Combined Project Information Documents / Integrated Safeguards Datasheet (PID/ISDS)

Appraisal Stage | Date Prepared/Updated: 28-Jan-2018 | Report No: PIDISDSA23191

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Project Name	Parent Project ID (if any)
Bangladesh	P161534	Climate-Smart Agricultural Water Management Project	
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
SOUTH ASIA	24-Jan-2018	22-Mar-2018	Agriculture
Financing Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	Economic Relations Division	Bangladesh Water Development Board, Department of Agricultural Extension, Department of Fisheries	

Proposed Development Objective(s)

To enhance climate resilience and productivity of irrigated agriculture in targeted schemes

Components

Improved Climate Resilience of Flood Control, Drainage and Irrigation Infrastructure
Climate-Smart Agricultural Production and Marketing
Project Management Support
Contingency Emergency Response

Financing (in USD Million)

Financing Source	Amount
Borrower	50.00
International Development Association (IDA)	120.00
Total Project Cost	**170.00**

Environmental Assessment Category

B - Partial Assessment

Decision

The review did authorize the preparation to continue

B. Introduction and Context

Country Context

1. **Bangladesh is one of the world's most populous countries with an estimated 164.9 million people living in a geographical area of about 147,570 km^2.** With per capita income of US$1,480 in 2017, it is well above the lower middle-income country category, a benchmark it crossed in 2014. During recent years, economic conditions improved in the country with headline inflation declining to 5.4 percent in FY17 from 7.3 percent in FY14, while the fiscal deficit was contained at around 3.1 percent of Gross Domestic Product (GDP) in FY16. The current account balance turned from a surplus of over US$4.3 billion in FY16 to a deficit of US$1.48 billion in FY17. The GDP grew well above the average for developing countries in recent years, averaging 6.5 percent since 2010, with an officially reported growth of 7.2 percent in FY17, mainly driven by manufacturing and services.

2. **The country has registered commendable progress in reducing extreme poverty and boosting shared prosperity.** Poverty incidence - based on the international US$1.90 per capita per day poverty line (measured based on the Purchasing Power Parity exchange rate) - declined from 44.2 percent in 1991 to 18.5 percent in 2010, falling further to 13.8 percent in 2016. Bangladesh's performance with respect to attainment of the Millennium Development Goals (MDG) was also impressive compared to the South Asia Region average for most of the indicators.[1]

3. **The remarkable progress notwithstanding, Bangladesh still faces formidable challenges to eliminating poverty and increasing shared prosperity.** Even by the most conservative estimates, Bangladesh is still home to over 22 million poor people – most of whom are concentrated in rural areas with constrained access to basic services. The main beneficiaries of the country's recent economic growth have been concentrated in urban areas, and in capital-intensive sectors, such as communication, banking and the garments sectors. Improvements in incomes therefore, have not been evenly shared and inequality - although lower than in most of its peers in the region[2]- on balance seems to still be a challenge. Agricultural growth, so essential to the reduction of rural poverty and redressing some of the inequity in favor of the rural poor, has been slow and lagged the growth rate for the larger economy - averaging less than 4 percent per year over the past 10 years.

4. **Largely because of its geography - featuring low elevation and vast watercourses-, the country is a natural disaster hotspot[3] and is one of the most vulnerable in the world to climate change and variability.** According to a global assessment, about 35.6 percent of the total land area, 32.9 percent of the population, and 14 percent of the country's GDP is exposed to natural disasters[4] which are known to periodically dent the country's economic progress whenever they occur[5]. The frequency and intensity of natural disasters and their impact on the economy is predicted to increase in coming years.

[1] Bangladesh registered remarkable progress in poverty alleviation, ensuring food security, primary school enrolment, gender parity in primary and secondary level education, lowering infant and under-five mortality rate and maternal mortality rate, improving immunization coverage, and reducing the incidence of communicable diseases.
[2] Bangladesh ranks 3rd out of eight countries in South Asia on the Gini Index (with a score of 0.32 in 2016).
[3] Mainly in the form of cyclones and floods.
[4] Natural Disaster Hotspots: A Global Risk Analysis, 2005. The World Bank Group.
[5] Estimates indicate that every year, 1.8 percent of GDP is lost due to natural disasters

Sectoral and Institutional Context

5. **Although Bangladesh has accelerated its structural shift from agriculture to industry and services in recent years, agriculture (including crops, livestock and fisheries) remains critical to eliminating poverty and boosting shared prosperity in the country.** The sector is: (i) the largest employer - 47.5 percent of the population is directly employed in agriculture and over 70 percent depends on agriculture in one form or another for their livelihood; (ii) a source of most of the country's food requirements; (iii) a source of raw materials for industry; and (iv) a generator of foreign exchange. Agriculture is also the main source of economic linkages in rural areas and thus plays a fundamental role in reducing poverty, which remains a predominantly rural phenomenon. In 2014, the sector contributed about 16.5 percent to the national GDP and while its contribution to the economy is likely to keep declining, agriculture will continue being the single largest contributor to income and employment of the rural population in the foreseeable future.

6. **The sector is characterized by traditional subsistence farming.** Production systems are largely dominated by small and marginal farmers, yet a significant shift towards commercial farming with high value crops, fisheries and animal products has been evident in recent years. Rice is the country's dominant crop[6] (77–80 percent of cultivated land devoted to paddy) and a key component of the population's diet. The country ranks third and fourth in the world for fisheries and aquaculture production. Fisheries and aquaculture play a major role in employment: about 17 million people are associated with the fisheries sector, with 5 million people involved in marine fisheries. Pond and seasonal floodplain aquaculture supply over 50 percent of total yearly fish production in the country and are highly profitable relative to many field and commercial crops. In addition, there is a growing trend of fish consumption among agriculture households from on-farm aquaculture.[7]

7. **Considerable gender gaps still persist in Bangladesh's agriculture sector.** Despite significant strides towards gender equality overall, and proclamations in myriad key policy documents[8] related to agriculture, rural development, and water resource management, there are still many barriers to women's participation in the agriculture sector. Access to and control over productive resources such as land, irrigated plots, credit, extension support and aquaculture assets (e.g. water ponds, *beels*) for example is skewed in favor of men. Often not considered "farmers," in part because they do not own land, women miss out on agricultural extension and information about new technologies, even when these relate to types of production in which women have typically predominated, such as vegetable growing. Earnings from wage employment also favor men, with average wages for rural women only 60 percent of those of men. Evidence from IFPRI's research in the country shows that an increase in women's empowerment in agriculture helps to move people out of poverty; improve household, child, and maternal dietary diversity; and increase agricultural diversity.

8. **From a long-term perspective, the performance of Bangladesh's agriculture has been mixed.** Following independence in 1971, sector growth increased at about 2 percent per year; accelerating to around 4 percent per year during the 1990s and early 2000s. Between 2010 and 2011, remarkable growth of 5.1 percent per year was achieved.[9] This momentum however, quickly fizzled out and the growth rate

[6] Mainly because of the long running policy thrust on rice self-sufficiency.
[7] Toufique, K.A., Belton, B., 2014. Is aquaculture pro-poor? Empirical evidence of impacts on fish consumption from Bangladesh. World Development 64, 609–620
[8] For example, the National Agricultural Policy, the National Food Policy, National Livestock Policy, the National Water Policy etc.
[9] This growth was mainly driven by irrigation expansion, modern technology, better road connectivity, more efficient markets and increased mechanization.

fell sharply to 2.7 percent in 2012, further decelerating to only 2.2 percent in 2013. These most recent growth rates are modest compared to the 4-4.5 percent growth rates by which the agricultural sector would have to grow in order to achieve an average overall national GDP of 7 percent - often cited as the minimum GDP growth rate needed for Bangladesh to transition into middle-income status by 2021.[10]

9. **Among others[11], low productivity and limited diversification both in the crop and non-crop sector are responsible for the suboptimal performance of Bangladesh's agricultural sector.** Even with improvements over the last decade, the sector is characterized by a significant yield gap for most crops largely due to limited adoption of modern technology. Closing this yield gap especially for the important crops e.g. Aman and Aus rice should go a long way in improving overall sector performance. In the fisheries sector, average productivity for inland capture fisheries stands at 0.28 Mt/ha while that of inland culture fisheries stands at 1.53 mt/ha, both below the averages observed in similar systems in Asia.[12] Productivity in the livestock sector is also below par with local cows producing only about 221 kg milk per year and average meat production hovering around 50 kg per animal (cattle). In addition, as indicated in Gautam and Rafiquee (2016), over the last three decades, the overall structure of Bangladesh's agriculture has changed little. Rice dominates and drives much of agricultural growth while the contribution of diversification[13] to sector growth has often been low and fading. Diversification in the product mix of agriculture therefore, through a shift toward high-value products, has great potential for accelerating sector growth, contributing to meeting the growing demand for a diversified food supply, better nutrition, and building resilience of agriculture to climate change.

10. **Furthermore, extreme weather events including intense floods, drought and storms are also implicated in undermining the performance of Bangladesh's agricultural sector.** Flooding in Bangladesh is a near-constant phenomenon, only recurring with varying magnitude and intensity both in space and time. While the more regular low intensity floods have usually been beneficial, when they assume extreme proportions, floods result in precipitous crop losses, damages to aquaculture infrastructure and loss of aquaculture fish stocks, livestock deaths, salinity intrusion, and rural population displacement, thereby adversely affecting agricultural performance.[14] On the other hand, agricultural droughts, especially in the northern parts of the country frequently lead to crop failure, livestock death, land degradation, and also undermine groundwater replenishment, which is critical to performance of irrigated agriculture in those areas.

11. **Due to climate change, the frequency and intensity of extreme events in Bangladesh are predicted to increase and so are the impacts of these events on the agricultural sector.** Climate projections for the country point to an increase of 1.6 degrees centigrade in median temperature and an increase of 4 percent in median annual precipitation by the 2050s. Sea level, partly mediated by temperature is projected to rise by 45 cm because of global warming, and this would inundate 10-15 percent of the country, pushing the saline front further inland. Warming of the ground surface will aggravate moisture stress and drought,

[10] Agriculture Sector Development Strategy: Background paper for preparation of Bangladeshi's 7th Five Year Plan.
[11] Other constraints to improved sector performance include, but are not limited to: (i) low resource use efficiency; (ii) limited diversification of production; and (iii) increasing loss of arable land.
[12] FAO. 2016. The State of World Fisheries and Aquaculture 2016.Contributing to food security and nutrition for all. Rome.
[13] Defined in this context as reducing the emphasis on rice/cereal and increasing the share of high-value agriculture (horticulture, livestock, and fisheries products).
[14] For example, the 1988 flood resulted in a loss of 2.1 million metric tons of rice, the 1998 flood resulted in a loss of over 3.35 million metric tons of rice, the 2004 flood led to agriculture production loss worth about US$500 million and losses related to the 2007 and 2009 cyclones were estimated at around two million metric tons of rice.

while excess evaporation of moisture will give rise to wetter peak monsoon.[15] With increasing river flow volume in monsoon, river bank erosion will be aggravated along the braided rivers forcing producers to lose their productive land.[16] The prospect of changing temperatures and precipitation patterns, combined with the uncertainty of the timing and magnitude of extreme events, and rising sea levels (with the attendant increases in soil and water salinity) will have important impacts on the agriculture sector. Under a changed climate for example, production of rice - a key staple - is predicted to fall by 8 percent by the year 2050,[17,18,19] while that of wheat is expected to decrease by 32 percent. In addition, it is predicted that pulse yields under climate change will reduce by 8.8 percent, oilseed-rapeseed by 6.3 percent vegetables (as a group) by 5.3 percent, and other crops (including jute) by 3.3 percent. With respect to the fisheries sector, increased temperatures will lead to a reduction in the availability of dissolved oxygen, resulting in the reduction in growth and reproduction success of most fish species. In cultured environments, increased occurrence of hypoxic conditions because of temperature increases will mediate a reduction of the growth rate and reproductive output of cultured fish species. Still under these environments, climate change, it is projected, will lead to increased disease spread, competition, parasitism and predation thus affecting overall aquaculture productivity. Similar deleterious effects are predicted for most of the other agriculture subsectors, with attendant negative impacts and cascading consequences on livelihoods, especially for the poor and marginalized smallholder farmers.

12. **On the other hand, agriculture is the leading emitter of greenhouse gas (GHG) emissions, responsible for nearly 40 percent of overall emissions in Bangladesh.** About 32 percent of sector emissions accrue from rice production, 31 percent from enteric fermentation, 12 percent from manure and poultry litter management, while the remainder is from five other subsector activities.[20] In a "business as usual" scenario, agricultural emissions are likely to increase from 74.6 MtCO2e in 2012 to 89.2 MtCO2e in 2030, largely driven by enteric fermentation.[21]

13. **Addressing these imminent challenges for the agricultural sector demands a new vision and approach that integrates climate variability and climate change considerations into the pursuit of agricultural growth objectives.** Broadly categorized under the rubric of Climate-Smart Agriculture (CSA), such an approach presents opportunities for Bangladesh to achieve the "triple wins" of: (i) sustainably increasing agricultural productivity and farmers' incomes; (ii) adapting and building resilience to climate change; and (iii) reducing and/or removing GHG emissions (where possible) while also enhancing achievement of national food security and development goals.

14. **The Government of Bangladesh (GoB) already has in place several policies, strategies, and plans to foster the adoption of CSA.** As early as 1995, even before climate change had moved to the forefront of global development and environmental concerns, Bangladesh formulated the National Environment

[15] Selvaraju, R., and others. 2006. Livelihood Adaptation to Climate Variability and Change in Drought Prone Areas of Bangladesh: Developing Institutions and Options. Rome: Asian Disaster Preparedness Centre (ADPC) and FAO.
[16] CEGIS, 2006. Impacts of Sea Level Rise in the Southwest region of Bangladesh, Center for Environmental and Geographic Information Services (CEGIS), Dhaka, p. 90.
[17] Sarker, Md Abdur Rashid, Khorshed Alam, and Jeff Gow. 2012. "Exploring the relationship between climate change and rice yield in Bangladesh: An analysis of time series data." *Agricultural Systems* 112: 11-16.
[18] Yu, W.H., Alam, M., Hassan, A., Khan, A.S., Ruane, A.C., Rosenzweig, C., Major, D.C., Thurlow, J., 2010. Climate Change Risks and Food Security in Bangladesh. Earthscan, Washington, DC.
[19] Amin, Md Ruhul, Junbiao Zhang, and Mingmei Yang. "Effects of climate change on the yield and cropping area of major food crops: A case of Bangladesh." *Sustainability* 7, no. 1 (2015): 898-915.
[20] See http://www.fao.org/faostat/en/#data/GT
[21] https://www.climatelinks.org/sites/default/files/asset/document/GHG%20Emissions%20Factsheet%20Bangladesh_4-28-16_edited_rev08-18-2016_Clean.pdf

Management Action Plan (NEMAP) to address country-specific climate change challenges as had been identified in the country's Intergovernmental Panel for Climate Change (IPCC) Second Assessment Report. In 2005, Bangladesh produced the National Adaptation Program of Action (NAPA) which provides an overarching strategic framework for mainstreaming climate change considerations into national planning and development priorities to achieve climate resilient development. Subsequent to the NAPA, in 2009, the Government prepared the Bangladesh Climate Change Strategy and Adaptation Plan (BCCSAP) which espouses essential action with respect to climate change along six thematic areas[22] and 44 program areas based on the development vision of the country. Through its Intended Nationally Determined Contributions (INDC), Bangladesh has put forth mitigation actions to tackle its growing emissions as a contribution to limiting global temperature rise and a strategy to transition to a low-carbon climate resilient economy. With the support of World Bank (WB) and the International Center for Tropical Agriculture (CIAT), Bangladesh produced a country CSA profile which, among others, identifies entry points for investing in CSA at scale. In a reinvigorated effort to address climate change, reduce risks for disasters and significantly improve environmental performance, the government is in advanced stages of finalizing an integrated and holistic long term plan – the Bangladesh Delta Plan 2100 (BDP 2100) to promote safe living through greater resilience and sound economic development. The Bank has financed the preparation of an Investment Plan that transforms the recommendations of the BDP2100 into implementable concrete actions until 2030.

15. **Current government development plans for the agriculture sector prioritize improving productivity and building resilience to climate change impacts.** The development vision for the agriculture sector under the 7th Five Year Plan (FYP) is to "ensure food and nutritional security, *through sustainable intensification and diversification of climate resilient agricultural systems*……." Among others, the sector objective is to ensure sustained agricultural growth through more efficient and balanced utilization of land, water and other resources while carefully addressing climate change concerns, especially building resilience of local communities. The proposed operation will support Government's priorities with respect to enhancing agricultural productivity while ensuring climate resilience of production systems. The concept is to support the rehabilitation/modernization and improved management of priority Flood Control and Drainage (FCD) and Flood Control Drainage and Irrigation (FCDI) infrastructure for improved flood protection and drainage during the monsoon, increased water use efficiency during the dry season, and resilience and adaptation to climate change as well as the diversification, transformation and reorientation of crop and aquaculture production systems in the rehabilitated schemes towards CSA approaches.

C. Proposed Development Objective(s)

To enhance climate resilience and productivity of irrigated agriculture in targeted schemes.

Key Results

16. Achievement of the PDO will be measured using the following indicators: (i) area under climate-resilience technologies and practices (both under crop production and aquaculture); (ii) farmers adopting

[22] The pillars are: a) food security, social protection and health; b) comprehensive disaster management; c) infrastructure development and protection; d) research and knowledge management; e) mitigation and low carbon development; and f) capacity building and institutional strengthening.

improved agricultural technology;[23] (iii) increase in productivity of selected agricultural commodities supported by the project; and (iv) number of direct project beneficiaries (percent of which are female).

D. Project Description

17. The CSAWMP focuses primarily on: (i) rehabilitating and improving the quality of FCD and FCDI infrastructure for climate-resilient water resources management; (ii) improving the management and sustainability prospects of FCD and FCDI infrastructure by supporting local communities to play an expanded role at all stages of scheme management (including contributing to Operation and Maintenance -O&M); (iii) promoting more efficient use of water resources through improved storage, on-farm water use efficiency and water productivity in the drought season; (iv) supporting the dissemination and adoption of CSA practices both in crop and aquaculture production; and (v) improving the marketing of agricultural products by the beneficiaries. The project is organized around four main components:

Component 1: Improved Climate Resilience of Flood Control, Drainage and Irrigation Infrastructure Systems (US$128.82 million, of which IDA US$92.89 million).

18. Project support under this component will finance the rehabilitation and modernization of select FCD/FCDI scheme infrastructure - identified and prioritized by the BWBD in consultation with relevant stakeholders and local communities to: (i) bring them back to full functionality; (ii) make them more resilient to climate change; (iii) address climate change impacts on water safety; and (iv) create enabling water management conditions suitable for implementing CSA practices. In addition, this component will support the transfer of scheme management to WMOs, and deepen and strengthen the institutional reforms introduced and piloted under the Water Management Improvement Project (WMIP), which was financed by the World Bank.

19. In line with the BDP 2100, Adaptive Delta Management (ADM) approaches - combining adaptation and flexibility based on a better understanding of local conditions and future scenarios- will be followed in infrastructure rehabilitation. Such an approach not only ensures that the rehabilitated infrastructure is resilient and addresses the long-term challenges of flood control, but also limits over - or under-investment in water-related challenges in the selected FCD/FCDI schemes. There are two sub-components under this component as detailed below.

Sub-component 1.1: FCD/FCDI Scheme Rehabilitation and Modernization (US$117.86 million, of which IDA US$83.99 million).

20. This sub-component will finance rehabilitation of selected FCD and FCDI schemes. The exact location of schemes will be identified (in collaboration with all relevant stakeholders) in batches from the nine BWDB zones using a set of selection criteria that combine more efficient use of water with increased resilience of production systems as well as water management infrastructure.

21. Rehabilitation/modernization will focus on improving the capacity of the infrastructure to modulate the impacts of excess water during the monsoon period on one hand, and water deficits in the post-monsoon period on the other hand as well as on addressing technical hindrances - at least in some portions of the schemes- that have always precluded the possibility of the production of many high-value noncereal crops under irrigated conditions[24]. Among others, this will include re-sectioning of

[23] In this case, agricultural technology is defined as CSA practices both for crop production and aquaculture

[24] For example, by introducing water management systems that allow rice and non-rice crops to be grown within the same irrigation service units

embankments to incorporate the latest higher flood safety design criteria adopted by BWDB[25]; re-excavation/deepening of canals; improving storage and creation of additional water storage capacity by excavating larger water retention structures to be used as water sources for dry season irrigation and ground water recharge or even as fish sanctuaries; managed aquifer recharge to augment ground water quantities and improve water quality in degraded aquifers; rehabilitation and construction of water control structures; river erosion control; promoting connectivity (e.g. using culverts and low-head weirs) to allow fish migration and natural recruitment where needed; and other protective works. Since appropriate drainage is crucial to diversification and effective on-farm water management, especially immediately after the monsoon ends, the project will also support rehabilitation of drainage canals and remodeling sluices for quick and early drainage. In addition to irrigation needs, construction of pump houses and installation of new pumps for drainage purposes will also be explored. Still, for the purposes of improved and effective on-farm water management, the project will support installation of small infrastructure such as small culverts, turn outs, field channels, distributary boxes et cetera[26]. As a principle, on-farm water management in the rehabilitated schemes will be undertaken with due consideration of the beneficiary's water needs (in terms of their cropping patterns and practices), land classification, the general water management context in the entire scheme, and where possible, the surrounding river systems.

Sub-component 1.2: Management Transfer and Capacity Building of BWDB and WMOs (US$10.96 million, of which IDA US$8.9 million).

22. This sub-component will finance participatory and community mobilization aspects in support of FCD/FCDI scheme management transfer and the involvement of communities in scheme operations and (routine) maintenance (O&M)[27,28] in line with the Participatory Water Management Regulations. This will include support to establishment and strengthening of WMOs for collective action; development of catchment/sub-catchment level O&M plans; training WMOs on infrastructure O&M, water resource management to enhance efficiency (water allocation, scheduling and distribution, and water saving techniques), and planning and budgeting for O&M; preparation of scheme- based adaptation plans; and managing trade-offs and resolving conflicts over timely drainage as well as subsequent water use.

23. The project will also support the training and capacity building of the new staff in their roles as well as other relevant BWDB staff (e.g. staff of the BWDB Audit Directorate, which is responsible for conducting audits of all WMOs) to help transform BWDB into an organization of the future of water management in Bangladesh. While capacity building will take the form of hands-on training and experience sharing and learning from best practices in other countries (e.g. through twinning arrangements), the exact nature and scope of capacity-building support will be based on a capacity assessment to be finalized in the first year of the project.

[25] Following unprecedented floods and erratic rainfall in 2017, BWDB has raised its design flood frequency return period to 1 in 100 years (previous return period was 1 in 25 year, as adopted in 1960s) for medium/minor rivers, and 1 in 200 years (previously 1 in 50 year) for major rivers and coastal embankment construction.

[26] Funding for this type of infrastructure is under the DAE budget.

[27] As per provisions of the National Water Policy (1999), ownership of the schemes over 10000 ha remains with the BWDB and so is the responsibility for major maintenance activities, which are beyond the financial capacity and skills of WMOs.

[28] There are a couple of pumped irrigation schemes included in the project. The project will pilot handing over the operation of a small pumped irrigation facilities to the WMOs with the responsibility of paying for the operation and maintenance cost of the pumps (fuel payments or solar panel costs, small maintenance works and pump operating staff cost etc.). If successful, this approach would be replicated for other larger pumped irrigation schemes.

Component 2: Climate-Smart Agricultural Production and Marketing (US$25.0 million, of which IDA US$20.0 million).

24. Project support under this component will focus on strengthening farmer's capacity to cope or adapt to climate change stresses. Project support will entail increasing the productivity, profitability and resilience to climate change of both crop and aquaculture production systems associated with the rehabilitated schemes while also pursuing opportunities for reducing GHG emissions from these production systems. Support under this component will be through two subcomponents as described below.

Sub-component 2.1: Support to Improved Crop Production and Marketing (US$12.5 million, of which IDA US$10.0 million).

25. The objective of this sub-component is to promote: (i) improved crop and on-farm agricultural water productivity; (ii) increased crop diversification towards high-value crops (e.g. fruits and vegetables); (iii) improved crop marketing to increase incomes and reduce price risks associated with diversification[29] away from the rice crop; and (iv) mainstreaming of climate change adaptation and mitigation considerations and measures in the crop production, processing/storage and marketing activities of beneficiary farmers.

26. Project support will go towards funding the demonstration and adoption of technology options for sustainable crop intensification and resilience to climate change, all based on the same principles of good choice of improved germplasm, adequate plant nutrition, effective pest management and response to market demand. A significant amount of such productivity enhancing technologies for various crops already exists in Bangladesh[30] together with adequate extension service coverage by the public sector, and in this case, project support will be limited to: (i) mobilizing and organizing WMO members in Farmer Field Schools (FFS) in order to maximize opportunities for scheme and context-specific technology options; (ii) training farmers on relevant CSA technologies; (iii) training and retooling extension agents, especially with respect to CSA technologies and practices; (iv) defraying the costs of demonstration and training materials, and farmer-to-farmer exchange visits, where necessary; and (v) financing adoption of CSA technology e.g. labor saving fertilizer applicators necessary to reduce drudgery associated with improved fertilizer management. To maximize on-farm water productivity and climate resilient water management, especially in the dry season, deliberate efforts will be undertaken to demonstrate and promote the adoption of improved water management technologies including more reliance on deficit irrigation techniques; use of high efficiency irrigation technologies such as drip irrigation, sprinklers, micro-irrigation; year-long cropping pattern towards adaptation to climate change; and shifts to less water demanding crops (especially away from Boro rice) or conversion to crops with higher economic value or productivity per unit of water consumed as will be dictated by the uniqueness of specific schemes.[31]

27. The project will also support diversification of the cropping systems at the FCD/FCDI scheme level with the view of catalyzing a prudent shift from the predominantly rice-based cropping systems to a more desirable crop share allocated between rice and high-value crops. This is in line with recent analytical work which shows that crop diversification in Bangladesh is critical to resilience of production to climate change

[29] The average annual variability of harvest prices around the estimated trend has been found to be as high as 15-40 percent for high-value crops such as fruits, vegetables, and spices, compared with only 5-6 percent for rice.
[30] Also another Bank-financed project, the National Agricultural Technology Program (NATP-2) focuses on technology generation.
[31] In this regard, the Integrated Water Management study (2016) on 'State of Water Resources' done for the Water Planning Resources Organization (WARPO) for each Upazila will serve as input into cropping decisions.

and to attaining faster productivity, income growth, nutritional security, and reducing the environmental footprint of Boro rice (which mainly relies on the increasingly scarce groundwater resources), among others. In this respect, the project will provide funding for several activities, including but not limited to: (i) awareness creation of diversification among farmers; (ii) market intelligence/assessments; (iii) farmer experimentation with new crops and training/demonstration of relevant production technology; (iv) assuring availability and access to seeds and germplasm and other critical inputs for the new crops; (v) postharvest management/quality control; (vi) value addition; and (vii) cooperative produce marketing, including infrastructure where reliable models of post-project ownership and sustainability are clear and guaranteed.

28. Project activities in support of improved productivity, diversification and marketing will deliberately pursue, prioritize, and promote technologies and practices with a potential to offer high climate change adaptation and mitigation dividends. Most of these technologies and practices and the specific production systems and regions to which they are relevant, the degree of adoption or mitigation they offer etc., are known and are summarized in the Bangladesh CSA Country profile[32]. Among others for example, these include: (i) use of submergence-resistant, and short duration high-yielding varieties for Aman rice; (ii) use of solar/biogas in lieu of diesel powered irrigation pumps, salinity-resistant varieties and proper use of fertilizers (in terms of right timing, placement, source and amount) for Boro rice; (iii) direct seeding and use of lodging-resistant varieties for Aus rice; (iv) use of salinity and drought-resistant varieties for spices; (v) use of floating beds on water bodies for vegetable production; (vi) use of dwarf and early maturing varieties for wheat; (vii) conservation agriculture for maize; (viii) reliance on short-duration varieties for pulses; (ix) aerobic treatment of manure to reduce methane production; and (x) water management in paddy fields to reduce methane emissions. Where relevant, the project will support the sourcing of new promising adaptation and mitigation technology including for adoptive trials.

Sub-component 2.2: Support to Improved Aquaculture Production and Marketing (US$12.5 million, of which IDA US$10.0 million).

29. Project support under this sub-component will go towards financing interventions that seek to improve the productivity and resilience of inland aquaculture production systems- associated with the rehabilitated FCD/FCDI schemes - to climate change[33]. Among others, the project will support the mobilization, formation and strengthening of Community-Based Organizations (CBOs),[34] bringing together beneficiaries with a common interest in aquaculture, as the platform for promoting improved aquaculture production and marketing. Through the CBOs, support will be provided for several purposes including, but not necessarily limited to: (i) deepening cooperatively owned and managed Beels and Ghers and raising associated dykes to enhance their protection from more frequent flooding associated with increasing rainfall as a result of climate change; (ii) improved access to reasonably priced fingerlings of desirable quality (e.g. through support to and regulation of local private hatcheries, establishment of nurseries, and improved brood stock management); (iii) introducing and promoting the use of lower cost alternative feed sources e.g. bio-slurry and algae (instead of relying on fishmeal), to not only reduce overall production cost, but also as a contribution - even if modest - to climate change mitigation; (iv) promoting the cultivation of indigenous species, as an autonomous climate change adaptation strategy; (v) disease

[32] https://cgspace.cgiar.org/rest/bitstreams/144796/retrieve.
[33] This project focuses on inland aquaculture. Another Bank-financed operation under preparation will provide support to coastal aquaculture value chains.
[34] In most cases, the CBO is expected to be an aquaculture subgroup under the WMO.

control and management; and (vi) postharvest management, quality control, value addition and marketing.

30. The project will also support cage farming and pen culture in suitable waterbodies mainly for the benefit of the landless and the poor. Successful models for cage and pen culture already exist in Bangladesh and in this case, the project will support the poor to secure rights of access to waterbodies, acquisition of relevant infrastructure, e.g. bamboo cages, nylon netting, fingerlings, and provide training on planning and siting of cage/pen aquaculture facilities, appropriate feeding and management practices and marketing. To redress gender inequities which have usually seen women relegated to lower value opportunities in the aquaculture value chain, dedicated support will be provided to strengthen women's capacity to engage in all aspects of the value chain. Among others, this will include increasing their access to new technology; information and skills; essential assets such as ponds/other waterbodies and production equipment; productive networks (e.g. market/client connections); and a revolving credit facility for inputs like stocking and provision of new species, supplementary feeds etc.

Component 3: Project Management Support (US$16.18 million, of which IDA US$7.1 million).).

31. The objective of this component is to facilitate efficient implementation of project activities and tracking and reporting of results. This component will support operational costs, project monitoring and evaluation and impact assessments, financial and procurement management, communication, and special studies. Under this component, support will also be provided for an interactive voice response (IVR) system to promote effective citizen engagement and community feedback on project interventions.

Component 4: Contingency Emergency Response (US$0.00 million).

32. This zero-cost component will finance eligible expenditures under the Immediate Response Mechanism (IRM) in case of natural or man-made crises or disasters, severe economic shocks, or other crises and emergencies in Bangladesh. This contingency facility can be triggered through formal declaration of a national emergency by the government authority; and upon a formal request from GoB to the Bank through the Economic Relations Division, Ministry of Finance. In such cases, funds from an unallocated category or other project components will be reallocated to finance emergency response expenditures to meet the emergency needs. The emergency response would include mitigation, recovery, and reconstruction following natural disasters, such as storm surge, severe droughts, floods, disease outbreaks, and landslides, among others.

E. Implementation

Institutional and Implementation Arrangements

33. Project implementation will be the joint and shared responsibility of the Ministry of Water Resources (MoWR), Ministry of Agriculture (MoA) and the Ministry of Fisheries and Livestock (MoFL), respectively working through the BWBD, the Department of Agricultural Extension (DAE) and the Department of Fisheries (DoF). Each implementing entity - BWDB, DAE and DoF – will take the lead on project elements under their respective institutional mandate, capacity and skills endowment. In this case, BWDB will take the lead on activities related to project Component 1 (Improved Climate Resilience of Flood Control, Drainage and Irrigation Infrastructure); DAE will be the lead entity on subcomponent 2.1 (Crop Production Improvement); while activities targeting the improvement of aquaculture production as defined under subcomponent 2.2 will be led by the DoF.

34. There will be a Project Coordination Unit (PCU) at BWDB charged with overall coordination across all project activities. The PCU will be headed by a Project Coordination Director and will be staffed with a Procurement Specialist, Finance Management Specialist, and Monitoring and Evaluation experts. The DAE and DoF will each establish a Project Implementation Unit (PIU) responsible for implementation of their respective components and coordinating with the PCU. Each of the PIUs will be headed by a Project Director (PD) and will also be staffed with a Procurement Specialist, Finance Management Specialist, and Monitoring and Evaluation Specialist. Short-term Technical Assistance/consultancy services will be sought to fill specific skill gaps during project implementation, as need arises.

35. A Project Steering Committee (PSC) with representation from different ministries/agencies (as per GoB directive) including MoWR, MoA, MoFL, Ministry of Land, Ministry of Local Government, Rural Development and Cooperatives, Irrigation Wing of Planning Commission, Implementation Monitoring and Evaluation Division (IMED) and ERD, having the Senior Secretary, MoWR as its Chair, will be established to provide overall policy guidance during project implementation. The PSC will meet at least twice a year to review overall implementation progress and PCU will serve as its Secretariat. To ensure a fully integrated approach to implementation as envisaged in the design, there will be a PMC overseeing the project technical functions including reviewing and integrating workplans and budgets, and reconciling tensions between crop and aquaculture land uses as is anticipated in some schemes. The PMC will be chaired by the Directors General of BWDB, DAE, and DoF on a rotational basis.

F. Project location and Salient physical characteristics relevant to the safeguard analysis (if known)

The proposed project is a follow-on of the Water Management Improvement Project (WMIP), another Bank-financed operation and will have national coverage. The project will mainly focus on rehabilitation of already existing Flood Control Drainage and Irrigation schemes, and dissemination and promotion of uptake of Climate Smart Agriculture technologies for both crop and aquaculture production in the rehabilitated schemes. The exact schemes and their location are not known but will be selected in batches from the 9 BWDB zones by using a set of selection criteria that combine more efficient use of water with increased resilience of production systems. The Project has taken a framework approach as the safeguards compliance issues will be known during implementation when subprojects have been identified and designed at the implementation stage. The project is classified as Category B.

G. Environmental and Social Safeguards Specialists on the Team

Md. Akhtaruzzaman, Social Safeguards Specialist
Iqbal Ahmed, Environmental Safeguards Specialist

SAFEGUARD POLICIES THAT MIGHT APPLY

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	The project is expected to undertake similar physical interventions as were implemented under the recently completed WMIP. The Project does not envisage any significant or irreversible environmental and social impacts and overall, is expected to generate significant positive environmental and social impacts. The environmental impacts that could arise due to the project are mainly from the construction related activities. OP/BP4.01 is triggered to avoid any potential adverse environmental impacts, avoid or minimize adverse social impacts and enhance positive environmental and social development outcomes of the many individual sub-projects. Exact locations, activities and design of the subprojects under the project will only be known at the implementation stage, and therefore, the Project has taken a framework approach of identification, design and implementation. BWDB has carried out partial environmental and social assessment of the proposed project at the preparation stage and prepared an Environmental and Social Management Framework (ESMF) to guide safeguards management and compliance during implementation. The ESMF includes an Environment Management Framework (EMF), a Social Management Framework (SMF), a Resettlement Policy Framework (RPF), a Tribal Peoples Development Framework (TPDF), a Gender Action Plan and communications framework. Also, the Environmental, Health, and Safety (EHS) Guidelines of the World Bank Group are applicable to the project.
Natural Habitats OP/BP 4.04	No	The project is not expected to cause impacts on any natural habitat formed largely by native plants and animal species.
Forests OP/BP 4.36	No	It is not expected that the project will have any impact on the management, protection, or utilization of natural forests or plantations.
Pest Management OP 4.09	Yes	The project is expected to finance agricultural activities. In this case, synthetic chemical pesticides may be used and the policy has been triggered. A

		standalone pest management plan(PMP) has been prepared to promote the use of biological or environmental control methods and reduce reliance on synthetic chemical pesticides.
Physical Cultural Resources OP/BP 4.11	No	No physical cultural resources will be affected. However, in case of chance finds, special precautions will be taken to avoid damaging cultural heritage sites and property.
Indigenous Peoples OP/BP 4.10	Yes	The project will cover FCD and FCDI schemes across the country and there is the likelihood that some of the project activities might touch upon areas inhabited by indigenous communities officially recognized as tribal peoples. The ESMF therefore, includes a TPDF to provide guidance for social screening and preparation and implementation of site specific Tribal Peoples Development Plan (TPDP) where applicable. The framework is fully cognizant of local and cultural nuances associated with designing and proposing alternative livelihood measures, grievance redress processes and all other project interventions including free, prior and informed consultation process.
Involuntary Resettlement OP/BP 4.12	Yes	The project is expected to limit its activities within existing available lands without encumbrances for rehabilitation of embankments and construction of water control structures. However, in special circumstances of riverbank erosion and retirement of small embankment sections and replacement of water control structures, acquisition of private land might be required. Besides, resectioning of existing embankment sections in few cases, can displace informal settlers on the existing embankments. Hence OP 4.12 is triggered and a RPF has been prepared as part of the ESMF to provide guidance for the preparation and implementation of site specific Resettlement Action Plans (RAP) where required. The ESMF provides guidance on site specific social impact assessments of subproject interventions and preparation of RAPs.
Safety of Dams OP/BP 4.37	No	The Project will not finance any dams, nor do project activities depend on any existing dams.
Projects on International Waterways OP/BP 7.50	Yes	The policy is triggered since the proposed project will rehabilitate existing irrigation and drainage infrastructure schemes in a downstream riparian country. However, the project falls under the

		exception of OP7.50 as it only involves additions or alterations that require rehabilitation, construction, or other changes that: (i) will not adversely change the quality or quantity of water flows to the other riparians; and; (ii) will not be adversely affected by the other riparians' possible water use. Therefore, in accordance with the Bank Procedures, the Regional Vice President requested and approved a waiver to notification to the riparian countries.
Projects in Disputed Areas OP/BP 7.60	No	There are no disputed areas in the project area of influence.

KEY SAFEGUARD POLICY ISSUES AND THEIR MANAGEMENT

A. Summary of Key Safeguard Issues

1. Describe any safeguard issues and impacts associated with the proposed project. Identify and describe any potential large scale, significant and/or irreversible impacts:

The project is expected to limit its activities within existing available lands and does not envisage any significant environmental/social impacts. No large scale or new infrastructure development is envisioned. The environmental impacts of the project are expected to be mostly construction related. The key impacts and issues include, disturbance to the aquatic habitat, changes in land form and land use, operation of construction machinery, air quality deterioration, noise generation, worker's health and safety, contamination of land and water, loss of trees etc. Also proper management is required to dispose the excavated soil from canals and collection of fill material for embankment. Only in special circumstances of retirement of embankment sections and replacement of structures, might acquisition of private land be required. Besides, resectioning of existing embankments may also involve displacement of informal settlers. Land may also be taken through voluntary donation/dispossession. The project will be implemented through out the country and may therefore impact on the indigenous peoples dispersed in the plain lands. However, the expected potential environmental and social impacts can be mitigated through proper design and implementation of the environmental and social management plans.

2. Describe any potential indirect and/or long term impacts due to anticipated future activities in the project area:

Project activities are not expected to cause any long-term or irreversible environmental and social impacts and the anticipated impacts will be largely limited within the scheme rehabilitation boundary and rehabilitation period. The project will mainly support improvement in environmental practices and health-safety standard in microenterprises as a follow-on of recently closed WMIP and will mainly focus on activities related to rehabilitation of existing flood control, irrigation and drainage schemes and promotion of CSA technologies for improved crop and aquaculture production. Any social and environmental safeguards related issues will be addressed following local laws and practices in compliance with the Bank safeguards requirements.

3. Describe any project alternatives (if relevant) considered to help avoid or minimize adverse impacts.

There are no relevant alternatives that could be considered. However, the project will prioritize environmentally sensitive and/or areas that are vulnerable to impacts of climate change and will avoid involuntary displacement of people to minimize impacts and strengthen resilience.

4. Describe measures taken by the borrower to address safeguard policy issues. Provide an assessment of borrower capacity to plan and implement the measures described.

Given the limited impacts, the project is rated as Category B. The safeguard policies Environment Assessment (OP 4.01) and Pest Management (OP 4.09) have been triggered. Although chances are slim, there might be land acquisition at a very limited scale, displacement of people - largely informal settlers/squatters- and project activities may also impact on areas inhabited by Indigenous Peoples. Thus both OP 4.12 and OP 4.10 are triggered. In view of the limited information (subproject nature, location, design etc.), a framework approach to environmental and social management has been adopted for the project.

BWDB has prepared an Environmental and Social Management Framework (ESMF) containing Environmental Management Framework (EMF), Environmental Management Plan (EMP) and Social Management Framework including Resettlement Policy Framework (RPF), Indigenous Peoples Development Framework (IPDF) and Pest Management Plan(PMP) in accordance with Environment Conservation Rules 1997 (ECR 1997) and ARIPA 2017 of Bangladesh and the Safeguard Policies of the World Bank and the Environmental, Health and Safety Guidelines of the World Bank Group/International Finance Corporation (IFC). The ESMF also incorporates institutional frameworks and current practices of BWDB and other implementing agencies including the Department of DAE and DoF.

BWDB and DAE are familiar with the World Bank safeguards policies as they have implemented a number of World Bank-financed projects. Recently, BWDB successfully completed the WMIP and the Emergency 2007 Cyclone Recovery and Restoration Project (ECRRP) where they gained knowledge and experience in environmental and social safeguards management and monitoring for community level interventions. DAE is acquainted with Bank policies as implemented through the National Agricultural Technology Program (NATP) and Integrated Agricultural Productivity Project (IAPP). Under the project, the PCU at BWDB and the PIUs at DAE and DoF will be staffed with Environmental Specialists and Social Specialists to oversee safeguards compliance during implementation.

Specific training on the ESMF and IPDF as well as on preparing site specific Environment Impact Assessments (EIAs), Environment Management Plans (EMPs), RAPs, Indigenous Peoples Plans (IPP) will be arranged for field level staff responsible for screening, documenting and reporting on safeguards, as well as other relevant people responsible for the preparation and implementation of the Plans.

5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

The ESMF was prepared in consultation with the key stakeholders including the field level staff of BWDB, DAE and DoF, and communities. A national consultation workshop has been planned by BWDB in January, 2018 to share the draft ESMF with all the stakeholders. Consultation with communities has been made mandatory for environmental/social screening/assessment of each subproject. The objective of the consultations is to disseminate information about the project and understand stakeholder's concerns and views. The safeguards documents together with the respective Bangla translation have been disclosed on January 24, 2018 in BWDB, DoF, DAE and Bank's operational website. Hardcopies have also been made available at the Headquarters of the implementing agencies as well as the relevant offices of project areas.

B. Disclosure Requirements

Environmental Assessment/Audit/Management Plan/Other

Date of receipt by the Bank	Date of submission for disclosure	For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors
04-Dec-2017	05-Dec-2017	

"In country" Disclosure

Bangladesh
05-Dec-2017

Comments

Resettlement Action Plan/Framework/Policy Process

Date of receipt by the Bank	Date of submission for disclosure
04-Dec-2017	05-Dec-2017

"In country" Disclosure

Indigenous Peoples Development Plan/Framework

Date of receipt by the Bank	Date of submission for disclosure
04-Dec-2017	05-Dec-2017

"In country" Disclosure

Pest Management Plan

Was the document disclosed prior to appraisal?	Date of receipt by the Bank	Date of submission for disclosure
Yes	04-Dec-2017	05-Dec-2017

"In country" Disclosure

If the project triggers the Pest Management and/or Physical Cultural Resources policies, the respective issues are to be addressed and disclosed as part of the Environmental Assessment/Audit/or EMP.

If in-country disclosure of any of the above documents is not expected, please explain why:

C. Compliance Monitoring Indicators at the Corporate Level (to be filled in when the ISDS is finalized by the project decision meeting)

OP/BP/GP 4.01 - Environment Assessment

Does the project require a stand-alone EA (including EMP) report?
Yes
If yes, then did the Regional Environment Unit or Practice Manager (PM) review and approve the EA report?
Yes
Are the cost and the accountabilities for the EMP incorporated in the credit/loan?
Yes

OP 4.09 - Pest Management

Does the EA adequately address the pest management issues?
Yes
Is a separate PMP required?
Yes
If yes, has the PMP been reviewed and approved by a safeguards specialist or PM? Are PMP requirements included in project design? If yes, does the project team include a Pest Management Specialist?
Yes

OP/BP 4.10 - Indigenous Peoples

Has a separate Indigenous Peoples Plan/Planning Framework (as appropriate) been prepared in consultation with affected Indigenous Peoples?
Yes
If yes, then did the Regional unit responsible for safeguards or Practice Manager review the plan?
Yes
If the whole project is designed to benefit IP, has the design been reviewed and approved by the Regional Social Development Unit or Practice Manager?

Yes

OP/BP 4.12 - Involuntary Resettlement

Has a resettlement plan/abbreviated plan/policy framework/process framework (as appropriate) been prepared?
Yes
If yes, then did the Regional unit responsible for safeguards or Practice Manager review the plan?
Yes

OP 7.50 - Projects on International Waterways

Have the other riparians been notified of the project?
NA
If the project falls under one of the exceptions to the notification requirement, has this been cleared with the Legal Department, and the memo to the RVP prepared and sent?
Yes
Has the RVP approved such an exception?
Yes

The World Bank Policy on Disclosure of Information

Have relevant safeguard policies documents been sent to the World Bank for disclosure?
Yes
Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?
Yes

All Safeguard Policies

Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?
Yes

Have costs related to safeguard policy measures been included in the project cost?
Yes

Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures related to safeguard policies?
Yes

Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?
Yes

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APPROVAL

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