Public Disclosure Authorized

Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 26-Oct-2020 | Report No: PIDC28431

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Parent Project ID (if any)	Project Name
Bangladesh	P172499		Jamuna River Economic Corridor Development Program (P172499)
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
SOUTH ASIA	Jun 07, 2021	Aug 31, 2021	Water
Financing Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	Ministry of Finance	Ministry of Water Resources	

Proposed Development Objective(s)

The Project Development Objectives are to (a) enhance resilience of Jamuna River's riverbanks to flooding and erosion; (b) improve navigability of the Jamuna River; and (c) strengthen sector institutional capacity.

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	100.00
Total Financing	100.00
of which IBRD/IDA	75.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	75.00
IDA Credit	75.00

Non-World Bank Group Financing

Counterpart Funding	10.00
Borrower/Recipient	10.00
Other Sources	15.00

Asian Infrastructure Investment Bank	5.00
UK: British Department for International Development (DFID)	10.00

Environmental and Social Risk Classification	Concept Review Decision
High	Track II-The review did authorize the preparation to continue

Other Decision (as needed)

NA

B. Introduction and Context

Country Context

1. **Bangladesh has made rapid social and economic progress in recent decades, reaching lower-middle-income status by 2015.** Gross domestic product (GDP) growth has averaged close to 6 percent annually since 2000 and, according to official estimates, accelerated to over 8 percent in FY19. Strong labor market gains contributed to a sharp decline in poverty, with the national poverty rate falling from 48.9 percent to 24.3 percent between 2000 and 2016, while extreme poverty declined from 34.3 percent to 12.9 percent.[1] Bangladesh entered the coronavirus disease 2019 (COVID-19) crisis with a relatively strong macroeconomic position. Garment exports and remittances narrowed the external deficit in recent years, and international reserves were adequate at the end of April 2020 at US$32.9 billion, equivalent to six months of imports. While tax collections are among the lowest in the world, under-execution of the budget has contained the fiscal deficit, which has been below 5 percent of GDP since FY01. As a result, public debt is low and stood at 33.7 percent of GDP at the end of FY19.

2. **COVID-19 has cut growth sharply and darkened the economic outlook, and one of the Government's pandemic response strategies centers around investments in water, sanitation, and hygiene (WASH).**[2] GDP growth is projected to be 1.0–1.6 percent in FY20 and −3.0–1.0 percent in FY21. The unprecedented uncertainties related to COVID-19 are likely to dampen private investment as developed-market recessions depress demand, a shortage of intermediate inputs is expected to lower industrial production, and labor shortages adversely affect all sectors. Transportation disruptions are expected to dampen agricultural growth, particularly production of perishable products like dairy, poultry, and vegetables. The recovery is expected to be very gradual, with ongoing economic disruptions and increasing fragilities in the banking system. In the medium term, a gradual recovery in growth is expected, with some increase in export demand and higher

[1] Household Income and Expenditure Survey, 2000/01 through 2016/17.

[2] In response to COVID-19, the World Bank is supporting the GoB through many lending operations. The COVID-19 Emergency Response and Pandemic Preparedness Project (P173757), approved in April 2020, focuses on implementing the containment strategy and improving prevention and response planning for emerging infectious diseases. The Bangladesh Programmatic Recovery and Resilience Development Policy Credit (DPC) (P174892) is being prepared to provide a fiscal stimulus for relief and recovery in the aftermath of COVID-19 and enhance the country's resilience to future shocks. Financial support for WASH service providers is included in the DPC, in recognition of the paramount importance of ensuring the continuity and expansion of adequate WASH service provision at a time when their revenues are dropping due to their customers' reduced ability to pay. There are WASH-specific operations as well that aim to help prevent the spread of infectious disease like COVID-19 through providing better access to WASH facilities and motivating people to adopt proper handwashing practices, such as the Rural Water, Sanitation and Hygiene for Human Capital Development Project (P169342) and the Chittagong Water Supply Improvement and Sanitation Project (P103999).

public spending. Recognizing that handwashing with soap is one of the most important things to contain the pandemic, the Government of Bangladesh (GoB), the private sector, civil society organizations, and development partners (DPs) have quickly launched awareness-building campaigns on the subject through media. In addition, emergency investments on WASH facilities have been made in public places to ease access to clean and reliable water supply. Improving access to WASH services is expected to mitigate some of the secondary impacts of the crisis as well, which may include increased mortality risk from more routine childhood diseases (for example, diarrheal disease) due to not seeking care for fear of COVID-19 infection, inability to seek care because of the lockdown, or overwhelmed health care facilities. In view of this, the importance of good water resource management (WRM) warrants renewed attention to ensure water demand for domestic WASH needs is met.

3. **Bangladesh is extremely vulnerable to the effects of climate change, which threatens lives and livelihoods and adversely affects the economy**. The Global Climate Risk Index ranks Bangladesh as the world's seventh most affected country over 1999–2018.[3] Rising temperatures leading to more intense and unpredictable rainfalls during the monsoon season and a higher probability of catastrophic cyclones are expected to result in increased tidal inundation. It is estimated that a 1 m rise in sea levels would submerge 18 percent of arable land in coastal areas.[4] Furthermore, recent studies estimate that by 2050, Bangladesh could have 13.3 million internal climate migrants.[5] Additional rural-urban migration would have significant consequences for air and water pollution and unsustainable consumption of natural resources, while putting additional pressure on urban labor markets. Addressing climate risks is increasingly becoming urgent to ensure sustainable economic development of the country.

Sectoral and Institutional Context

4. **Over the last decade, the GoB has been spending around 0.6–0.8 percent of GDP on the water sector, which needs to be improved both in quantity and quality.** Its biggest achievement has been in WASH service coverage, with close to 96 percent of its population having access to improved water sources and 92 percent having access to improved sanitation following eradication of open defecation.[6] However, as noted in the World Bank's Bangladesh Water Sector Diagnostics (BWSD), the water sector in Bangladesh still faces many challenges, including complex problems in river and coastal management, unsustainable groundwater use, water quality deterioration, poor WASH service delivery in public places and for remote areas and the extreme poor, inadequate transboundary management, and weak governance and institutional capacity.[7] To tackle these issues, the GoB aims to increase the sector spending to 2.5 percent of GDP by 2030. It is important that this increased spending is matched with efforts to enhance quality of spending. For example, the Public Expenditure Review of the Water Sector[8] points out that while the WRM subsector has received around 70 percent of the total sector spending,[9] most of this is used in capital expenditures with little regard to repairs and maintenance, and there is a need to focus on spending to improve sector outcomes.

[3] Germanwatch. 2020. *Global Climate Risk Index 2020.*
[4] UNFCCC. 2007. *United Nations Framework Convention on Climate Change.*
[5] World Bank. 2018. *Groundswell: Preparing for Internal Climate Migration.*
[6] World Bank. 2018. "Promising Progress: A Diagnostic of Water Supply, Sanitation, Hygiene, and Poverty in Bangladesh." WASH Poverty Diagnostic, World Bank, Washington, DC.
[7] World Bank. 2020. "Bangladesh Water Sector Diagnostic (BWSD)". Washington, DC. This document aims to support the GoB and the World Bank—in line with the Bangladesh Delta Plan 2100 (BDP2100) goals and the Country Partnership Framework (CPF)—to help develop a common approach for water sector development. Using evidence from literature and official documents, analyses, and expert interviews, it provides a diagnostic of water-related challenges and concludes with a set of priorities for the next decade for the GoB and its DPs. All of six challenges and six priorities noted in the BWSD are addressed in the BDP2100.
[8] PwC. 2020. *Public Expenditure Reviews of the Water Sector in Select Countries in Asia: Bangladesh.*
[9] WRM consists of disaster management; flood control, drainage, and irrigation (FCDI); irrigation; groundwater management; inland waterways; integrated WRM; other WRM; and water discharge. FCDI accounted for the biggest share of expenditures, ranging from 31 percent to 47 percent,

5. **Bangladesh aspires to attain upper-middle-income status by 2031, and better river management is important for achieving that goal.** Bangladesh is situated among the floodplains of three major rivers—Padma-Ganges, Jamuna-Brahmaputra, and Meghna—and 230 smaller rivers (see figure 1). Given the dominance of rivers in the country's geography, good river management practices go a long way in maximizing overall productivity of a river system and minimizing disaster risks, both of which translate into economic growth.[10] Further, coordinated multisectoral river interventions can optimize rivers to yield more jobs, trade, navigational opportunities, food, and power, all the while sustaining environmental integrity and protecting land, industries, and livelihoods from riverbank erosion and floods.

followed by inland waterways with 17 percent. WRM spending is made through multiple agencies, including the Ministry of Water Resources (MoWR), Ministry of Disaster Management, Ministry of Agriculture, Ministry of Energy, and Ministry of Shipping (MoS). The MoWR alone has invested around US$5 billion during 2018–2020.

[10] Biswas, A. K., O. Ünver, and C. Tortajada. 2004. *Water as a Focus for Regional Development.* Oxford University Press.

Figure 1. Main Rivers and River Basins in Bangladesh

6. **A historically narrow policy focus has exacerbated water sector management challenges.** The BWSD observes that for decades the sector was shaped by a series of master plans that focused solely on food security, which meant controlling monsoon floods to avert famines and increasing groundwater use for rice production in dry seasons. This limited focus led to insufficient and inadequate investments in river management and the resulting emergence and aggravation of the following issues:

(a) **Poor floodplain management and weak climate adaptation measures.** Every year during the monsoon 20–25 percent of the country floods, and every four to five years, this number reaches up to 67 percent from a major flood event. Riverbank and coastal erosion, which occurs constantly over time but more severely during extreme weather events, has been identified as a 'silent killer' because valuable land continues to be lost and about 100,000 people are displaced every year.[11] The GoB estimates that the annual costs of climate change events could amount to 1.5–3.0 percent of GDP by 2031.[12] This vulnerability is partly because existing river infrastructures are not adequate and not enough disaster risk financing is in place.[13]

(b) **Shrinking and ill-maintained inland water transport (IWT).** IWT is relatively an energy-efficient and safe mode of transport and is considered an engine for economic growth.[14] It is the second major means of transportation in Bangladesh, which captures 25 percent of the passenger market and 16 percent of the cargo market.[15] A well-maintained waterway has strong economic benefits. For instance, travel time between Dhaka and Chittagong through waterways could be reduced from 40 hours to 30 hours if the navigation routes were well maintained. Despite its economic advantages, IWT is shrinking. Of the county's 24,000 km of rivers, only 3,800 km are functional waterways in the dry season, which is a sharp decrease from the 5,200 km in 1991. Two main reasons for this decline are (i) unchecked erosion and sedimentation, which lead to wider, shallower rivers; and (ii) increased seasonal variability in water quantity.

(c) **Weak transboundary water collaboration.** Over 93 percent of Bangladesh's total renewable water resources originate from India, Nepal, and China. Being the lower riparian country, Bangladesh can be negatively affected by upstream water use fueled by population and development pressures which, in turn, can have an impact on its own economic growth. At the same time, this position offers an economic opportunity for Bangladesh because its location and waterways make it a gateway to the Bay of Bengal for landlocked Nepal, Bhutan, and subregions of India and Myanmar (see figure 2). While regional discussions on water availability issues have not resulted in agreement,[16] progress has been made in jointly developing and managing navigational routes with India. This transboundary water partnership can be strengthened further to realize IWT's full economic potential, which is much larger than what is currently being achieved.

(d) **Weak, inefficient, and fragmented institutional organization.** The Water Act 2013 serves as a robust, comprehensive legal framework for the country's water sector, but the relevant institutions are weak in capacity, responsibilities are fragmented and often overlap, and poor interministerial coordination is a concern. Further, the MoWR and the Bangladesh Water Development Board (BWDB), the core water sector

[11] World Bank. 2020. BWSD.
[12] Gudmundsson, R., R. Moussa, and M.I. Hussain. 2019. "Climate Change Mitigation and Adaptation in Bangladesh: Policy Options." IMF Country Report No. 19/300, International Monetary Fund, Washington, DC.
[13] In the absence of formal disaster risk financing instruments, Bangladesh relies on the uncertain provision of donor assistance or ad hoc budget reallocations to meet disaster-related needs.
[14] Bonnerjee, S., A. Cann, H. Koethe, D. Lammie, G. Lieven, J. Muskatirovic, B. Ndala, G. Pauli, and I. White. 2009. *Inland Waterborne Transport: Connecting Countries.* The United Nations World Water Assessment Programme and International Navigation Association.
[15] About 76 million tons per annum (MTPA) of cargo are transported through Bangladesh's inland water network, of which about 61 percent are imports. Fertilizer, clinker, and wheat constitute two-thirds of import movements on the IWT network. The remaining third are coal, fly ash, sugar, edible oil, salt, steel scrap, ceramic sand, gypsum, and stones. Container movements are negligible, at 140,000 tons in 2017, almost all imports. About 79 percent of import cargo are generated in Chittagong Port, 6 percent in Mongla Port, and the rest in Kolkata, India. Of the cargo originating in Kolkata, 96 percent went to the Dhaka region and the rest to Mongla Port. Domestic freight flows on the inland water network are limited to construction materials, cement, petroleum products, and fertilizer. The movement of export commodities is negligible. World Bank. 2019. *Moving Forward: Connectivity and Logistics to Sustain Bangladesh's Success.*
[16] Discussions between Bangladesh, Nepal, and India to create storage reservoirs in Nepal began in the 1980s but have not yet resulted in agreement. The Ganges Water Treaty with India is the only transboundary water sharing arrangement that Bangladesh has with India despite sharing 54 transboundary rivers.

institutions, need to move away from their current focus on capital expenditures and assume broader responsibilities that include stakeholder consultation, integrated planning, research, operation and maintenance (O&M), and collaboration. Institutional challenges are also at the core of transboundary water collaboration. The Bangladesh-India Joint River Commission, for example, must be brought to the point that it can carry out joint strategic planning, water quality and flow management, and problem solving.

7. **The BDP2100 is expected to stimulate economic growth through a paradigm shift in river management**. Adopted in October 2018, the BDP2100 is the Government's long-term strategy on holistic WRM and is now the country's key development agenda.[17] The BDP2100 sets out US$38 billion worth of physical and institutional investments,[18] which are projected to increase economic growth by 8 percent per year. Without the BDP2100, the growth projection drops to 6 percent per year.[19] To aid in the BDP2100's implementation, the GoB created the Delta Wing under the Planning Commission that is mandated to coordinate, facilitate, and monitor BDP 2100 progress. In addition, the Delta Governance Council (DGC) was formed in July 2020 as an interministerial forum chaired by the Prime Minister to provide strategic directions and make important policy decisions.[20]

8. **The BDP2100 has strong support from DPs.** In addition to the World Bank, key DPs include the Netherlands, Japan, Germany, United Kingdom, France, Canada, the United Nations Development Programme, the Food and Agriculture Organization, the Asia Infrastructure Investment Bank (AIIB), and the Asian Development Bank (ADB). All of the DPs have contributed technical assistance (TA) funding for various BDP2100 activities and remain committed to assisting with the BDP2100's implementation. [21] Recognizing its convening power, the GoB has requested the World Bank to take the lead in coordinating DPs' activities to maximize efficiency and effectiveness and minimize fragmentation and the Government's administrative burden.

9. **The proposed Jamuna River Economic Corridor Development Program (the Program) is the first major investment to be implemented under the BDP2100.** The BDP2100 implementation got off to an understandably slow start given its size, complexity, and need for multi-sector coordination and then COVID-19. However, the Program builds overall confidence in the BDP2100's relevance and is a key action to establish implementation momentum. Without this substantial effort, it is likely the BDP2100 would face major challenges in ever achieving its objectives. Thus, the Program, being both first and substantial in its support of the BDP2100, is critical support to Bangladesh's long-term economic development prospects.

Relationship to CPF

10. **The Program supports all three focus areas in the World Bank CPF for FY16–FY20.[22]** The CPF, which adopted the Government's 'adaptive delta management' principle, recognizes the BDP2100's transformative impact on achieving both Bangladesh's development aspirations and the World Bank Group's twin goals. First, the Program will address Climate and

[17] The BDP2100 was prepared with the support of the Dutch Government and the World Bank Group, pursuant to a tripartite memorandum of understanding signed on June 16, 2015.
[18] The World Bank, under the Bangladesh Water Platform 3.0, plans to develop a financing strategy with the Government for the majority of the BDP2100 infrastructure investments. This strategy, and an accompanying implementation road map, are scheduled to be completed in April 2021.
[19] These projections are before COVID-19, underlining that realizing the economic potential of the BDP2100 is ever more pivotal for the country given the dire economic fallout from COVID-19.
[20] The Minister of Planning is the Vice Chair, and a member of the General Economics Division (GED) is the Member Secretary of the DGC. Its members include the Ministers of Agriculture; Finance; Food; Lands; and Environment, Forests, and Climate Change. Bangladesh Post, July 4, 2020, "New Initiative to Speed Up Execution of Delta Plan."
[21] The Dutch Government is supporting the GED through TA on BDP2100 implementation. Japan is preparing TA that focuses on river training knowledge.
[22] This document was extended to cover until FY21.

Environment Management (Focus Area 3) by enhancing the Jamuna River's resilience to floods and riverbank erosion and improving its navigation capacity, which would bring a shift to a wider use of relatively energy-efficient river transport. Second, the Program helps tackle some of the key constraints to the Growth and Competitiveness agenda (Focus Area 1) by facilitating job creation and trade through IWT development along the Jamuna River and offering incentives for more effective and efficient private sector engagement. Third, the Program contributes to Social Inclusion (Focus Area 2) because it will help protect the livelihoods of the people living along the Jamuna River and prevent their potential migration to urban slums.

C. Proposed Development Objective(s)

11. **This Program supports the Government's sector strategy, the BDP2100, which identifies the Jamuna River as one of its major areas for investments**. The BDP2100 aims to achieve six specific goals, and its strategy for meeting those goals is structured around addressing flood risk and freshwater management at a national level and dealing with unique challenges at a hotspot level. The Program will help implement the national strategy on flood risk management and the hotspot-specific strategy on 'River and Estuaries'. In doing so, it is expected to contribute to achieving the BDP2100 goals: 1. Ensure safety from floods and climate change related disasters; 3. Ensure sustainable and integrated river systems and estuaries management; and 5. Develop effective institutions and equitable governance for in-country and trans-boundary WRM.

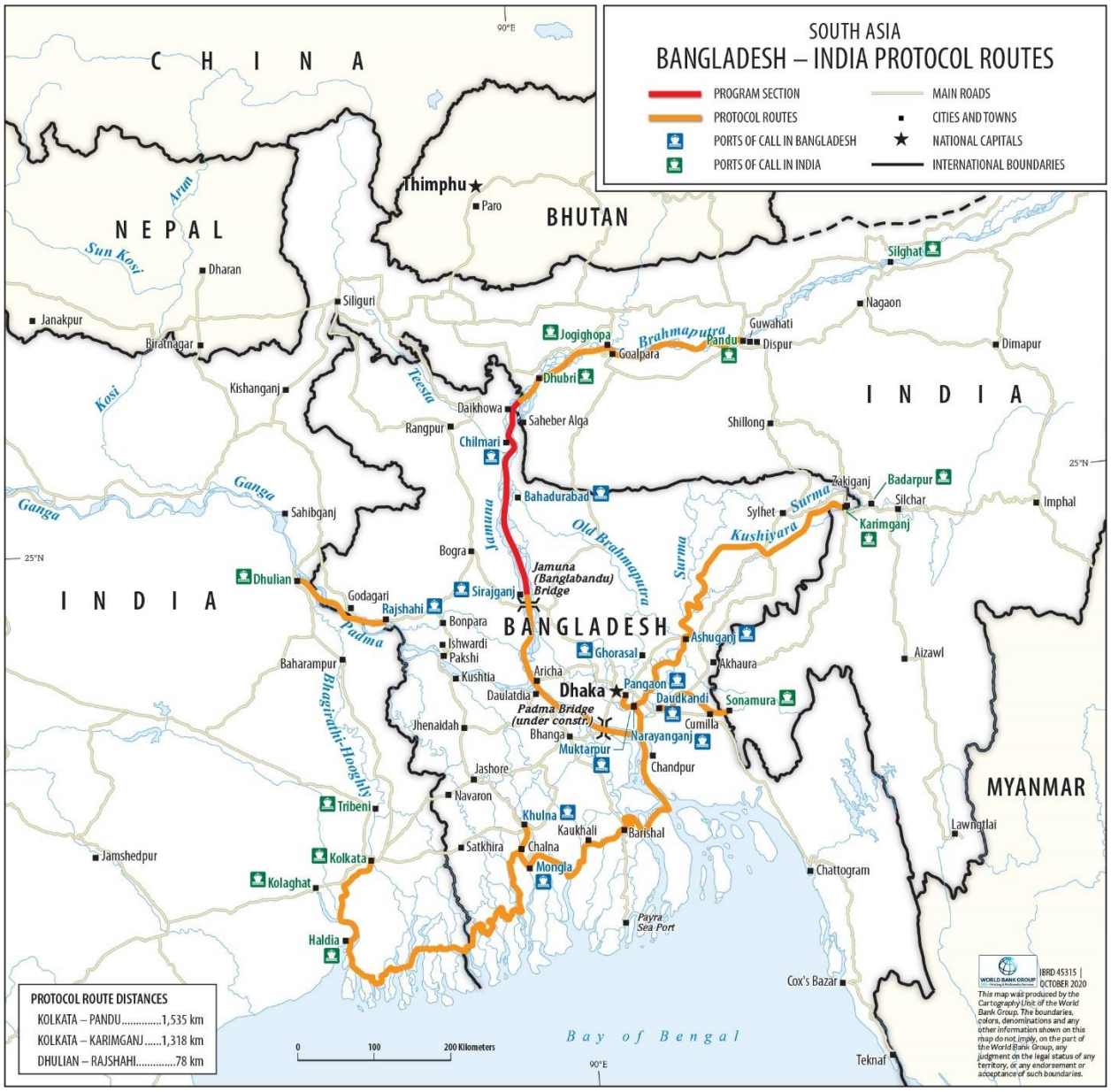
12. **The Program will reinforce ongoing regional efforts to enhance transboundary water management in South Asia.** Recognizing that inland waterways for South Asia could be a driver of economic growth and poverty reduction, some riparian countries are actively exploring and implementing ambitious plans for IWT.[23] Among them, the Bangladesh-India Protocol Routes[24] hold particular importance in linking the northeastern corner of India[25] to the Bay of Bengal through Bangladesh to promote regional trade and economic growth, with the Jamuna River being one of their main arteries (see figure 2). Because the Brahmaputra River holds paramount importance in terms of serving neighboring Bhutan, Nepal, and Myanmar, the Program's impact on regional trade would extend beyond Bangladesh and India.

[23] For example, India's renewed interest in IWT is reflected in the National Waterways Act (2016), which has added 106 new national waterways (NWs) and increased the length of declared NWs fourfold to over 18,000 km. Following the 2017 signing of a memorandum of understanding between Bangladesh and Bhutan on the use of inland waterways for bilateral trade, Bhutanese traders are currently using the Jamuna-Brahmaputra River to transport stone chips to Bangladesh through India. Nepal also has shown keenness on exploring the potential of inland navigation. In an effort to solidify this momentum, the Bangladesh Water Platform 3.0 is planning to support secretary-level roundtable meetings between Bangladesh, Bhutan, India, and Nepal to discuss transboundary water issues such as navigation and WRM.

[24] In accordance with Article VIII of the Trade Agreement between Bangladesh and India, the Protocol on Inland Water Transit and Trade between the countries was signed to make mutually beneficial arrangements for the use of their waterways for commerce (a) between the two countries, (b) between two places in one country, and (c) to third countries through the territory of the other. The protocol was first signed in 1972, and since then it has been renewed without any interruption. The current protocol, which added five new waterways, will remain in force up to March 31, 2025.

[25] Northeast India is endowed with abundant natural resources, such as oil and gas, coal, limestone, hydroelectricity potential, tropical forests with rich biodiversity, pristine natural beauty, and clean environs. The region accounts for 8 percent of India's land area and 4 percent of its population, but only about 3 percent of its GDP. One challenge is that the area is connected to the rest of India only through the 27-km-wide Chicken's Neck or Siliguri corridor, resulting in greater transit times and 8–15 percent higher costs. Kathuria, S. 2018. *A Glass Half Full: The Promise of Regional Integration in South Asia.* Washington, DC: World Bank.

Figure 2. Program Location in the Context of the Bangladesh-India Protocol Routes



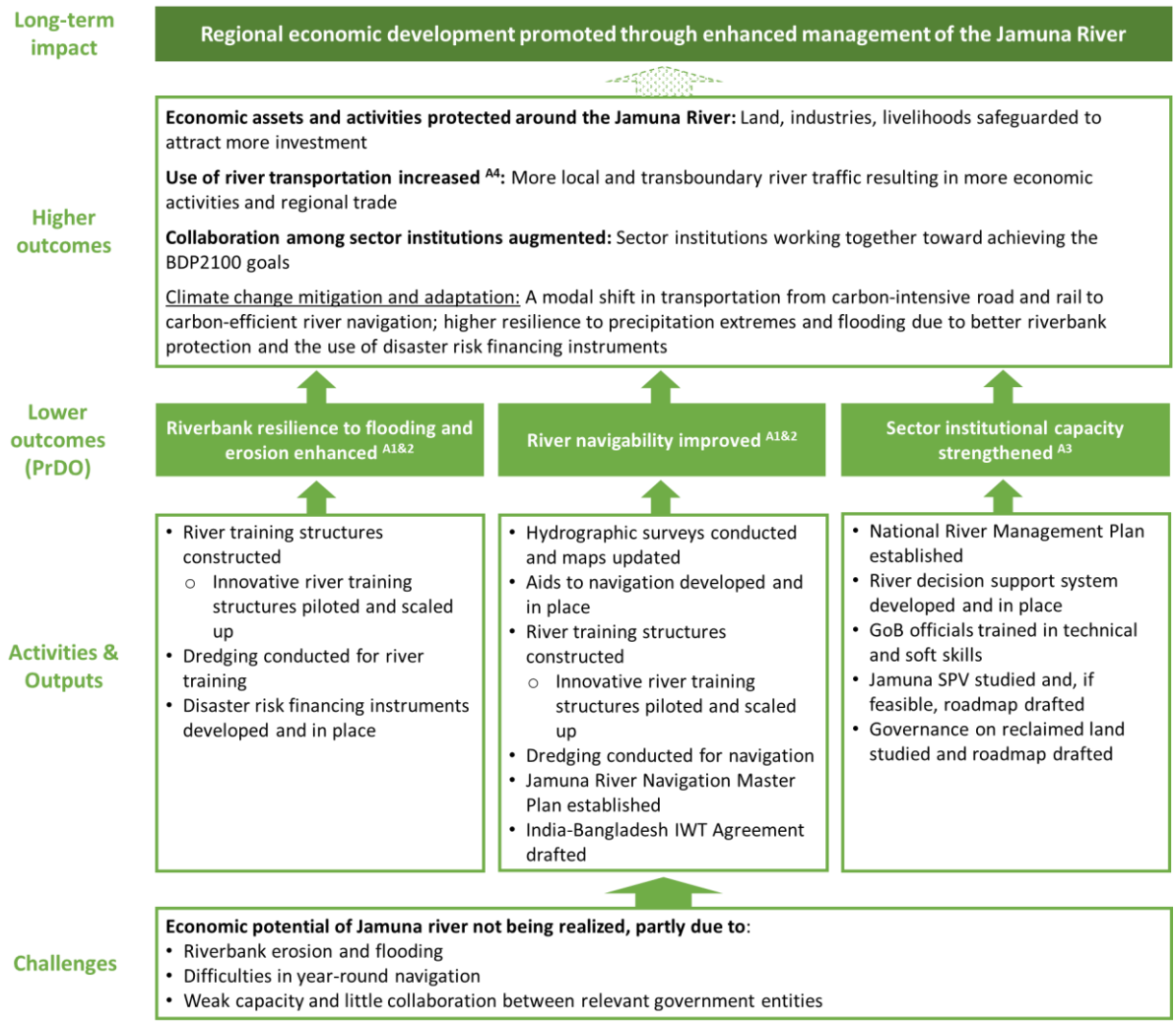
Source: Bangladesh Inland Water Transport Authority (BIWTA).

13. The Program and Phase 1 Project Development Objectives are to (a) enhance resilience of Jamuna River's riverbanks to flooding and erosion; (b) improve navigability of the Jamuna River; and (c) strengthen sector institutional capacity.

Key Results (From PCN)

14. **Figure 3 illustrates how Program activities will contribute to results and the long-term impact.** It shows that regional economic development through Jamuna River management requires concurrent improvements across three pillars: riverbank protection investments, stabilized navigation channels, and stronger river institutions.

Figure 3. Theory of Change for the Program



Assumptions

- A1: Studies and pilots provide important, useful insights into the Jamuna River's hydro morphology and applicability of innovative river training structures.
- A2: Performance-based dredging contracts are well designed and received by the private sector.
- A3: Training is well targeted and designed; sector staff trained remain on the job and use new tools and knowledge to improve the river sector performance.
- A4: The transport sector takes advantage of stabilized river navigation channels, shifting from road and rail.

D. Concept Description

15. It is important to note that the Jamuna is a section of one of the major rivers in the world, its entire length is the 15th longest, and it is part of the third largest river system in terms of discharge.[26] It originates in China as the Tsangpo River, flows through India as the Brahmaputra River, and then dissects Bangladesh from north to south until it meets the Padma-Ganges River and the Meghna River before emptying into the Bay of Bengal (see figures 1). An estimated 50 percent of the households living in districts in the Jamuna River basin depend on agriculture and fisheries for their economic survival, compared to about 27 percent of the households nationwide.

16. **The Program's economic potential is high.** Given it size, natural resource wealth, and undeveloped status, the Jamuna River has enormous economic potential and its benefits appear to exceed those of other BDP2100 projects as explained below.

(a) **Flood and land erosion control.** The Jamuna River is prone to land erosion and severe flooding. A study estimates that subsequent costs to cope with such disasters could add up to around US$1,250–2,000 per year per household in the most affected areas within the basin, stemming from relocations, land loss, and crop loss.[27] Reducing these disaster costs is deemed especially important from the poverty alleviation perspective, given that the districts in the Jamuna River basin are some of the poorest in Bangladesh with 37 percent of poverty rate, higher than the national average of 25 percent. Furthermore, stronger flood and land erosion control is expected to have a positive impact on economic growth in the basin. With the effect of climate change expected to exacerbate land erosion and flooding in the Jamuna River, investments in control measures should be a crucial part of the country's climate adaptation efforts.

(b) **IWT.** Transformational economic benefits from improved IWT are threefold:

(i) **Regional trade and growth.** The upper Jamuna River cannot accommodate vessels loading more than 500 tons during the dry season due to the lack of channels of adequate depth. It is estimated that the current cargo movements of about 3.5 MTPA[28] between India and Bangladesh could be increased to 11.5 MTPA, if navigation channels are year-round and well maintained[29] (see figures 1 and 2). This figure only considers about 79 MTPA of cargo moving into northeastern India and would be much larger if cargo movements into Bhutan and Nepal are included.

(ii) **Logistics cost.** The modal shift from road and rail transport to IWT lowers the overall logistics cost to the society, not only in direct transportation costs but also externalities stemming from environmental emissions, crashes, congestion, noise, and unrecovered costs associated with the provision, operation, and maintenance of public facilities.[30] Given the Jamuna River's IWT potential to replace freight traffic through the crowded Siliguri corridor (see subparagraph (i) above and footnote 24), total costs to be saved are expected to be significant.

[26] https://en.wikipedia.org/wiki/List_of_rivers_by_length; https://en.wikipedia.org/wiki/List_of_rivers_by_discharge.
[27] Ferdous, M. R., A. Wesselink, L. Brandimarte, K. Slager, M. Zwarteveen, and G. Di Baldassarre. 2019. "The Costs of Living with Floods in the Jamuna Floodplain in Bangladesh." *Water* 11 (6), 1238.
[28] The Economic Times, September 3, 2020, "India, Bangladesh launch new initiative to connect landlocked North East".
[29] Ernst & Young LLP. 2017. *Study for Modal Shift of Cargo Passing through Siliguri Corridor Destined for North-east and Neighboring Countries to Inland Water Transport*.
[30] For example, direct transportation costs from Chittagong to Pangaon are US$0.06 per ton-km by waterways and $0.12 per ton-km by trailer. World Bank. 2019. *Moving Forward: Connectivity and Logistics to Sustain Bangladesh's Success.*

(iii) **Water availability.** IWT could incentivize the upstream riparian countries to let the water flow during the dry season, so that the Jamuna River's exceptional seasonal variability in water quantity[31] is mitigated. This will help Bangladesh meet the country's ever-growing demand for water, essential for human capital development and economic growth.

(c) **Multiplier effects.** Once the economic benefits of flood and land erosion control and IWT are realized, they are expected to transform the Jamuna River basin and further attract longer-term investments in irrigation schemes, land reclamation, green economic zones, and river-based tourism. A study has shown that US$12 billion worth of full-scale Jamuna River investments—consisting of US$2.8 billion of IWT, US$3.7 billion of river training, US$5.9 billion of economic zone development, and US$1.0 billion O&M—will have multiplier effects across the economy and be able to increase the country's exports by US$30 billion per year.[32] Though much smaller in size, the Program will be an important first step toward fulfilling this potential.

17. **The Program will support activities in the Jamuna River that invest in riverbank protection, navigation channel development, and stronger river institutions, with nature-based solutions (NBSs) as a guiding principle**. NBSs seek to integrate 'green infrastructure' (or natural systems) and 'grey infrastructure' (or traditional built solutions) to provide next generation solutions that enhance system performance and better protect communities.[33] The Program will use NBSs in riverbank protection, combining building-with-nature solutions with cost-effective, innovative hard engineering structures. In addition, the concept of dynamic navigation that allows 'room for the river' will be deployed in the Program, which lets the river dynamically meander and naturally carve out multiple channels during the monsoon season and then seeks the best navigation routes at the start of the dry season, without coercing permanent navigation channels.[34] To keep the navigation routes functional when this channel shifting takes place, it is important to invest in (a) regular hydrographic surveys to update navigation charts; (b) aids to navigation; and (c) river training structures and dynamic dredging.

18. **Disaster risk financing instruments will complement the infrastructure and institutional investments to provide the GoB and the communities with quick, predictable financial means to cope with disaster situations.** Prearranged financial solutions release financing in the immediate aftermath of disaster events and can enhance the timeliness of the provision of assistance. Such financial solutions can also enhance the predictability of transfers, reducing uncertainty regarding the amounts received. The disaster risk financing instruments under the Program will specifically cover (a) the residual climate risks that are not addressed by investments under the BDP2100 and (b) the risks of unintended consequences of BDP2100 investments.

19. **To achieve its development objectives, the Program will invest US$1.3 billion across five components**.

(a) **Component 1: Riverbank protection and river training (US$940 million).** This component will invest in river training structures that will help preserve the shoreline by absorbing the energy of incoming water and control the river flow to reduce the risk of riverbank erosion and flooding. Innovative river training structures, such as permeable groynes and permanent top-blocked semipermeable spurs, will be studied and piloted as

[31] The Jamuna River discharges as much as 102,000 m^3/s in the rainy season but as little as 3,500 m^3/s in the dry season.
[32] Institute of Water Modeling (IWM). 2019. *Brahmaputra-Jamuna River Economic Corridor Development Program.*
[33] Browder, Greg, Suzanne Ozment, Irene Rehberger Bescos, Todd Gartner, Glenn-Marie Lange. 2019. *Integrating Green and Gray: Creating Next Generation Infrastructure.* Washington, DC: World Bank and World Resources Institute.
[34] Experience from the Ayeyarwady River supports this approach. In addition, a recent hydro-economic modeling study and other research suggest that the Jamuna River, which is 15 km wide today, can be stabilized to about 8 km in width with four or five braided channels, even after keeping enough 'room for the river.'

well, which are expected to be effective both in protecting riverbanks and managing navigation channels. Dredging for river training will be also conducted.

(b) **Component 2: Navigation channel development (US$300 million).** This component will create navigation channels that are 50–100 m in width and 2.5–3.0 m in draft, allowing for heavy cargo vessels sailing both ways day and night for much of the year. Investments will be made on all three elements of dynamic navigation. Support for planning and institutional frameworks will also be extended, which would include establishing relevant master plans and drafting the India-Bangladesh Bilateral IWT Agreement.

(c) **Component 3: Disaster risk financing (US$40 million).** Risk financing solutions with clear triggers and pre-identified disbursement channels will be developed through a potential grant from the Global Risk Financing Facility.

(d) **Component 4: Institution building and project management (US$20 million).** This component will finance (i) capacity building activities for key government officials, on technical and soft skills; (ii) development of a decision support system (DSS), including water accounting and actuarial analyses for flood insurance, and the Delta Portal[35]; (iii) capacity building activities for the India and Bangladesh IWT entities, including establishment of a Bilateral Navigation Facilitation Committee[36]; and (iv) the program management activities, including fiduciary, E&S, and O&M budget. In addition, the results and recommendations of a study of the water sector's political economy and governance structure, which will be carried out under the Bangladesh Water Platform 3.0, is expected to provide critical insights and concrete ways forward that could be implemented under this component.

(e) **Component 5: Contingent emergency response component (CERC) (US$0 million).** This provisional zero amount component is included, which will allow for rapid reallocation of credit proceeds from other project components during an emergency.

20. **Phase 1 has the same components as the Program, investing US$100 million over four years**.[37] Its focus will be on financing 'no-regret' river training structures and testing innovative ones, foundational investments on navigation, and capacity building. Total works will be limited to up to US$20 million only under Component 1, and the rest would be procurement of goods and TA.

(a) **Component 1: Riverbank protection and river training (US$25 million).** Under Phase 1, this component will put in place 'no-regret' river training structures, such as temporary top-blocked permeable groynes and riverbank revetments, that would be effective in protecting riverbanks and are proven to have little E&S impact. It will also assess the effectiveness and scalability of innovative river training structures and determine optimal locations for their expansion through design studies, 2D and 3D modeling, and onsite pilots. Informed by their early results, detailed design and E&S studies as well as bidding document preparation will be carried out for more complex Phase 2 investments, including dredging for river training.

[35] The development of the Delta Portal is being supported by the Bangladesh Water Platform 3.0.
[36] This will build on the ongoing India-Bangladesh Joint Monitoring Committee and aim to replicate the successful example from the Cambodia-Vietnam Navigation Coordination Committee.
[37] The total amount of investment to be supported under Phase 1 will be confirmed at the Quality Enhancement Review (QER) stage after examining the possibility for increase.

(b) **Component 2: Navigation channel development (US$60 million).** Phase 1 will invest in two of the three elements of dynamic navigation: (i) hydrographic survey and chart updating[38]; and (ii) aids to navigation. Furthermore, a Jamuna River Navigation Master Plan[39] and a Resource Management and Operation Plan will be established, and the India-Bangladesh Bilateral IWT Agreement will be drafted. Detailed design and E&S studies as well as bid document preparation will be carried out for the more complex Phase 2 investments, including dredging for navigation.

(c) **Component 3: Disaster risk financing (US$10 million).** Phase 1 will set up the Government's chosen instrument for disaster risk financing.

(d) **Component 4: Institution building and project management (US$5 million).** Phase 1 will focus on developing the DSS, establishing the Bilateral Navigation Facilitation Committee, delivering core training to key government officials on innovations in river training, dynamic navigation, E&S (including capacity building of the IAs),[40] and collaboration. Program management activities on fiduciary, E&S, and O&M will be supported as well.

(e) **Component 5: CERC (US$0 million).**

21. **Each component will focus on different sections within the northern 200 km stretch of the Jamuna River between Daikhowa and Sirajganj** (see figures 1 and 2). Component 1 will cover the river stretches with the lowest level of river protection, which includes (a) the 60 km stretch south of Daikhowa, the most braided and unstable; and (b) 40 km in other key stretches to be determined at the QER stage in consultation with the BWDB. Component 2 will be implemented selectively within the Program location where navigation is most challenging. The sites for Component 3 will be chosen based on the results of Phase 1 modeling and pilots. Phase 1 locations for each component will be determined during preparation.

22. **It is expected that the Program will contribute to both climate change adaptation and mitigation**. Activities under Components 1, 3, and 4 will have adaptation benefits because they would help increase resilience to climate change. Component 2 has the potential for mitigation through fuel efficiency improvements and reduction in road congestion, both of which would result from a transportation modal shift from road and rail to waterways. Mitigation may also occur from and carbon sequestration under Component 1, where NBSs could reduce greenhouse gas (GHG) emissions compared to existing riverbank structures that are made of cement.

23. **The Program design will incorporate gender development aspects**. To inform the Program Concept Note stage, a stakeholder consultation was held in September 2019, attended by government entities, academia, DPs, environment civil society organizations, and gender activists. During the Program preparation, specific gender gaps will be identified, gender actions to address those gaps will be prepared, and gender indicators to measure progress toward reducing the gaps will be devised. A gender assessment will be part of the Social Assessment, which would include examination of current and potential gender-based violence (GBV), a stakeholder communication and action plan, contractor and labor

[38] Regular surveys and charting are critical to continuously update the knowledge on the river geomorphology so that aids to navigation can be repositioned along the best route before the start of the dry season. They will also help performance-based dredging for navigation by locating hotspots where bottlenecks should be removed.
[39] It will include a market study that will examine (a) cargo demand to and from India to determine viable cargo tonnage, its optimal lowest allowable depth (LAD), and required associated dredging; and (b) potential terminal locations.
[40] Terms of reference (ToR) are being prepared to assess the E&S capacity of the IAs and identify their training needs.

management procedures, a grievance redress mechanism (GRM), and a Gender Action Plan, all to be implemented under Component 5.

24. **The Program is expected at least to qualify for the World Bank's corporate definition of 'Foundational Mobilizing Finance for Development (MFD)'**. The BDP2100 clearly lays out its vision for leveraging private sector financing and has identified at least seven public-private partnership (PPP) projects as priority. They include investments in land reclamation, river port developments, and extraction of high-value heavy metals. Phase 1 would be considered 'Foundational MFD' because it addresses many bottlenecks for realizing this vision on the Jamuna River, through public investments in riverbank protection measures, developing stable navigation channels, and building capacity in river institutions. Furthermore, Phase 1 will set up disaster risk financing instruments to transfer part of the climate risk to the private insurance market, which would help the governments or communities facing the consequences of disasters. The MFD typology for Phase 2 will be examined later in its Project Appraisal Document (PAD) whether it could qualify for 'MFD Enabling'.

25. **The Program is being supported by the best experts in the field.** An independent panel of experts (PoE) has been formed, and its members[41] are providing advice on river training, morphology, engineering, river navigation, and E&S to ensure that the Program is designed in line with global best practices. The Water Global Practice (GP) at the World Bank is providing advice and support through the WRM and Water and Resilience Global Solutions Groups as well as the 2030 Water Resources Group, which works actively with the GoB on facilitating partnership between private, public, and civil society. The Program will also leverage global experts in the Transport and Finance, Competitiveness, and Innovation GPs, having a co-task team leader and a team member from the two GPs respectively on board.

26. **Knowledge sharing will be facilitated with several relevant World Bank operations in the region.** It would be important that the Program develops a synergy with the Assam Integrated River Basin Management Project (P174593, which aims to improve the water security in Assam), the Climate Adaptation and Resilience for South Asia Project (CARE Project, P171054, which cofinances the DSS in Component 5), and the Bangladesh Regional Waterway Transport Project (P154511, which is piloting the performance-based dredging contracts proposed under in Component 2, see box 1). In addition, on the Gender Action Plan, the Program will build on the experiences from the India West Bengal Inland Water Transport Logistics and Spatial Development Project (P166020) and the India Assam Inland Water Transport Project (P157929).

27. **The Bangladesh Water Platform continues to support BDP2100 implementation, including through the Program.** The Bangladesh Water Platform is the World Bank's TA that aims at providing a medium-term strategic foundation and facilitating a forum for multisectoral, multistakeholder collaboration for strong water sector management. Given the BDP2100's importance to the sector and the country's economy, support for its implementation has been at the center of the Bangladesh Water Platform. Strengthened by its analytical work conducted in the past two years, including a water sector public expenditure review and the BWSD, the Water Platform in its third year of implementation focuses on providing strategic policy advice to the GoB, coordinating stakeholders, and developing and advancing projects in the pipeline. The Program plans to closely work with the Water Platform 3.0 on the Delta Portal development, transboundary water collaboration, and consolidating DPs' support for investments in the Jamuna River basin.

[41] Experts on aquatic biodiversity and livelihood restoration are being recruited.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	Yes
Projects in Disputed Areas OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

28. The program is located along the Jamuna river in the North-North-Western part of Bangladesh. Out of Tsangpo-Brahmaputra-Jamuna's total length of more than 3,800 km, length of its Bangladesh portion is only about 250 km. The Jamuna is a typical braided river with highly dynamic anabranch channels. Annual shifting of these channels ranges from few hundred meters to several kilometers. In plan form, the river typically shows two to three channels per cross-section and a total width of 8 to 18 km. The Jamuna is dotted with various river islands many of which are currently inhabited and/or have agricultural croplands. During monsoon, the mighty river is most devastating often leading to bank erosion and flooding that causes irreparable damages to nearby communities. During the dry season, the water level recedes to meandering shallow channels and the vast tracts of fertile land that emerges, are used to produce various agricultural crops.

29. Jamuna is one of the country's most important natural breeding ground of large and commercially important carp and cat fishes. The flood plain where the river meanders is an incredibly rich area for fisheries, which local communities rely upon extensively. A braided river of this magnitude provides an enormous diversity of habitats, the complex nature of hydraulic properties creates deep scour holes, which support large river fishes and highly endangered Ganges river dolphin, and the sand bars, shoals and mud flats supports diverse bird population including migrating waders. The sand bars also used to provide habitat support the crocodilian species Gavialis gangeticus. Jamuna is also home to black softshell turtle or Bostami turtle (Nilssonia nigricans), which was believed to be extinct from wild until recently. There are two Ganges river dolphin sanctuary in the Jamuna.

30. The Brahmaputra/Jamuna is characterized by phases of widening and narrowing in response to earthquake-induced pulses of sediment load and variations in hydrology. The Jamuna has an annual average discharge of around 20,000 m3/s at Bahadurabad with maximum of 102,000 m3/s and a minimum of 3,500 m3/s. Over 75 percent of the discharge of the Jamuna river is generated from rainfall and snowmelt.

31. The proposed program would stabilize the Jamuna River to create a manageable navigation channel in the 205 km stretch between Sirajganj and the Indian border, and to create river-based opportunities for economic growth. The civil interventions in the first phase will put in place pilot river training structures and navigational aids. However, this phase will also involve a series of technical and environmental and social studies for Phase-2 investments, which include, Jamuna River Navigation Master Plan, Resource Management and Operation Plan, detailed design and E&S studies as well as bid documents for dredging for navigation.

32. The Phase 1 of the program is designed to focus on pilot investments; nevertheless the inherent sensitivity and fragility of this river ecosystem made it precarious. Many of the proposed activities especially in river training are never really tested in such a scale and their impacts on both river morphology as well as river biodiversity are unfamiliar. Although not proposed in Phase 1, but in subsequent phases of the program, dredging will a major activity. The civil constructions will primarily concentrate in the winter, which also coincides with the initiation of winter migratory bird influx. Pilot river training structures are likely to cause changes in river morphology impacting fish migration, turtle breeding sites and dolphin sanctuaries. Extensive use of geo-textile may change the riverbed environment which necessitate careful scrutiny and study.

33. Both OHS and Community Health and Safety issues will be a cause of concerns during construction phase. Increasing navigation management will also be a critical issue. Oil spills from vessels for collection and transportation of sands, cements and construction aggregates and small dredgers, used to collect sand from river bed, as well as other solid and liquid waste pollution during construction and operation will also need to be assessed and managed properly.

34. Also, important to record here, parallel ongoing and proposed activities on the same river, sometime on the same stretch, such as the Indian line of credit that supports dredging in the same section as the Phase 1. The risks of the line of credit (both direct, cumulative and reputational) are high which could potentially significantly impact on the PDO of the program. While, the Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) Project 1: River Stabilization and Development: Jamuna-Padma and Dependent Areas, comparable activities are proposed for even larger section of the river basin including further downstream.

35. Proposed Phase-1 civil construction activities are relatively medium scale, and sensitivity of the surrounding ecosystem and being an important migratory bird and wildlife habitat. This phase supports the preparation of higher risk Phase-2 investment. The capacity of the implementing agencies in managing environmental and social risks will be strengthening.

36. The social risk for the Phase 1 will focus on preparatory studies for Phase 2 implementation, which involves major civil works related to river protection and navigation, posing significant social risks on the livelihoods of the surrounding communities, and may involve potential displacement of informal settlers living along the river and also presence of indigenous communities in the project area. In addition, Phase 1 will involve limited pilot-level civil works. Also very importantly, from its beginning in the Phase 1, the Program is highly likely to attract high degree of vigilance and scrutiny by civil society, media and other stakeholders given its scale, ambition, and challenges and complexities related to E&S risk management which would pose high reputational risks to the Bank.

37. In addition, the social risk is also high due to ongoing associated works being implemented by BIWTA related to a navigational dredging project with funding support from a Line of Credit by the Government of India, and another project on river stabilization and development is equally on the pipeline with funding support from the Asian Development Bank, to be implemented by BWDB. While detailed information on both projects are currently being collected, both might be clearly considered as “associated facilities” under the Bank’s ESF and require. E&S audit to assess the impacts and ongoing mitigation efforts.

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