) system in 2021. To address the strategies for climate action, the 8FYP encourages incorporation of appropriate climate adaptation and resilience measures in all levels of national and sectoral development.

5. Summary of Review Findings

The assignment tried to capture a holistic view of the water sector LIPRFs in Bangladesh including the elements of climate actions, status of water resources, and institutional setup for water governance. Water and IWRM sector in the country has significantly flourished since its inception back in the Pakistan period. And the country, despite being one of the most critically affected by climate change, has been able to successfully deal with WRM and meet the consistently growing need of water in different sectors. The current assignment identified a wealth of policy instruments that support MoWR and other agencies perform in the water sector. However, only the active and governing LIPRFs were documented in this report in order to understand the operating water governance in the country. The key findings from the review work are listed in the following points.

Status of Water Resources

- Despite having a fairly abundant surface water resources system, the consumers of water are heavily dependent on groundwater supply in Bangladesh. The largest consumer is the agriculture sector.
- Executing agencies from not only MoWR but other ministries such as MoLGRD&C and MoA are engaged in water resources development.
- The growing demand for water has threatened sustainability of the existing subsurface aquifers. The government has been trying to shift the water balance toward the surface water.
- The transboundary inflow occupies almost 75% of total water volume which indicates the country's dependency on regional availability and cooperation on WRM.
- The main issue associated with the availability of water resources is its abundance in the wet season, and shortage in the dry season. Water storage potential yet remains unharvested to the full scale. The government has been trying to promote rainwater harvesting as a renewable and alternative source of supply through its different policy instruments.
- The coastal zone is the most critically affected hydrologic region in terms of access to safe water due to arsenic (As) contamination, climate vulnerabilities and salinity intrusion.
- Water reclamation option could be a viable source for industrial and agricultural applications, and solution for reducing stress on excessive abstraction of groundwater. However, this study did not find reliable information on the status of water reuse in the country. Even, there is no policy instrument found that promotes adoption of resource recovery and reuse for water applications.

Status of Water Governance

- Water governance in Bangladesh demonstrates a complex and participatory arrangement water institutions, both at the central government, and local government levels.
- Although MoWR is the focal ministry for water governance, the groundwater supply infrastructure and operations are managed by the DPHE under the MoLGRD&C. Therefore, agricultural water use is linked with operations of both MoWR and MoLGRD&C.
- The water organizations follow the policy instruments designed by the MoEFCC to address the climate actions in their development programs.
- Though the policy instruments suggest a basin-scale practice of WRM, the existing institutional setups such as water management committees include administrative boundaries for IWRM.
- The country has fairly adequate information on the technical, hydrological and operational aspects of water management. Yet, practice of the evidence-based decision making and

access to use of supporting tools for information management are not present to a satisfactory level.

Review of the existing LIPRFs

- The governing policy instruments on water resources are the National Water Policy 1999, National Water Management Plan 2001, Water Act 2013, Water Rules 2018, and the IWRM Guidelines 2020. The Water Policy 1999 and the Water Management Plan 2001 shape the country's development in the water resources and flood control infrastructure. Yet, these instruments have not been updated since their first publication.
- In the context of transboundary river management, Bangladesh has only one bilateral treaty with India. The government has been trying to formulate another treaty for the Teesta river with India. However, no policy instrument was found to address the transboundary aquifer management.
- The sector development policies are generally adopted by the LGD with a focus on WSS.
- The water sector policies are supported and enhanced with input from the national level plans and strategies such as the BDP 2100, the 8FYP, etc.
- Many of the water sector policies address impact of climate change but only a few of those provide directions toward formulating specific adaptation and resilience measures.
- Relevant policies in the agriculture sector focus on enhancing irrigation efficiency and technologies but there is a gap in the linkage with the information on water resources.
- The subsectors of fisheries and livestock have no specific policy instruments to provide directions on use of the water resources. Currently, these sectors use instruments supplied by MoWR and MoA.
- There is a lack of adequate and well-formulated legal capacities on monitoring and regulations identified in the existing policy instruments of the water sector. It is essential to address deficiency in policy compliance and protect the natural water resources.
- The recent policy instruments, such as the 8FYP, are encouraging establishment of a decentralized water management practice. If it could be implemented successfully, water governance in the country will experience a noticeable shift in the near future.

5.1 Initial Assessment of Gaps and Needs in the Policy Framework

The review findings, and information on the water sector stakeholders were further analyzed to identify noticeable gaps and sectoral needs in the policy framework in this assignment. Specific findings from this analysis are documented in the following points.

- Water governance in Bangladesh strictly follows a top-down approach. It leaves the lower level and community based water organizations with knowledge gap on policy implementation to a certain extent. Coupled with this challenge, the locally adopted best management practices are also frequently found absent in these policy instruments.
- There are evidences of data duplication and lack of an appropriate data management and sharing protocols among the stakeholders. Therefore, it may be quite challenging to acquire right data at right time from the right authorities. Many agencies use IT enabled platforms to store and manage their data but the systems are not favorable for instant and easy access. Also, the quality of metadata is unsatisfactory. The implementation programs are producing a wealth of information every day, but those are not properly stored and archived to support data

analytics and decision-making.

- There is lack of advanced and IT enabled M&E system in place to support water governance. Many of the implementation projects are still go through traditional and manual M&E process leaving with a low-performing governance compared to the expectation. Fortunately, the 8FYP formulated development plan for a digital and result-based M&E system to support implementation of the BDP 2100. This example needs to be demonstrated as much as possible in every sector and program.
- Many of the requirements of the policy instruments appear ambitious compared to the current status of implementation and resources capacity of the executing institutions. For example, the SDGs targets are incorporated in many policy instruments but the local level institutions are not ready yet to deliver the intended results. There is a significant need for capacity building particularly for the local level (rural and municipal) water institutions. There is further scope for conducting an extensive capacity needs assessment for the water sector agencies.
- At present, there is no decision-support framework institutionalized to support water accounting and water auditing at the governance level.
- The National Water Policy 1999 and the National Water Management Plan 2001 could not be updated due to various challenges including the resource limitation at WARPO. The same scenario applies for many other policy instruments. For instance, the last policy framework in the livestock sector was developed in 2007. It reveals that some government institutions are unable to maintain a regular update on the policy instruments and implementation status.
- IWRM requires a participatory approach, yet there is only one policy instrument available at present to provide proper directions on this and ensure an enabling environment for all stakeholders. There is a lack of understanding, clarity and accountability on roles and responsibilities of the individual institution in the existing setup.
- MoWR does not have any dedicated policy instrument to support protection and enhancement of water quality in the existing water resources.
- The subsectors of fisheries and livestock are very important in the context of IWRM, but there were no well-designed policy instruments found in these sectors to support an efficient use of water resources.
- Considerations for an integrated balance of surface water and groundwater resources are essential in the operating policy frameworks as well as among the participating water institutions from different ministries. There is a coordination gap sensed between the policy frameworks adopted by the MoWR and the LGD at present.
- A well-designed policy instrument on the use of IT enabled platforms, geospatial technologies, remote sensing, simulation and analytics tools need to be formulated with considerations for sector-specific water application and climate actions.

5.2 Linkage with the Activities and Outcomes of the CARE for South Asia Project

The CARE for South Asia project aims at creating an enabling environment for water governance at both national and regional perspectives with inclusion of climate actions. Specific findings from the review of the existing LIPRFs on the water sector have the following linkage with the interventions planned for Bangladesh in the project.

- The CARE for South Asia project will develop a climate-informed water accounting framework for the agricultural water management. The framework will essentially provide evidence-based decisions on water use for agricultural production and support water accounting and auditing by MoWR and its partner organizations.
- The 8FYP recommends development of a Result-Based M&E (RBM&E) system following the principles outlined in the BDP 2100. ADPC and RIMES have been working on developing necessary guidelines for this M&E framework and an online portal to access the framework in consultation with GED and MoWR.
- An extensive capacity needs assessment will be performed for the selected water institutions and the project will arrange appropriate trainings for the staff of those agencies.
- Essential technical assistance will be provided on enhancing water sector policy instruments used by MoWR, WARPO and BWDB. The policy instrument will be selected in consultation with the sector focal points from MoWR, WARPO and BWDB.
- Adequate trainings will be provided on the frameworks, and decision support systems designed in the project in order to ensure sustainability of use of the project outputs and improved capabilities for water governance.

The essential advisory support will be provided by applying a participatory approach, and the selected water institutions from the government will play a crucial role in designing the project outputs.

6. Conclusion

The assignment produced consolidated information on existing policy frameworks in the water sector and other thematic areas connected with the water governance of Bangladesh. In addition, the history and evolution of water governance in the country, current institutional setup of the water sector and IWRM in the government, and some contemporary climate adaptation programs, were all reviewed to obtain a comprehensive understanding of the country's status on water management and sectoral development.

Bangladesh demonstrates an impressive commitment to the sustainable development of the water sector and climate resilience, by formulating the Delta Plan 2100. The country's development plans and policy instruments are aligned, or gradually being aligned, to the overarching goals of this ambitious Delta Plan for each thematic area; agriculture, industry and infrastructure, transport, etc. In this study, more than forty policy instruments were reviewed, including the Delta Plan 2100 from various sectors with a focus on water and agriculture. A review of the relevant agriculture sector (including the subsectors of crop, fisheries and livestock) policies were considered i as this sector is the primary consumer of freshwater in the country.

The history of water management in Bangladesh depicts a remarkable evolution from a flood control approach to the concept of water governance, over time. The MoWR and the LGRD&C are managing the country's water resources and water-related services respectively, through the use of a number of policy instruments. These instruments range from legal frameworks such as Acts and Rules to generic policy documents such as plans, guidelines and strategies. However, these policy frameworks or actual interventions are influenced by the government's actions on climate change.

As evident from the review findings, the water management approach in Bangladesh will be shaped or enhanced by the interventions made in accordance with the Eighth Five Year Plan and upcoming five-year plans, the Delta Plan 2100, and the proposed new edition of the National Water Policy (NWPo). Additionally, the contemporary policies on the climate actions such as the updated NAPA or INDC will set the targets for climate adaptation in those water sector interventions as appropriate.

The government should take the opportunity to eliminate the institutional and policy gaps as much as possible, in the new edition of the NWPo. In addition, the water sector needs to connect and adhere to relevant policy instruments from other sectors as well in order to accomplish inclusive and sustainable development.

The review findings of this study will be further enhanced with essential inputs from participating water sector stakeholders, through a detailed consultation under the aegis of the CARE for South Asia project. ADPC will support the government in updating the National Water Policy or other priority guiding documents, as per the scopes of the project.

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Appendix-I: List of Reviewed Legal, Institutional, Policy and Regulatory Frameworks

SI	Sector/ Theme	Name of Policy Framework	Abbreviated Form of the Policy Framework	Type of Policy Framework	Policy Level	Publication Year	Issued by
1	Water	District Integrated Water Resources Management Guideline 2020	District IWRM Guideline 2020	Guideline	National	2020	WARPO
2	Water	Upazila Integrated Water Resources Management Guideline 2020	Upazila IWRM Guideline 2020	Guideline	National	2020	WARPO
3	Water	Union Integrated Water Resources Management Guideline 2020	Union IWRM Guideline 2020	Guideline	National	2020	WARPO
4	Water	Bangladesh Water Rules 2018	Water Rules 2018	Rules	National	2018	MoWR
5	Water	Water Supply Master Plan for Dhaka City 2014	Water Supply Master Plan 2014	Plan	Local	2014	DWASA
6	Water	National Strategy for Water Supply and Sanitation 2014	NSWSS 2014	Strategy	National	2014	LGD
7	Water	Bangladesh Water Act 2013	Water Act 2013	Act	National	2013	LPAD
8	Water	Haor Master Plan 2012-2032	Haor Master Plan 2012-2032	Plan	Regional	2012	DBHWD
9	Water	National Strategy for Water Supply and Sanitation for Hard-to-Reach Areas of Bangladesh 2012	NSWSS HtR 2012	Strategy	National	2012	LGD
10	Water	Sector Development Plan for Water Supply and Sanitation Sector of Bangladesh (FY 2011-2025)	SDP 2011-2025	Plan	National	2011	LGD
11	Water	Water Safety Framework in Bangladesh 2011	WSF 2011	Guideline	National	2011	LGD
12	Water	Coastal Zone Policy 2005	CZPo 2005	Policy	Regional	2005	MoWR
13	Water	National Water Management Plan 2001	NWMP 2001	Plan	National	2004	WARPO
14	Water	Guidelines for Participatory Water Management 2000	GPWM 2000	Guideline	National	2000	WARPO
15	Water	National Water Policy 1999	NWPo 1999	Policy	National	1999	MoWR
16	Water	National Policy for Safe Water Supply and Sanitation 1998	NPSWSS 1998	Policy	National	1998	LGD

SI	Sector/ Theme	Name of Policy Framework	Abbreviated Form of the Policy Framework	Type of Policy Framework	Policy Level	Publication Year	Issued by
17	Water	Ganges Water Sharing Treaty 1996	Ganges Treaty 1996	Treaty	Transboundary	1996	JRC
18	Agriculture	National Agriculture Extension Policy 2020	NAEP 2020	Policy	National	2020	MoA
19	Agriculture	National Agricultural Mechanization Policy 2020	NAMP 2020	Policy	National	2020	MoA
20	Agriculture	National Agriculture Policy 2018	NAP 2018	Policy	National	2018	MoA
21	Agriculture	Groundwater Management Act 2018 for Agriculture Use	Groundwater Management Act 2018	Act	National	2018	MoA
22	Agriculture	Bangladesh Agricultural Development Corporation Act 2018	BADC Act 2018	Act	National	2018	MoA
23	Agriculture	Bangladesh Agricultural Research Institute Act 2017	BARI Act 2017	Act	National	2017	MoA
24	Agriculture	Integrated Micro-Irrigation Policy 2017	Micro-Irrigation Policy 2017	Policy	National	2017	MoA
25	Agriculture	National Organic Agriculture Policy 2016	NOAP 2016	Policy	National	2016	MoA
26	Agriculture	Medium Term Strategy and Business Plan 2012-2016	MTSBP 2012-2016	Strategy	National	2012	MoA
27	Agriculture	Bangladesh Agricultural Research Council Act 2012	BARC Act 2012	Act	National	2012	MoA
28	Agriculture	Master Plan for Agricultural Development in the Southern Region 2011	MPADSR 2011	Plan	Regional	2011	MoA
29	Fisheries	Policy for Establishment of Fish Hatchery in the Vabadaha Area 2019	Vabadaha Fish Hatchery Policy 2019	Policy	Regional	2019	MoFL
30	Fisheries	Fisheries Research Institute Act 2018	FRI Act 2018	Act	National	2018	LPAD
31	Fisheries	National Aquaculture Development Strategy and Action Plan 2013-2020	Aquaculture Strategy 2013-2020	Strategy	National	2014	MoFL and FAO
32	Fisheries	Bangladesh Fisheries Development Corporation Act 1973	BFDC Act 1973	Act	National	1973	LPAD
33	Fisheries	Pond Development Act 1939	PD Act 1939	Act	National	1939	LPAD
34	Livestock	National Livestock Development Policy 2007	LDP 2007	Policy	National	2007	MoFL

SI	Sector/ Theme	Name of Policy Framework	Abbreviated Form of the Policy Framework	Type of Policy Framework	Policy Level	Publication Year	Issued by
35	Climate Change	Intended Nationally Determined Contribution 2015	INDC 2015	Strategy	National	2015	MoEFCC
36	Climate Change	National Adaptation Program of Action 2009	NAPA 2009	Plan	National	2009	MoEFCC
37	Climate Change	Bangladesh Climate Change Strategy and Action Plan 2009	BCCSAP 2009	Strategy	National	2009	MoEFCC
38	Environment	National Environment Policy 2018	Environment Policy 2018	Policy	National	2018	MoEFCC
39	Environment	Environmental Conservation Rules 1997	ECR 1997	Rules	National	1997	DoE
40	Environment	Environmental Conservation Act 1995	ECA 1995	Act	National	1995	DoE
41	Energy	Power System Master Plan 2016	PSMP 2016	Plan	National	2016	MoPEMR
42	Energy	National Renewable Energy Policy 2008	Renewable Energy Policy 2008	Policy	National	2008	MoPEMR
43	Industry	National Industry Policy 2016	Industry Policy 2016	Policy	National	2016	MoI
44	Public Works	Bangladesh National Building Code 2020	BNBC 2020	Act	National	2021	MoHPW
45	National Policy	Perspective Plan 2021-2041	PP 2041	Plan	National	2020	GED
46	National Policy	Eighth Five Year Plan 2021-2025	8FYP 2021-2025	Plan	National	2020	GED
47	National Policy	Bangladesh Delta Plan 2100	BDP 2100	Plan	National	2018	GED
48	National Policy	National Sustainable Development Strategy 2010-2021	NSDS 2010-2021	Strategy	National	2013	GED

Notes: Not all the reviewed policy instruments were described in the main report.

Appendix-II: Programs of the BCCSAP 2009

Theme	**T1: Food Security, Social Protection and Health**
Programme	P1. Institutional capacity for research towards climate resilient cultivars and their dissemination P2. Development of climate resilient cropping systems P3. Adaptation against drought P4. Adaptation in fisheries sector P5. Adaptation in livestock sector P6. Adaptation in health sector P7. Water and sanitation programme in climate vulnerable areas P8. Livelihood protection in ecologically fragile areas P9. Livelihood protection of vulnerable socio-economic groups (including women)
Theme	**T2: Comprehensive Disaster Management**
Programme	P1. Improvement of flood forecasting and early warning P2. Improvement of cyclone and storm surge warning P3. Awareness raising and public education towards climate resilience P4 Risk management against loss on income and property
Theme	**T3 : Infrastructure**
Programme	P1. Repair and maintenance of existing flood embankments P2. Repair and maintenance of cyclone shelters P3. Repair and maintenance of existing coastal polders P4. Improvement of urban drainage P5. Adaptation against Floods P6. Adaptation against tropical cyclones and storm surges P7. Planning and design of river training works P8. Planning, design and implementation of resuscitation of river and khals through dredging and de-siltation work
Theme	**T4: Research and Knowledge Management**
Programme	P1. Establishment of a centre for knowledge management and training on climate change P2. Climate change modelling at national and sub-national levels P3. Preparatory studies for adaptation against sea level rise P4. Monitoring of ecosystem and biodiversity changes and their impacts P5. Macroeconomic and sectoral economic impacts of climate change P6. Monitoring of internal and external migration of adversely impacted population and providing support to them through capacity building for their rehabilitation in new environment P7. Monitoring of impact on various issues related to management of tourism in Bangladesh and implementation in priority action plan
Theme	**T5: Mitigation and Low Carbon Development**
Programme	P1. Improved energy efficiency in production and consumption of energy P2. Gas exploration and reservoir management P3. Development of coal mines and coal fired power stations P4. Renewable energy development P5. Lower emission from agricultural land P6. Management of urban waste P7. Afforestation and reforestation programme P8. Rapid expansion of energy saving devices eg. Compact Florescent Lamps (CFL) P9. Energy and Water Efficiency in Built Environment P10. Improvement in energy consumption pattern in transport sector and options for mitigation
Theme	**T6: Capacity Building and Institutional Strengthening**
Programme	P1. Revision of sectoral policies for climate resilience P2. Main-streaming climate change in national, sectoral and spatial development programmes P3. Strengthening human resource capacity P4. Strengthening gender consideration in climate change management P5. Strengthening institutional capacity for climate change management P6. Main-streaming climate change in the Media

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