Report Number: ICRR0024635

## 1. Project Data

| Project ID | Project Name |
|---|---|
| P150220 | BWCSRP |
| **Country** | **Practice Area(Lead)** |
| Bangladesh | Urban, Resilience and Land |

| L/C/TF Number(s) | Closing Date (Original) | Total Project Cost (USD) |
|---|---|---|
| IDA-58370 | 31-Dec-2022 | 74,447,346.63 |
| **Bank Approval Date** | **Closing Date (Actual)** | |
| 03-Jun-2016 | 30-Nov-2024 | |

| | IBRD/IDA (USD) | Grants (USD) |
|---|---|---|
| Original Commitment | 113,000,000.00 | 0.00 |
| Revised Commitment | 79,907,922.20 | 0.00 |
| Actual | 75,285,779.00 | 0.00 |

| Prepared by | Reviewed by | ICR Review Coordinator | Group |
|---|---|---|---|
| Craig P. Kullmann | Vibecke Dixon | Avjeet Singh | IEGSD (Unit 4) |

## 2. Project Objectives and Components

### a. Objectives

The Project Development Objectives in the PAD (p.7) are: *to strengthen Bangladesh’s capacity to deliver reliable weather, water and climate information services and improve access to such services by priority sectors and communities*. The Financing Agreement for the loan (p. 5) has the same objectives. This review has assessed the PDO achievement in terms of the following two objectives:

i. To strengthen Bangladesh’s capacity to deliver reliable weather, water, and climate information services

ii. To improve access to such services by priority sectors and communities.

The second PDO's reference to priority sectors includes (i) water, (ii) disaster risk management, (iii) aviation, and (iv) agriculture and communities to professional users, such as forecasters and end-users/beneficiaries, i.e., farmers. (ICR, p. 2)

### b. Were the project objectives/key associated outcome targets revised during implementation?

Yes

### Did the Board approve the revised objectives/key associated outcome targets?

No

### c. Will a split evaluation be undertaken?

Yes

### d. Components

**Component A- Strengthening Meteorological Information Services** (US$67.5 million at appraisal, and US$24.3 actual). Activities financed under this component included the modernization of surface, ocean and upper air monitoring networks and ICT systems comprised of: (i) consultancies for technical assistance to support a Meteorological Systems and Services Integrator (MSSI), (ii) upgrading of synoptic and agricultural weather stations; (iii) installation of urban rain gauges and three Doppler weather radars; (iv) installation of aviation weather systems at international airports; (v) installation of coastal marine stations and ocean buoys; (vi) digital elevation and bathymetric surveys; (vii) portable hydrogen generators for upper-air measurements; (viii) upgrading equipment maintenance facilities, ICT systems, data centers, and high-speed communications. This component also financed infrastructure for *weather forecasting*, which comprised: (i) installation of nowcasting workstations; (ii) weather workstations; (iii) high-performance computing system for weather and oceanographic forecasting, (iv) consultancies for storm surge and wave models, (v) a consultancy for digitalization and forecast verification system. In addition, the component financed: (i) consultancies for training needs assessments, study tours, training courses, and regional collaboration, (ii) development of a legal and regulatory framework and data sharing policy, and (iii) technical experts and consultants to carry out project management, monitoring, and evaluation. The activities related to early warning systems included: (i) development of a Common Alerting Protocol (CAP) system (involving computers, software and end user facilities, and community-based early warning system for drought and extreme meteorological events. (PAD, p. 34-45)

**Component B- Strengthening Hydrological Information Services and Early Warning Systems** (US$45.3 million at appraisal, and US$35.6 actual). Activities financed under this component included: (i) *a* Water Resources Systems Integrator; (ii) upgrading over surface water level stations, rain gauges, groundwater stations, and climate stations to automatic real-time reporting; (iii) purchasing of specialized survey boats, echosounders, water quality sondes, and storm surge monitoring stations; (iv) enhancing ICT, data centers, and communications for real-time data sharing; and upgrading equipment calibration facilities. Flood forecasting activities were: (v) new nowcasting workstation for flash floods, expanded flood models (including coastal areas), and medium- to long-range forecasting tools. Institutional capacity building activities included: (vi) training programs, study tours, twinning arrangements, development of a data sharing policy, and refurbishment of the Bangladesh Water Development Board (BWDB) offices. Service delivery to priority sectors and community activities included: (vii) a Geographic Information System (GIS) center, upgraded web portals, automated data exchange with stakeholders, Common Alerting Protocol implementation, and community-based early warning systems in flash flood-prone districts. (PAD, p. 46-52)

**Component C- Agro-Meteorological Information Systems Development** (US$16.1 million at appraisal, and US$21.1 million actual). Activities financed under this component included: (i) development of the Bangladesh Agrometeorological Information System (BAMIS) - to integrate meteorological and agricultural data allowing for tailored advisories for different agro-ecological zones; (ii) upgrade and automation of agro-meteorological stations, deployment of soil moisture and temperature sensors, and installation of crop monitoring and remote sensing tools; (iii) information communication and technology (ICT) enhancements to expand data storage, processing, and dissemination capabilities, including web-based and mobile platforms tailored for farmers and extension services; (iv) capacity building activities included training Bangladesh Meteorological Department (BMD) and Department of Agricultural Extension (DAE) staff on data analysis, forecasting, and agrometeorological advisory preparation, as well as study tours and twinning programs with regional centers of excellence, roving seminars to raise awareness and train farmers on using weather and climate information, and annual feedback surveys will be conducted to refine advisories and ensure they remain relevant and actionable for farming communities. (PAD, p. 52-57)

**Component D- Contingent Emergency Response Component** (US$0 million at appraisal, and US$0 million actual). This component was included as a flexible mechanism to provide rapid financing for emergency response and recovery efforts in the event of a disaster.

### e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

**Cost:** The estimated total project cost at appraisal was US$127.8 million. The actual total cost was $83.5 million. (ICR, p. 6)

**Financing**: At appraisal, the IDA financing was estimated at US$113 million. The amount of IDA financing disbursed at closing was US$75.3 million, which was 66.6 percent of the loan.

**Borrower Contribution:** At appraisal, the borrower committed to US$14.8 million and disbursed US$8.24 million, which was 55.6 percent of the commitment.

**Dates**: The Project was approved on June 3, 2016, and became effective on May 4, 2017. The project closing date at appraisal was December 31, 2022, but the actual closing date was extended by 23 months until November 30, 2024, for a total implementation period of 8 years and 6 months. The project had six restructurings, and a Mid-Term Review (MTR) was conducted in January 2020. The six restructurings of the project included the following:

- On February 2, 2019, the project was restructured to add civil works as eligible expenses correcting inconsistencies between the Financing Agreement and the Project Appraisal Document (PAD).
- On April 29, 2020, a level 2 restructuring reduced the scope of Components A and B, and increased the scope of Component C, modified the result indicators and targets, and cancelled about US$24 million.
- On June 7, 2022, a level 2 restructuring modified the loan closing date from December 31, 2022, to December 31, 2023.
- On April 26, 2023, a level 2 restructuring cancelled US$2.85 million.

- On December 18, 2023, a level 2 restructuring modified the loan closing date from December 31, 2023, to November 30, 2024.
- On November 30, 2024, a level 2 restructuring cancelled US$6.05 million, and corrected the closing dates in the results framework.

Due to the reduction in scope of Components A and B, and the modification of indicators and targets at the second restructuring, IEG conducted a split evaluation for this report.

## 3. Relevance of Objectives

### Rationale

Bangladesh is a lower-middle-income country in South Asia with a population of 173 million (as of 2024) that is highly prone to water related hazards such as floods, drought, and cyclones. These hazards are prevalent throughout the region, and between 1970 and 2010 79 percent of all recorded natural disasters were related to floods and cyclones, impacting an estimated 2-6 percent of the region's GDP. (PAD, p. 17)

The World Bank had invested over a billion dollars in increasing the country's resilience to natural disasters such as cyclones and flooding (coastal and inland) with improvements in infrastructure, reforestation, and disaster preparedness; however these investments did not improve the capacity of the government to forecast extreme weather events and help different sectors prepare and manage through those events that produce too much or too little water (floods and droughts). (PAD, p. 5)

The project objectives were directly aligned with the World Bank's Systematic Country Diagnostic (SCD) of 2021 to improve the sustainable management of natural capital through the development of information systems for enhanced collection, processing, analysis, and dissemination of air, soil, and water data. (SCD, p. 33). The PDOs were also aligned with the Country Partnership Framework (CPF) FY 16-21 at appraisal and its Focus Area 3: Climate and Environmental Management. Focus Area 3's Objective 11: increased resilience of the population to natural disasters in urban and coastal areas had an indicator *of Upazilas receiving agro weather bulletins* that relied upon the project's results framework. The PDO was also fully aligned with the South Asia Regional Integration Strategy (2014) that identified improved hydromet modernization, disaster preparedness, and climate resilience as a high-priority area to support regional integration.

At project close, the project was recognized in the CPF under *High Level Outcome C: Enhanced Climate and Environmental Resilience* and its *Objective 7: Improved effectiveness of delta management to accelerate climate resilience building*, and its contributions to improved forecasting capacities. Overall, the relevance of PDOs is rated High.

## Rating

High

## 4. Achievement of Objectives (Efficacy)

### OBJECTIVE 1

#### Objective

To strengthen Bangladesh's capacity to deliver reliable weather, water, and climate information services

#### Rationale

The theory of change (ToC) in the Implementation Completion Report (ICR, p. 2) identified that the outcome of interest was to strengthen Bangladesh's capacity to deliver reliable weather, water, and climate information services.

The inputs identified were adequate to reach the outcome. These included financing of: installation and upgrading of data collection instruments for weather, climate, and water such as automatic weather and climate stations, groundwater, and surface water level stations; water quality stations; and deployment of urban rain gauges, Doppler weather radars, coastal marine stations, ocean buoys, and storm surge monitoring stations, aviation weather systems, portable hydrogen generators for upper-air measurements, and specialized survey boats. To utilize this data and improve forecasting capacity the project financed the installation of nowcasting workstations (for weather and flash floods), high-performance computing systems, expanded flood and storm surge models (including coastal areas), medium- to long-range forecasting tools, digital elevation and bathymetric surveys, ICT systems, data centers, high-speed communications, GIS centers, and web portals. The project financed early warning systems and developed a Common Alerting Protocol system, automated data exchange with stakeholders, and community-based early warning systems for drought, extreme meteorological events, and flash floods. The inputs that further strengthened the institutional capacity were consultancies for technical integration (Meteorological and Water Resources Systems Integrators), legal and regulatory frameworks, training needs assessments, training programs, study tours, twinning arrangements, regional collaboration, support the development of a Department of Meteorology at University of Dhaka, and refurbishment of offices in different agency buildings. (PAD, p. 35-52)

The expected outputs were: (i) weather, climate, and water measurement stations installed, (ii) forecasting and computing systems and ICT equipment installed and flood and storm surge models developed, (iii) early warning electronic system developed; (iv) regulatory framework developed, and (v) specialized trainings, study tours, and regional collaboration events conducted, and university meteorology department developed.

These outputs were expected to lead to outcomes such as : (i) real-time and accurate flood and weather forecasting improved with longer lead times, enabling early warning systems to produce timely information utilized by stakeholders, (ii) inter-agency coordination, collaboration to ensure data sharing and dissemination improved, (iii) regulatory environment clarified, and (iv) and institutionalized educational mechanisms producing informed professionals.

The result of these outcomes were in turn expected to lead to the PDO outcome of strengthening Bangladesh's capacity to deliver reliable weather, water, and climate information services, contributing to higher-level outcomes of enhanced climate and disaster resilience.

The ToC's activities, outputs, and outcomes provide a logical causal chain that was sufficient to reach the PDO outcome target. The ToC included the following assumptions:(i) willingness for inter-agency collaboration and data-sharing, (ii) sector interest and capacity to translate enhanced hydrological and meteorological data into action, and (iii) sufficient university student interest and job market absorption capacity. The assumptions are relevant to the PDO. The results framework's indicators adequately capture the ToC with some shortcomings, which are described in the monitoring and evaluation sector below.

**OUTPUTS**:

The project achievements measured against the original output level indicators for this objective were as follows:

- 95 percent of the hydromet-related network upgraded and modernized (Original target was 70 percent, **(exceeded)** (ICR, p. 17) The project installed 1,934 hydromet-related stations of which 1,842 were functional at project closing (95 percent). The stations that were not functional at closing were identified as damaged by flood, vandalism, or stolen. The ICR interview confirmed that the ratio presented in the ICR measured the number of stations that were installed and functional, divided by the total number of stations installed. The PAD's definition of this indicator as a percentage is not clear. The PAD discusses the number and type of new instruments that were planned to be installed as an upgrade to an existing station or a new instrument even though there were no specific targets for types of equipment to be installed. A better indicator may have been the number of instruments installed rather than a percentage. The ICR reported on all types and quantities of instrumentation installed (ICR, p. 22), which aligns with the description in the PAD. The installation of 1,842 functional stations is a significant achievement in modernizing the hydromet system.
- 0 percent of planned training targeted towards technical and professional staff of the three implementing agencies, officials at the district/upazila and other decentralized levels, and community members completed (Original target was 75 percent) **(not achieved)**. This indicator was to be informed by training plans developed by the three implementing agencies. The ISR from March 2020, prior to the second restructuring did not report progress against this indicator and only mentioned that training plans were under development.
- 0 percent of the target O&M budget for delivery of weather and climate Services completed (Original target was 50 percent of the target budget for O&M activities ) (**not achieved**) The PAD indicated that an O&M study for the installed infrastructure would be carried out to inform the required budget for O&M activities. The ICR reported that all three implementing agencies have warranty and annual maintenance contracts negotiated with the vendors who provided hardware and software for their respective hydromet systems. The interview with the Task Team (August 19, 2025) confirmed that the O&M studies for each system were completed and informed the budget needs to cover ongoing operation and maintenance costs. The ICR reported that the government allocated budget in 2025 for operation and maintenance, and that annual maintenance contracts are multi-year, contingent upon government funding, but it did not report the amount of O&M budget allocated nor the percentage of the target O&M budget as this indicator was dropped at the second restructuring, and hence not achieved.
- Greater regional cooperation on weather services and improved sub-regional information exchange. (Original target was: (i) Regional consultations commence and areas of collaboration identified; (ii) Improved provision by BMD to Weather Information System (WIS); (iii) Improved accessibility by BDM to Regional Specialized Meteorological Center (RSMC) climate/cyclone forecasts; and (iv) Joint partnership for regional product development strengthened **(partially achieved )** (ICR, p. 35). The

ICR reported that two of the four targets were achieved - Regional consultations commence and areas of collaboration identified; (ii) Improved provision by BMD to Weather Information System (WIS) (ICR, p. 12). This indicator was modified at the second restructuring.

- 0 people who receive early warning alerts for significant weather and water hazards in time (Original target was (i) early warning system established and fully functional in 4 districts, (ii) 100,000 people receiving early warning alerts) **(not achieved)** The project reduced the scale of community based early warning systems, and this indicator was dropped at the second restructuring. The ICR did not report on any community based early warning system advancements.

**OUTCOMES**:

The expected project achievement at outcome level for this objective was improved forecasting capacity:

- Improvement in Forecast Skill of 24 hour public weather forecasts for mean temperature and precipitation (Original target was (i) system for verification established, (ii) all forecasts are verified and baseline skill level established, (iii) 10 percent increase in baseline skill, and (iv) 25 percent increase in baseline skill. The ICR did not report against this indicator, and mentioned (ICR, p 20) that verification processes were established. However, the ICR did not report on baseline skill levels nor an increase in percentage of skills over baseline. This indicator was dropped and replaced at the second restructuring, and hence **not achieved.**

The ICR's ToC adequately captured the causal chain and included assumptions. However, the results framework indicators did not adequately measure the originally expected outputs and outcomes, and most of the indicators were eventually dropped and modified at the second restructuring. The project exceeded the target hydromet stations and partially achieved the output indicator for sub-regional capacity strengthening. The remaining output and outcome targets were not achieved resulting in a Modest rating.

### Rating
Modest

## OBJECTIVE 1 REVISION 1

### Revised Objective
To strengthen Bangladesh's capacity to deliver reliable weather, water, and climate information services

### Revised Rationale
The ToC largely remained the same with some activities reduced in scope and some expanded at the second restructuring. Component A dropped operational research, satellite imagery, and some data sharing software, storm surge modeling, while Component B slightly reduced the number of hydromet-related monitoring stations that were installed. Community-based early warning activities were reduced in scale and the related indicator was dropped. Component C expanded the scope of activities to include support to agromet departments at two universities, upgrades to the agromet portal and decision-support systems, and new measurement stations. Dissemination of agromet services was enhanced through community radio, digital displays, and additional advisory content.

The restructuring modified output and outcome indicators and targets for almost all indicators.

**OUTPUTS**:

The project achievements at output level for this objective included:

- 95 percent of the hydromet-related network upgraded and modernized (Revised target was 60 percent) (Restructuring Paper #2, p. 16) **(exceeded)** (ICR, p. 17) The project installed 1,934 hydromet-related stations of which 1,842 were functional at project closing (95 percent). The stations that were not functional at closing were identified as damaged by flood, vandalism, or stolen. The ICR interview confirmed that the ratio presented in the ICR measured the number of stations that were installed and functional, divided by the total number of stations installed. The PAD's definition of this indicator as a percentage is not clear. The PAD discusses the number and type of new instruments that were planned to be installed as an upgrade to an existing station or a new instrument even though there were no specific targets for types of equipment to be installed. A better indicator may have been the number of instruments installed rather than a percentage. The ICR reported on all types and quantities of instrumentation installed (ICR, p. 22), which aligns with the description in the PAD. The installation of 1,842 functional stations is a significant achievement in modernizing the hydromet system.
- 69 students completed a master's in meteorology (Revised indicator and target was 40 students) **(exceeded)** (ICR, p. 17). This indicator was introduced at the second restructuring to replace a more generic indicator that measured the percentage of trainings completed. The improvement in the indicator captures the institutionalized nature of the capacity-building efforts. The project supported the development of a Department of Meteorology at Dhaka University with a bachelor's and master's program. The master's program graduated 69 students, of which 35 were female, and it currently has 11 students enrolled, of which 6 are female. The Bachelor program currently has 76 students, of which 40 are female. In addition, the project supported the Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) and the Bangladesh Agricultural University (BAU) with master's programs in agro-meteorology. This BAU program has 19 students, of which 8 are female, and the BSMRAU program has 11 students, of which 7 are female. (ICR, p. 34). The ICR also reported that the DAE established an agromet division with trained staff. (ICR, p. 17)
- O&M planning for delivery of weather and climate Services completed (Revised indicator and target was a post-project operational plan approved, and implementation initiated) (**achieved**) (ICR, p.32). While this target was originally quantitative in nature, the rationale for 50 percent of the O&M budget was not justified. The modification of the target to be qualitative reflected realism on the part of the Task Team as they still retained a focus on O&M that went beyond an output by including in the target that the plan was being implemented. The ICR reported that all three implementing agencies have warranty and annual maintenance contracts negotiated with the vendors who provided hardware and software for their respective hydromet systems. This included standard operating procedures for all equipment. The ICR reported that many of the hydro-met related stations were entrusted to partner/research institutes who benefit from the data produced. (ICR, p. 32) The interview with the Task Team (August 19, 2025) confirmed that the O&M studies for each system were completed and informed the budget needs to cover ongoing operation and maintenance costs. The ICR reported that the government allocated budget in 2025 for operation and maintenance, and that annual maintenance contracts are multi-year, contingent upon government funding.
- Improved sub-regional capacity strengthening and dialogue (Revised target was implementing agency participants to engage in at least 3 regional dialogue meetings; 10 staff participate in regional training)

**(exceeded)** (ICR, p. 35). This prior indicator was ambiguously defined at appraisal, and the second restructuring quantified the target, which was an improvement. The project supported and promoted regional collaboration between Bangladesh, India, and Sri Lanka, which resulted in institutionalizing Bangladesh's participation in the South Asia Hydromet Forum (SAHF), South Asia Climate Outlook Forum (SASCOF), and weekly SAHF Forecaster forums. (ICR, p. 17). As a result, BMD is co-chairing the regional working group on numerical weather prediction. (ICR, p. 17). In addition, 59 staff from these agencies participated in a range of in-person and virtual regional technical trainings in 2022, 2023, and 2024, supporting the professional development of agency staff. (ICR, p. 23)

**OUTCOMES**:

The outcome level indicator for this objective is to measure improved forecasting capacity:

- Improvement of 3 attributes for meteorological forecasting and two attributes for hydrological forecasting. (Revised indicator and target was improvement in forecasts by at least one attribute (skill/lead time/ frequency/spatial range) **(exceeded)** This indicator has two elements: *Meteorology* - Improvement in 24-hour public weather forecasts for national mean temperature and precipitation; and *Hydrology* - Improvement in flood forecast. The ICR reported that BMD increased its meteorological forecast resolution from 18 to 3 kilometers (spatial range improvement), extended meteorological forecast lead times from one to three days (lead time improvement), and expanded their model runs from one to four times daily (frequency improvement). In total, meteorological forecasting capacity was strengthened in three attributes, improving the government's accuracy and speed to notify the public of meteorological events. BWDB scaled up its flood forecasting coverage from 31 to all 64 districts (spatial improvement) and developed additional models addressing groundwater, drought, salinity, and river morphology (skill improvement). In total, BWDB improved its hydrological forecasting capacity in two attributes, enhancing the government's ability to notify the public across the entire country of expected flooding events and better manage ground and surface water resources. (ICR, p. 17) For both meteorology and hydrology the project exceeded the targets. While not formal targets, the ICR reported additional achievements directly linked to the PDO indicator. These achievements included data sharing mechanisms that were established between BMD, BWDB, and DAE, and forecasting products were published via multiple channels. In addition, all hydromet stations were integrated into centralized dashboards, and standard operating procedures were developed and implemented. Moreover, the project implemented data verification processes to ensure high-quality data and information were being produced and disseminated (ICR, p. 20). BWDB created a dynamic coastal flood inundation map and automated decision support tools.

The ICR's ToC adequately captured the causal chain and included assumptions. The project exceeded or achieved its output and outcome targets, demonstrating that it had strengthened Bangladesh's capacity to deliver reliable weather, water, and climate information services. The rating of the revised objective 1 is High.

### Revised Rating
High

## OBJECTIVE 2
### Objective

To improve access to weather, water, and climate information services by priority sectors and communities.

**Rationale**

The ToC in the ICR, p. 3 identified that the expected outcome was improved access to weather, water and climate information services by priority sectors and communities. The PAD identified several potential priority sectors such as agriculture, civil aviation, disaster risk management, water, fisheries, maritime activities, urban infrastructure services, and flood management. Given that data and information generated under PDO 1 extended beyond agriculture, it is not clear why other priority sectors were not identified in the results framework, creating a disconnect between PDO 1 and PDO 2 for non-agriculture sectors. The interview with the Task Team (August 19, 2025) confirmed that the civil aviation sector benefited from hydromet stations at three airports, and the disaster risk management sector also benefited from improved early warning systems and notifications of weather events, as well as flood forecasting.

The inputs included financing of the following activities in the agriculture sector: (i) development of the Bangladesh Agrometeorological Information System (BAMIS), (ii) agro-meteorological stations, soil moisture and temperature sensors, and installation of crop monitoring and remote sensing tools; (iii) information communication and technology (ICT) enhancements to expand data storage, processing, and dissemination capabilities, including web-based and mobile platforms tailored for farmers and extension services; (iv) capacity building activities included training farmers on using weather and climate information, and (v) and design of annual feedback surveys to refine advisories and ensure they remain relevant and actionable for farming communities (PAD, p. 52-57). The inputs related to the civil aviation and disaster risk management sectors for PDO 2 are the same as PDO 1.

The expected outputs were: (i) BAMIS developed, and agro-meteorological stations and sensors installed; (ii) web-based and mobile platforms developed, (iii) farmers trained in weather and climate information; and (iv) an annual feedback survey conducted. The outputs for civil aviation and disaster risk management sectors would be the same as PDO 1.

These outputs were expected to lead to outcomes such as farmers' feedback refining the type of information they need, and that they received timely and high-quality weather and climate information to make informed decisions on planting, fertilizer application, irrigation, harvesting, and adjusting crop patterns. The outcome for the civil aviation sector would be their ability to better direct incoming and outbound flights as well as cancel or redirect flights with adequate lead time based on forecasted meteorological events. The outcomes for disaster risk management professionals would be accessing more timely and refined forecasting information to properly inform the general population and prepare for forecasted events.

The result of these outcomes in turn expected to lead to the PDO outcome of farmers making improved farming decisions, resulting in higher yields or avoided losses; for the civil aviation sector the outcome would be reduced risk of accidents; and the disaster risk management sector would be informed decisions to avoid losses due to flooding contributing to a higher-level outcome of enhanced climate and disaster resilience.

The ToC's activities, outputs, and intermediate outcomes provide a logical causal chain that was sufficient to reach the PDO outcome target. The assumptions for PDO 2 were the same as PDO 1; however, they were less relevant for PDO 2. More applicable assumptions for PDO 2 would have been focused on the sector level.

**OUTPUTS**:

The project achievements at output level under this objective included:

- 487 Upazilas (i.e., 96 percent) with kiosks installed and receiving BAMIS information (Original target BAMIS is in place and Upazila Kiosks in 50 percent of locations) **(exceeded)** The BAMIS portal was established in 2019 to generate and disseminate agromet advisories. Agromet kiosks were installed in 96 percent of Upazilas (487 Upazilas out of 492) and are being operationalized to disseminate agromet advisories. The project installed 65 digital display boards at the district level that were operationalized for the dissemination of agromet advisories. In addition, 12 community radios stations were operationalized and provide agromet advisories five days a week for one hour to local farmers. This information has helped facilitate the exchange of information among DAE extensionist workers and farmers. All dissemination mechanisms receive agromet advisories through the BAMIS portal. (ICR, p. 33)
- Targeted weather and climate products were developed and tested (Original target was Customized Agro advisories; Improved Public Weather Systems (PWS); Quantitative Precipitation Forecasts and Estimates (QPF, QPE); Nowcasting) **(mostly achieved)** BMD improved its meteorological forecasts for the general public. BWDB improved its flood forecasting by expanding its model and the development of a decision support system to improve hydrological outlooks for the general public. DAE developed its agromet advisories for farmers that were disseminated through BAMIS, which logged 9.5 million views between 2019- April 2025. (ICR, p. 35). The ICR did not report on products for Nowcasting.
- 80 percent of 15,000 targeted groups receiving agromet information services of which 25 percent are female. (Original target was 70 percent of lead farmers were receiving agromet information services of which 40 percent were female) **(partially achieved)** The project reached 30,000 lead farmers from 15,000 farmers' groups with agromet information including special advisories through short message service (SMS) and IVR (Voice message) of which 25 percent of farmers in the DAE databased were female. Each farmer group has approximately two designated lead farmers that represent the group of farmers to DAE and were expected to disseminate information to the group. The ICR reported that the DAE was in the process of verifying the current distribution list and expanding it further to include key members of the community. Agromet services are being developed and delivered regularly as National, District and Special Bulletins. (ICR, p. 21) The interview with the Task Team confirmed that these figures are based on the database of farmers managed by the DAE. The ICR also reported that the BAMIS has over 9.5 million views since it went online in 2019, but it does indicate who was accessing the portal i.e., farmers or other stakeholders. This PDO outcome indicator is at the output level and does not measure outcomes such as how farmers are using the data to inform decisions around planting, fertilizing, irrigating, or harvesting.
- Systematic measurement of user satisfaction in place, to measure improvements in weather information service delivery: Establishment of a user satisfaction measurement system (Original target yes) (**achieved**) The ICR reported that for all three components, baseline, midline, and endline studies were completed and reports prepared. In addition, simplified survey tools were developed for all three implementing agencies, and DAE and BWDB implemented pop-up windows on their website to continuously receive user feedback. (ICR, p. 35) However, a key weakness of this indicator is that it is an output assigned to measure a PDO outcome. While establishing a user feedback survey is a positive development, the ICR lacks information on how and to what degree the information from these reports was used. Moreover, the ICR did not report any results that may have measured user perceptions about the services or if the users (e.g., farmers, or flood prone communities) made informed decisions based on the information generated by the new systems.

The ICR's ToC mostly captured the causal chain. In addition, the assumptions were less relevant for PDO 2. The project achieved or exceeded the output targets, and relied on satisfaction surveys as a proxy to measure outcomes. The quality of evidence at outcome level had moderate shortcomings; therefore, the rating for PDO 2 is Substantial.

**Rating**
Substantial

## OBJECTIVE 2 REVISION 1

**Revised Objective**
To improve access to weather, water, and climate information services by priority sectors and communities.

**Revised Rationale**
The ToC largely remained the same with some activities expanded at the second restructuring. Component A dropped operational research, satellite imagery, and some data sharing software, storm surge modeling, while Component B slightly reduced the number of hydromet-related monitoring stations that were installed. Community-based early warning activities were reduced in scale and the related indicator was dropped. Component C expanded the scope of activities to include support to agromet departments at two universities, upgrades to the agromet portal and decision-support systems, and new measurement stations. Dissemination of agromet services was enhanced through community radio, digital displays, and additional advisory content.

**OUTPUTS**:

The output level indicators for this objective in the results framework included:

- 65 Districts with Display boards and 487 Upazilas with kiosks installed and receiving BAMIS (Indicator and target were revised to BAMIS is in place and District display and Upazila Kiosks in 70 percent of locations) **(exceeded)** The BAMIS portal was established in 2019 to generate and disseminate agromet advisories. Agromet kiosks were installed in 99 percent of Upazilas (487 Upazilas out of 492) and are being operationalized to disseminate agromet advisories. The project installed 65 digital display boards at the district level (100 percent of districts) that were operationalized for the dissemination of agromet advisories. In addition, 12 community radios stations were operationalized and provide agromet advisories five days a week for one hour to local farmers. This information has helped facilitate the exchange of information among DAE extensionist workers and farmers. All dissemination mechanisms receive agromet advisories through the BAMIS portal. (ICR, p. 24)
- Targeted weather and climate products were developed and tested (Revised target was BMD: portal for improved public weather services dissemination established; BWDB: water resource advisories and hydrological outlooks; DAE: customized agro advisories) **(achieved)** BMD improved its meteorological forecasts for the general public. BWDB improved its flood forecasting by expanding its model and the development of a decision support system to improve hydrological outlooks for the general public. DAE developed its agromet advisories for farmers that were disseminated through BAMIS, which logged 9.5 million views between 2019- April 2025. (ICR, p. 35). The ICR did not report on products for Nowcasting. This indicator and target were modified at the second restructuring.

- 80 percent of the 30,000 targeted lead farmers in 15,000 targeted farmer groups receiving agromet information services of which 25 percent were female (Indicator and target were revised to 80 percent of lead farmers and 25 percent of which were female receiving agromet information services) **(achieved)** The project reached 30,000 lead farmers from 15,000 farmers' groups with agromet information including special advisories through short message service (SMS) and IVR (Voice message) of which 25 percent of farmers in the DAE databased were female. Each farmer group has approximately two designated lead farmers who represent the group of farmers to DAE and are expected to disseminate information to the group. The ICR reported that the DAE was in the process of verifying the current distribution list and expanding it further to include key members of the community. Agromet services are being developed and delivered regularly as National, District and Special Bulletins. (ICR, p. 21) The interview with the Task Team confirmed that these figures are based on the database of farmers managed by the DAE. The ICR also reported that the BAMIS has received over 9.5 million views since it went online in 2019, but it does not indicate who was accessing the portal, i.e., farmers or other stakeholders. This PDO indicator is at the output level and does not measure outcomes such as how farmers are using the data to inform decisions around planting, fertilizing, irrigating, or harvesting.
- Systematic measurement of user satisfaction in place, to measure improvements in weather information service delivery: Establishment of a user satisfaction measurement system (Original target yes) (**achieved**) The ICR reported that for all three components, baseline, midline, and endline studies were completed and reports prepared. In addition, simplified survey tools were developed for all three implementing agencies, and DAE and BWDB implemented pop-up windows on their website to continuously receive user feedback. (ICR, p. 35) However, a key weakness of this indicator is that it is an output assigned to measure a PDO outcome. While establishing a user feedback survey is a positive development, the ICR lacks information on how and to what degree the information from these reports was used. Moreover, the ICR did not report any results that may have measured user perceptions about the services or if the users (e.g., farmers, or flood prone communities) made informed decisions based on the information generated by the new systems.

The Task Team shared the endline survey, which had 2,708 respondents, of which 80 percent were farmers. The report also compared survey results from baseline and midline on selected indicators. The Task Team decided not to include the results in the ICR due to concerns about methodological differences between the surveys. Nevertheless, the report provides data points that give some insights into the potential outcome of the project, such as a satisfaction index among farmers regarding *access to* the agro-meteorological forecasts. The index improved between baseline (index value of 1.75) and endline (index value of 2.93). Likewise, the overall satisfaction index levels of respondents with agro-met services provided by DAE improved substantially between baseline (index value of 1.13) and endline (index value of 3.12). The endline report also indicated that the majority of farmers across six different regions reported they have enough time to make decisions to protect assets and crops as a result of agro-met information (ranging from 58 to 69.9 percent with the exception of one region that reported 30 percent.) There was no comparator from the baseline or midline for this indicator; therefore, it is difficult to glean insights on the outcome of project interventions. When asked about the satisfaction of the information provided by BMD, BWDM, and DAE, 73 percent of respondents said they were satisfied.

With respect to the usefulness of agromet information for crop production and irrigation planning, the endline results were mixed. The endline survey asked about agromet information being used for crop production planning, irrigation planning, crop management, crop collecting and processing, and crop pest and disease management. Of these categories, the majority of respondents across regions indicated that agromet information was useful for crop production planning (59.8 percent), irrigation planning (57.3 percent), and crop management (51.9 percent), with variation across areas. There was no comparator or control, and the report did not indicate any baseline values, limiting the interpretation of the project's impact. These surveys seemed to be a critical evaluation tool to gain insights into the effectiveness of the interventions, but the quality and comparability between surveys are an issue, resulting in a missed opportunity.

The ICR's ToC mostly captured the causal chain. In addition, the assumptions were less relevant for PDO 2. The project achieved or exceeded the output targets, and relied on satisfaction surveys as a proxy to measure outcomes. The quality of evidence at outcome level had moderate shortcomings. The rating for PDO 2 remained Substantial with moderate shortcomings.

**Revised Rating**
Substantial

## OVERALL EFFICACY

**Rationale**
The achievements for PDO 1 output indicators were not reported on three of the five indicators, and hence not achieved. These three indicators and targets were revised at the second restructuring. Two output indicators were either exceeded or partially achieved. The outcome indicator was not reported on and hence not achieved, and was also revised at the second restructuring. The rating for the original PDO 1 is Modest. The achievements for PDO 2 at the output level are clear; however, the evidence at outcome level had moderate shortcomings and resulted in a rating of Substantial. The overall efficacy rating is Modest.

**Overall Efficacy Rating**
Modest

**Primary Reason**
Insufficient evidence

## OVERALL EFFICACY REVISION 1

**Overall Efficacy Revision 1 Rationale**
Under Revision 1, PDO 1 was upgraded to High, while PDO 2 remains Substantial. These combined ratings resulted in a **Substantial** overall rating.

**Overall Efficacy Revision 1 Rating**

Substantial

## 5. Efficiency

**Ex Ante Economic Efficiency**: The project conducted a benefit-cost analysis (BCA) to determine the economic feasibility of the project and used industry standards approaches at appraisal, which were: i) benchmarking, and ii) benefit transfer (BT) and value of statistical life (VSL). In the first approach, the benefit streams were: benchmarks for the average annual direct economic losses caused by hydro-met hazards as a share of gross domestic product (GDP); and the potential changes in annual losses with modernization of hydro-met services as a percentage of the total level of losses. (PAD, p. 89). The second approach values nonmarket goods and services known as benefits transfer (BT). For Public Weather Service (PWS) benefits the project undertook a benefits transfer to Bangladesh using value estimates from a study of willingness to pay (WTP) for improved weather services in Mozambique (PAD, p. 91). For an agro-met decision support system (DSS) values, the project undertook a benefits transfer to Bangladesh using value estimates from Zimbabwe for improved seasonal forecasts. For the value of early warning systems, the project undertook a benchmarking type evaluation using the value of statistical lives saved (VSL) for the reduction in hazardous hydro-meteorological-related fatalities.

The economic internal rate of return (EIRR) of the project at appraisal was 75.07 percent, and a net present value (NPV) of US$414,319,016 discounted at 12 percent. The benefit-cost ratio (BCR) was estimated at 2.67. (PAD, p. 98). The ICR recalculated the EIRR and NPV using the assumptions at appraisal and could not replicate the results. The ICR estimated an EIRR of 25.9 percent with an NPV of US$239.7 million at a discount rate of 12 percent and a BCR of 2.0, which is significantly lower than at appraisal.

**Ex Post Economic Efficiency**:

The economic analysis at project completion used the same approach and benefit streams as identified at appraisal and modified a few assumptions that were no longer considered good practice, such as excluding depreciation costs. The project at closing had an EIRR of 53.7 percent and an NPV of US$394.8 million, using a discount rate of 12 percent, which is in line with the World Bank economic guidelines for lower-middle-income countries in South Asia. (ICR, p 35) Sensitivity analysis estimated an NPV of US$1,121.6 million using a discount rate of 6 percent.

**Operational and Administrative Efficiency**: The project was approved on June 3, 2016, and became effective on May 4, 2017. The project closing date at appraisal was December 31, 2022, but the actual closing date was extended by 23 months until November 30, 2024, for a total implementation period of 8 years and 6 months. The project team effectively managed implementation and factors outside of their control, such as the COVID-19 pandemic, and the 2024 political crisis.

**Conclusion.** The project's ex-post NPV was higher than at appraisal using the recalculated figures, based on a 12 percent discount rate, and was positive using a 6 percent discount rate. The project’s ex-post EIRR was higher than at appraisal (53.7 vs 25.9 percent). The project achieved or exceeded its targets, doing so at a reduced cost (US$128 million vs. US$83.5 million actual); however, the project was extended by 23 months, adding to operational inefficiencies. As a result, the project’s efficiency is rated Substantial.

## Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

| | Rate Available? | Point value (%) | *Coverage/Scope (%) |
|---|---|---|---|
| Appraisal | ✓ | 25.90 | 0<br>☑ Not Applicable |
| ICR Estimate | ✓ | 53.70 | 0<br>☑ Not Applicable |

* Refers to percent of total project cost for which ERR/FRR was calculated.

## 6. Outcome

The project’s relevance was rated as High. The overall outcome, accounting for the split evaluation, was rated Satisfactory, reflecting moderate shortcomings in the Project's achievement of its objectives and its efficiency, and the extended period of implementation. The table below shows a comparison between the original objectives and the first material revisions.

| | **Original Objectives** | **Objectives after April 2020 Revision 1** |
|---|---|---|
| Relevance | Substantial | Substantial |
| PDO Objective 1 - To strengthen Bangladesh’s capacity to deliver reliable weather, water and climate information services | Modest | High |
| PDO Objective 2 – To improve access to weather, water and climate information services by priority sectors and communities. | Substantial | Substantial |
| Efficacy | Modest | Substantial |
| Efficiency | Substantial | |
| **Outcome** | Moderately Satisfactory | Satisfactory |
| Numerical value of outcome rating | 4 | 5 |
| Amount disbursed (out of US$83.50 million total disbursed) | US$22.56 | US$60.94 |
| Share of disbursements | 27% | 73% |
| Weighted value of outcome ratings | 1.08 | 3.65 |
| Final Outcome rating | 4.73 rounded to 5 is Satisfactory | |

### a. Outcome Rating

Satisfactory

## 7. Risk to Development Outcome

The risks to the development outcomes are primarily linked to: (i) financial sustainability to cover operating and maintenance costs,  (ii) institutional support to continue collaboration and coordination between agencies to share data, and (iii) technical aspects of the information infrastructure to collect data. The production of information is not only dependent on the operation and maintenance of new instruments, but also on replacement when damaged or destroyed due to weather events or human factors. Mitigating factors for financial sustainability are the negotiation of warranty periods and annual maintenance service contracts that were put in place to ensure short-term operation. The ICR reported that the government allocated additional operating and maintenance budget for the three agencies, which is positive for the sustainability of the new systems. Continued budget allocation will be critical, but current allocations are a positive indicator.

In addition, the project mitigated sustainability issues through the institutional strengthening efforts and formalized ownership transfer of hydromet equipment and services. The Project built long-term capacity within BMD, BWDB, and DAE, improving the pipeline of trained professionals through their academic institutions, and strengthening the integration of data and forecasting into decision-making processes. The integration of the systems and the increased dependency on each agency to produce, share, and analyze information strengthens the overall enabling environment and increases accountability to mitigate both institutional and technical risks.

## 8. Assessment of Bank Performance

### a. Quality-at-Entry

The project was highly relevant and aligned with national priorities related to addressing the challenges to providing timely and accurate weather, climate, and water information to inform decisions in different sectors such as agriculture, disaster risk management, and urban infrastructure and flood control.

The design of the project was led by the World Bank and drew upon global and regional lessons learned from hydromet projects such as transitioning from focusing on infrastructure to the delivery of hydromet services. The financing of this project was contingent on Bangladesh being part of a consolidated regional program where similar projects were implemented in Nepal and Bhutan.

The PAD was explicit that the capacity in the country for weather and flood forecasting was low, and many systems were manual. The project rightly anticipated a longer timeframe for implementation, which was six years, particularly given the complexity of the design, the required integration of data and systems, and collaboration between agencies. Given the lower capacity and the proposed technological transition to automated and integrated systems that require close collaboration and coordination between agencies, the project was overly ambitious with its scope and reach, and the changes it expected from implementing agencies.  The ICR, p. 13, noted that the project required a high degree of inter-institutional coordination and that the initial design underestimated the challenges of aligning the agencies under a cohesive implementation framework, requiring further adjustments and time to build trust and conditions for effective collaboration. Delays in formalizing institutional collaboration agreements between BMD, BWDB, and DAE resulted in fragmented early implementation. This slowed progress on data-sharing mechanisms, co-location of observation networks, and system integration. The reflection in the ICR highlights that moving an organizational ecosystem from low to high capability in a short timeframe poses significant risks, given that human systems are conservative and change happens slowly as stakeholders hold onto the familiar processes and associated competencies.

A positive aspect of the design was the emphasis on building state capacity for forecasting and the explicit intention to institutionalize capacity-building efforts through academic institutions and specifically undergraduate and graduate programs. While the project did provide traditional technical training, it made the extra effort that most projects do not make and attempted to institutionalize capacity-building mechanisms to ensure sustainability.

The detailed nature of the PAD demonstrates the high degree of thought that went into the technical design and implementation arrangements, as well as the risks as noted by the Task Team at appraisal and the need for intensive supervision.

### Quality-at-Entry Rating

Satisfactory

## b. Quality of supervision

The World Bank provided close technical support throughout the project implementation, conducting 16 formal supervision missions – averaging about two per year. In addition, the Task Team conducted technical missions to support the client. The project had co-Task Team Leader (TTL) arrangements, which changed three times during the life of the project. In total, there were 7 different TTLs who oversaw the project.

The Task Team was responsive to the government requests to make changes to the project, cancel activities that were no longer aligned with government priorities, or were not advancing. These changes were implemented through four restructurings. Moreover, the Task Team provides substantial support on procurement matters, particularly around the complex bidding processes, and provided international technical expertise on technical issues regarding equipment and systems as well as environmental, social, and fiduciary aspects. The Task Team updated results framework indicators and targets, in some cases improving the quality of the indicator and other cases lowering the bar. Throughout the life of the project the Task Team did not address the weakness in measuring the impact of PDO 2 which is a significant shortcoming.

The World Bank leveraged global knowledge from across its hydromet portfolio with a focus on South Asia/India, to help Bangladesh adopt good practices. This engagement strengthened institutional learning, technical competency, and sustainability, ensuring the Project's outcomes extended beyond immediate outputs. The inputs from the three implementing agencies in the ICR underscore the quality of the assistance provided by the World Bank Task Team during implementation only noting that the procurement processes were complicated and administrative approvals could have been expedited in some cases. (ICR, p. 34) One of the key weakness during implementation was related to not improving the ability of the project to measure impact of PDO 2.

### Quality of Supervision Rating
Satisfactory

### Overall Bank Performance Rating
Satisfactory

## 9. M&E Design, Implementation, & Utilization

### a. M&E Design

The results framework partially captured the outputs and outcomes for PDOs 1 and 2. The results framework indicators for PDO 1 were more complete, but could have tried to capture the outcomes of coordination and collaboration between agencies, even in a qualitative manner. PDO 2 was focused on access to information at the beneficiary level. The PDO indicators could have included changes in satisfaction levels with access, timeliness, and utility of the information to the beneficiary. Likewise, the project lacked an indicator on the number of DAE extension agents trained in the interpretation of the new data and some metric via DAE extension agents on the number of farmers they trained on utilization of the data.

The project was intentional about measuring sustainability, which was a lesson learned from other hydromet projects; therefore, the inclusion of an indicator on O&M budget as well as capacity building to build a pipeline of professionals were positive aspects. The ICR noted that more quantitative and time-bound indicators, particularly for accuracy improvements and lead times, would have further enhanced the results framework by focusing on sectors and communities in the intermediate results indicators.

### b. M&E Implementation

The project carried out three beneficiary surveys during implementation, which offered the opportunity to make midcourse corrections but also measure the impact of the project interventions. The interview with the Task Team (August 19, 2025) noted the methodological challenges between the surveys, limited the utility of the information for decision making, which created a missed opportunity to measure the project's impact.

The project's ISRs systematically updated the results framework indicators during implementation to reflect progress. The implementing agencies simplified the user satisfaction feedback survey and incorporated it into their online portals so that users could give real-time feedback on the information that is shared. These online surveys remain active and have been institutionalized.

During implementation, the Task Team proactively updated the results framework indicators during restructurings, in some cases improving the quality of the indicator and other cases lowering the bar. The issues around measuring outcomes, particularly for PDO 2 were never resolved during implementation which was a missed opportunity. Likewise, the complexity of the beneficiary surveys could have been mitigated with adequate World Bank support, increasing the utility of the surveys and the ability to measure the project's impact.

The ICR reported that delays in finalizing key procurement contracts initially affected the availability of data, and that although baseline studies were delayed and data harmonization across BMD, BWDB, and DAE faced challenges, the system improved over time and real-time monitoring tools. (ICR, p. 15)

### c. M&E Utilization

The data from the M&E system informed decision-making and enabled course corrections. The ICR noted that regular or real-time insights into the state of the observation networks, including downtimes, informed decisions about maintenance and contract management.

While detailed beneficiary baseline, midline, and endline surveys were conducted, they appeared overly complex and difficult for the implementing agencies to manage. This resulted in a simplified version of the beneficiary feedback survey being instituted at the end of the project, which is available on each agency platform, offering the opportunity to improve services based on feedback. Moreover, the complexity of the surveys, methodological challenges, and quality issues resulted in the ICR not reporting on findings from the endline report, leaving limited insights into the outcomes of the project at the end-user level (farm level). Likewise, there were no insights gleaned from other priority sectors' users.

### M&E Quality Rating

Substantial

## 10. Other Issues

### a. Safeguards

**Environmental:** The project was classified as a Category B Project, given the nature and scale of its activities, and triggered the following environmental Safeguard Policies: OP 4.01 Environmental Assessment, and OP 7.50 Projects on International Waterways. At appraisal, the Environmental and Social risk rating was considered Moderate, and compliance with most of the policies was rated as ‘Satisfactory’ during the life of the project, with some implementation issues. The project developed environmental management plans (EMP), including e-waste management plans, which were integrated into procurement contracts. (ICR, p. 15-16).  The ICR noted that the overall safeguards rating and OP 4.01 were downgraded to ‘Moderately Satisfactory’ between the Implementation Status and Results Reports (ISR) 7 and 14, due to the pending disclosure of screening sheets, noncompliance with EMP implementation for three work packages, inadequate due diligence on physical works, and a vacant environmental specialist position.  To mitigate these, the Task Team worked with the client to improve documentation, internal monitoring, and compliance, and conducted a safeguard clinic to strengthen PIU capacity. As a result, the PIU corrected non-compliance issues, and the overall implementation performance was upgraded to satisfactory.

**Social:** The project triggered OP 4.10 Indigenous Peoples and OP 4.12 Involuntary Resettlement 4.12. All project sites were screened, and the screening reports confirmed that there were no impacts on land acquisition, resettlement, or Indigenous Peoples. There were no significant social risks reported during the life of the project, and no concerns about labor influx were identified in any of the three components. Most of the construction activities were related to rehabilitation or refurbishment. The project established several local Grievance Redress Committees (GRC), and the Bank's environmental and social team provided training sessions to all implementing agencies on screening, grievance management, code of conduct, occupational health and safety, and COVID-19 protocols. The implementing agencies followed by conducting a national safeguard workshop for those involved with the project. There were 14 grievances that were filed, and the ICR reported that all were addressed, and that the performance of the social safeguards was satisfactory throughout the project period.

### b. Fiduciary Compliance

**Financial management**: The project's financial management was generally satisfactory. The last Implementation Status and Results Report filed before project closing stated the project remains compliant with timely submission of interim unaudited financial reports, annual audit reports with unqualified audit opinions, and timely resolution of audit observations. Initially, the Project experienced staffing challenges, fund disbursement, and financial tracking issues due to delays in procurement approvals and slow budget execution. Over the life of the project, these issues were resolved, and the PIU was supported with capacity-building efforts and close Task Team supervision. The project closed with a satisfactory rating for financial management.

**Procurement:** The project faced procurement challenges throughout its duration and was rated moderately satisfactory at project close. The ICR noted that the complexity of hydromet equipment procurement, international vendor engagement, and technical specifications led to multiple revisions and delays, which were further complicated by COVID-19. In addition, some contracts required rebidding due to non-compliance with specifications, causing further disruptions. Contract management issues also occurred, and the project implementation unit had challenges in processing amendments in a timely manner. The Bank's task team aimed to mitigate these issues with streamlined procedures and by providing technical and procurement support.

### c. Unintended impacts (Positive or Negative)

None

### d. Other

None

## 11. Ratings

| Ratings | ICR | IEG | Reason for Disagreements/Comment |
|---|---|---|---|
| Outcome | Satisfactory | Satisfactory | |

| | | |
|---|---|---|
| Bank Performance | Satisfactory | Satisfactory |
| Quality of M&E | Substantial | Substantial |
| Quality of ICR | --- | Substantial |

## 12. Lessons

**Connecting hydromet services to a sector application such as agriculture can improve the ability to measure the outcomes of improved forecasts.** This project made an explicit effort to improve and tailor hydromet information to the agriculture sector resulting in the generation of agromet information. The project invested in developing the agriculture sector capacity to ensure that agromet information reached the end users i.e., farmers. Qualitative assessments from the endline indicated that additional efforts are needed to train agricultural extension workers and farmers on how to best use agromet information with the learning being that access to information is a necessary but insufficient condition for end users to systematically use it to inform farming decisions that will increase productivity or minimize risk of loss of assets and crops. Moreover, to measure the outcomes of access to information and how that information is utilized at the sector level, reliable, valid, and practical metrics and methods are needed throughout the life of the project.

**Linking capacity building interventions to academic institutions and through peer-to-peer learning can be a mechanism to ensure sustainability.** This project explicitly aimed to support Bangladeshi academic institutions at the undergraduate and graduate levels to strengthen the country's capacity to deliver reliable hydromet information and services. While this project did include specific technical training for agency staff, from the outset, the project had a vision of sustainability through the linkages with academic institutions. Moreover, the project invested in regional coordination and peer-to-peer learning with bordering countries, allowing Bangladeshi agency staff to learn from and share their experiences with counterparts in other countries. Both interventions appear to be an effective way to strengthen capacity beyond traditional technical training financed by the project.

**If investments in change management interventions are made in addition to integrated systems and formal policies, this can improve interagency coordination and collaboration in Hydromet projects.** Hydromet projects and integrated data management systems are inherently complex because they depend on multiple agencies to generate, share, and use information in real time. Experience from this project shows that although investments in technology, integrated systems, and legal frameworks are necessary, they are not always sufficient to ensure timely and effective interagency collaboration. A major barrier lies in organizational culture and the level of trust between agencies, which can limit the willingness to share data. While new technology and policies that clarify responsibilities and data-sharing protocols are important, this project's initial difficulties highlight that future initiatives could benefit from incorporating change management interventions. Such interventions could focus on building trust and fostering new organizational cultures that enable effective coordination and cooperation. (ICRR author)

**Building trust in new hydromet systems by implementing agencies can be done by parallel testing with legacy systems**. Agency staff who are accustomed to existing systems and have competency in those systems may resist migrating to more complex automated systems that may be beyond their existing competencies. As a result, agency staff may not trust the information, data, or analysis generated by hydromet systems. In an effort to mitigate this risk, the project ensured parallel testing phases of the new systems alongside the old ones to allow agency staff to observe differences and benefits of the new systems. This also allowed staff to cross-check results from hydromet services with existing manual systems. Investing time and resources in this transition and migration may increase ownership by agency staff. In addition, similar efforts are likely needed to help end-users transition from existing information formats to new data with revised information bulletins or electronic channels and ensure trust in the new system.

**Including operation and maintenance service contracts into procurement strategies can enhance the sustainability of hydromet infrastructure.** Many hydromet systems fail post-project due to a lack of maintenance funding, trained personnel, and structured operational support. Agencies often face challenges sustaining critical infrastructure, and these challenges lead to equipment failures and service disruptions. A lesson from this project to mitigate these issues is that future projects can embed hydromet systems into core operational frameworks. This includes pre-negotiating, during initial procurement, and signing annual maintenance contracts before the warranty period ends. Moreover, mainstreaming O&M in regular government budgets, implementing maintenance tracking software for automated issue reporting, and ensuring spare parts are included in annual maintenance contracts are established. (ICR, p. 20)

## 13. Assessment Recommended?

No

## 14. Comments on Quality of ICR

The ICR provides a detailed overview of the project. The narrative is generally in line with the TOC, the ratings, and available evidence, with some shortcomings. The ICR is candid, accurate, and generally results focused. The report is concise, follows the majority of the guidelines on the content provided, but did not make an attempt to triangulate data to reach conclusions for PDO 2. The quality of evidence and analysis is aligned to the messages outlined in the ICR, though there are moderate shortcomings in the completeness of data and information. The ICR's lessons are clear, useful, and based on evidence outlined in the ICR. The quality of ICR rating is Substantial.

### a. Quality of ICR Rating

Substantial