



Report Number: ICRR0023443

1. Project Data

Project ID

P129633

Project Name

JM Climate Data and Information Mngmt

Country

Jamaica

Practice Area(Lead)

Environment, Natural Resources & the Blue Economy

L/C/TF Number(s)

TF-A0433

Closing Date (Original)

30-Apr-2021

Total Project Cost (USD)

6,656,387.91

Bank Approval Date

28-Jul-2015

Closing Date (Actual)

31-Aug-2022

IBRD/IDA (USD)
Grants (USD)

Original Commitment

6,800,000.00

6,800,000.00

Revised Commitment

6,656,387.91

6,656,387.91

Actual

6,656,387.91

6,656,387.91

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2. Project Objectives and Components

a. Objectives

According to the Project Appraisal Document (PAD) (p. 7) and the Financing Agreement of October 2, 2015 (p. 6) the objective of the project was “to improve the quality and use of climate related data and information for effective planning and action at local and national levels”.

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



No

c. Will a split evaluation be undertaken?

No

d. Components

The project included four components:

Component 1: Upgrading hydro-meteorological data collection, processing and forecasting systems (appraisal estimate US\$4.01 million, actual US\$3.7 million): This component was to finance activities to upgrade existing and/or provide new systems for hydro-meteorological data collection, processing and forecasting, including: i) supplying and installing equipment for sea-level monitoring, meteorological, hydrological, and agro-meteorological activities, provision of training for staff of Meteorological Service of Jamaica (MSJ), Water Resources Authority (WRA), Rural Agricultural Development Authority (RADA) and voluntary observers of the monitoring network on operation and maintenance of the equipment; and purchasing of spare parts; ii) replacing the outdated weather Doppler radar, including rehabilitation of the Cooper's Hill station facility and training of MSJ staff in operation and maintenance of the new radar; iii) strengthening the capacity of staff of MSJ, WRA and RADA on data management, quality assurance of data collection, processing, and weather forecasting through provision of consulting services and training.

Component 2: Climate Resilient Planning and Hydro-meteorological Information Services (appraisal estimate US\$1.39 million, actual US\$1.01 million): This component was to finance i) updating the downscaled high resolution climate change scenarios and using said scenarios to prepare the State of the Jamaican Climate 2015 and 2019 reports (including the summary for policy makers); and provision of training on sector specific climate resilient planning based on said scenarios; ii) preparing national vulnerability assessments in selected priority sectors to complement the modeling outputs mentioned above and to define priorities and actions on climate resilience; iii) preparing detailed health sector vulnerability assessments and costed resilience strengthening plans to assist health facilities and operations withstand and respond to climate related hazards; iv) carrying out a community-based risk profiling to assess the communities' vulnerability to various climate related hazards and developing early warning messaging for vulnerable groups; and v) upgrading the multi-agency climate and natural risk data and information sharing system to integrate climate data and making the data user friendly and accessible to the public.

Component 3: Climate Change Education, Awareness and Behavior Change (appraisal estimate US\$0.73 million, actual US\$0.74 million): This component was to finance i) carrying out climate change information, education and communication (IECC) campaigns, and ii) conducting targeted attitude and behavioral change initiatives to address climate change adaptation needs and influence behavioral change of targeted groups, as part of the Communications Strategy Action Plan developed under the Pilot Program for Climate Resistance (PPCR) Phase 1.

Component 4: Project Management, Monitoring and Evaluation (appraisal estimate US\$0.68 million, actual US\$0.71 million): This component was to provide support to the Planning Institute of Jamaica (PIOJ) for Project implementation, including overall technical management, financial management, procurement, environmental and social safeguards implementation, monitoring and evaluation of Project activities, data collection, supervision of works through the provision of consulting services, non-consulting services, goods, and operating costs.



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

Project Cost: The project was estimated to cost US\$7.50 million. Actual cost was US\$7.35 million.

Financing: The project was financed by a Trust Fund (TF-A0433) in the amount of US\$6.80 million of which US\$6.65 million was disbursed.

Borrower Contribution: The Borrower was to make in-kind contributions in the amount of US\$700,000 which materialized.

Dates: The project was restructured three times:

- On May 2, 2019, the project was restructured (level 2 restructuring) to increase the number of PDO indicators from three to four and reduce the number of intermediate outcome indicators from eight to six and revise them to ensure that all aspects of the PDO were supported by appropriate indicators.
- On October 6, 2020, the project was restructured (level 1 restructuring) to: i) extend the project's closing date from April 30, 2021 to April 30, 2022, to allow for implementation of activities, which were delayed as a result of the COVID-19 pandemic; ii) reallocate funds between disbursement categories; and iii) add additional activities as a result of savings that the project accrued (US\$0.7 million). These activities included: installation of 10 additional AWSs and the installation of previously procured 5 AWSs by the Meteorological Service of Jamaica to further support expansion and coverage of Jamaica's hydromet network, procurement of 3 Aqua-calcmeters for the Water Resource Authority (WRA), solarization of the radar station and a number of AWSs to facilitate real time data transmission, procurement of two sea level tide gauges, and training in Doppler Radar data and products to facilitate uptake in data use. In addition, the implementation of some of the recommendations of the Health Sector Vulnerability Study (e.g., in terms of improved emergency water supply, improved emergency energy systems, and strengthening of emergency operation center procedures) were to be carried out; iv) revise the Results Framework to reflect the additional activities stated above; and v) modify risk ratings.
- On April 28, 2022, the project was restructured (level 1) to extend the closing date by four months from April 30, 2022, to August 31, 2022, to allow for the completion of training of staff and other implementation activities which had been delayed due to the malfunctioning of the Doppler Radar.

3. Relevance of Objectives

Rationale

Regional/Sector Context: According to the PAD (p. 11) natural disasters and vulnerability to climate change were identified as major challenge to economic growth of Jamaica. Due to the country's location in a region of traditionally high hurricane activity and Jamaica has been experiencing frequent direct impacts and indirect storm damages. The damage and losses resulted in a heavy fiscal burden, increased indebtedness, and redirection of resources from medium-term development plans. At the time of appraisal, about 82 percent of the population lived in coastal towns and communities located within five kilometers of



the 1,022 km long coastline. About 75 percent of productive industries and service sectors were located in the coastal zone and contributed an estimated 90 percent to the country's Gross Domestic Product (GDP). Location of major infrastructure along the coast increased the vulnerability to natural hazard impacts and not sufficiently managed urban growth contributed to unplanned settlements in marginal and environmentally sensitive lands in flood plains and on unstable slopes. In 2013, the Intergovernmental Panel on Climate Change conducted projections, which found that small island countries such as Jamaica will be severely threatened by the direct and indirect impacts of climate change. It was estimated that Jamaica had a high economic risk exposure to two or more natural hazards.

Jamaica was one of 18 countries participating in the Pilot Program for Climate Resilience (PPCR). The PPCR was a funding window of the Climate Investment Funds (CIF) and aimed to help developing countries integrating climate resilience into development planning, providing incentives for scaled-up action, and initiating a shift from "business as usual" to broad-based strategies for achieving climate resilience at the national and regional levels. As Phase I of the PPCR, Jamaica developed the Strategic Program for Climate Resilience (SPCR) to assess sectoral vulnerabilities to climate impacts, identify priority sectors and action plans, and propose investment components for PPCR finance. This project was the first of the three investment projects identified under the SPCR.

Alignment with the government's Strategy: The objective of the project supported the government's Vision 2030 Jamaica National Development Plan, specifically Outcome 14: hazard risk reduction and adaptation to climate change. Also, the objective of the project is in line with the five thematic areas of the SPCR: i) mainstreaming climate change into Jamaica's planning and policy formulation processes; ii) strengthening institutional arrangements to ensure the effective mainstreaming of climate change; iii) building capacity for climate data management, forecasting and planning; iv) facilitating sectoral adaptation measures; and v) climate change education and awareness.

Alignment with the Bank's Strategy: The objective of the project was in line with the Bank's most recent Country Partnership Strategy (FY2014-2017) and its outcome 8 "improved institutional capacity to plan and respond to climate change events and natural disasters, especially i) building institutional capacities to identify, assess and understand disaster and climate risks in terms of their economic and fiscal impacts. In 2022, the Bank conducted a Systematic Country Diagnostic, which emphasized the importance of reducing vulnerability and improving resilience to shocks as one the major challenges to overcome.

The PDO was stated at the appropriate level to address the development problem. Overall, the relevance of objectives was **"high"**.

Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1



Objective

To improve the quality and use of climate related data and information for effective planning and action at local and national levels

Rationale

The three parts of the objective (“quality”, “use”, and “effective planning and action”) were interlinked. Therefore, this review assesses them together as one objective.

The project's **theory of change** assumed that project **inputs/activities** such as supplying and installing equipment for sea-level monitoring, hydrological and agro-met activities and training for staff and volunteers being provided as well as replacing the weather Doppler radar, rehabilitating the station facility, and training personnel were to result in the **outputs** of meteorological, hydro-met and agro-met equipment being operational and the Doppler radar being fully operational. Also, the **theory of change** envisioned that project **inputs/activities** such as strengthening the capacity of government agencies' staff on climate data management, quality assurance of data collection, processing and weather forecasting as well as upgrading multi-agency climate and natural risk data and information sharing system to integrate climate data and providing technical assistance to promote climate change awareness were to result in **outputs** such as technical staff being trained in development, dissemination, and use of weather, climate and hydrological data. Also, the **theory of change assumed** that the activities mentioned above were to result in multi-agency climate and natural risk data and information sharing system being updated and climate change information, education and communication campaigns being conducted.

These outputs were to result in the **outcome** of quality of climate data and use of climate related data and information being improved. The **theory of change assumed** that improving quality of climate data and use of climate related data and information may result in effective planning an action. This assumption seems reasonable. The project's theory of change was adequate and logical without apparent logical gaps.

Outputs:

- 200 meteorological, hydromet and agromet equipment were operational, exceeding the original target of 120 equipment and achieved the revised target of 160 equipment. This equipment included: i) three sea level tide gauges (two of which were procured as additional activity) were procured to measure the rise of sea level monitored by MSJ; ii) 72 Automatic Weather Stations (AWS) (of which 17 AWS were procured as an additional activity) to allow for real time weather reporting; iii) 20 soil moisture probes for MSJ and 12 for WRA were procured and installed which enabled more informed irrigation decisions on when to irrigate, how much water must be supplied to avoid low-quality production, and when to plan for harvesting; iv) 57 hydro-met stations; vi) 30 others (groundwater probes etc.); and v) Six real time systems for MSJ stations in remote locations.
- The Doppler Radar was solarized, exceeding the target of having reached step 4 “radar being operational”. Since the process of the radar procurement and installation consisted of several important steps, in order to capture the progress and stages of procurement, installation and operationalization of the radar, the unit of measurement for this indicator was changed from “Doppler Radar being installed and operational” to a number which included a scale from 0 to 5 with the following meaning: 0 – radar is obsolete, 1 - specifications are defined, 2 – supplier is identified; 3 – radar is procured and installed, 4 – radar is operational, 5 – radar is solarized.



- One doppler radar was procured and installed not achieving the original target of four and revised target of 5. According to the June 14, 2023 teams' email, as mentioned above in the previous bullet, scale of 1-5 was adopted to account for various stages of the operationalizing of the radar – the biggest procurement item of the project.
- Accurate and high resolution national and sectoral climate change scenarios were developed, achieving the target.
- 380 technical staff and other personnel were trained in development, dissemination, and use of weather, climate and hydrological data, exceeding the original target of 300 staff and personnel and achieving the revised target of 380 staff and personnel.

Outcomes:

- The quality of weather forecasts decreased from 66 percent in 2015 to 64 percent in 2022, not achieving the target of 75 percent. According to the ICR (p. 29) the data source used to assess the baseline for this indicator (incomplete radar imagery) was different from the data source used for the verification of the end results (broader coverage and real Automatic Weather Station (AWS) data). Verification of forecasts required the matching of a forecast and an observation for a particular time and location. Before 2019 (when the baseline was estimated) the verifications utilized radar images while after 2019, verifications used actual measured rainfall values from AWSs for the observation data. Therefore, the baseline information was incomplete as it did not rely on accurate and objective observation data. As a result, it is not possible to assess whether the target of this indicator was achieved. According to the Bank team (May 1, 2023) if the same data existed at the time of appraisal that exists now as a result of the project, the baseline would have been lower and there would have been the same range of improvement as envisioned in the Results Framework.
- Nine targeted technical implementing agencies used improved climate data and information services, exceeding the original target of seven agencies and the revised target of eight agencies. The entities were Meteorological Service Jamaica (MSJ), Water Resources Authority (WRA), Ministry of Health and Well Being (MOHW), Climate Change Division (CCD), Office of Disaster Preparedness and Emergency Management (ODPEM), National Spatial Data Management Division (NSDMD), Rural Agricultural Development Authority (RADA) and Planning Institute of Jamaica (PIOJ).
- Six targeted vulnerable groups within 14 target communities had access to early warning messaging, achieving the target of six groups. These six vulnerable groups were living in unplanned settlements in hazard-prone locations and were fisher folk, farmers, the disabled, elderly, pregnant women, and children.
- 14 community disaster risks management plans were prepared through focus group sessions with representatives of the targeted groups. This outcome did not have a target.
- Six instruments for climate planning and action were informed by improved climate data and information, exceeding the original target of four instruments and the achieving the revised target of six instruments (i) 2015 Status of Jamaica Climate Report (SOJC); ii) Vulnerability Assessment (VA) in Health sector (15 facilities assessed and recommendations made to resilience and disaster preparedness); iii) Action plan from VA in Health completed (actions Water supply systems and back



power supplies for Health Facilities being implemented); iv) SOJC 2019 prepared and published; v) investment into IT infrastructure by National Spatial Data Management Division. The project completed the investment into the node including improvement of bandwidth to 50mbps; and vi) 14 Community Risk Profiles prepared.

- The percentage of meteorological, hydro-met and agro-met stations that were reporting data in real time and met quality standards increased from 15 percent in 2015 to 54.5 percent in 2022, exceeding the target of 30 percent of stations.
- The 2012 Knowledge, Attitude, Practice and Belief (KAP) survey found that 66 percent of the Jamaican population recognized the term “climate change”. The project carried out climate change information, education, and communication campaigns to educate the public on the link between the impact of climate events on specific livelihoods in support of adaptation, sensitization, and activities in sub-sectors. As a result, in 2021, the same survey found that the percentage of the population recognizing and understanding the term “climate change” increased to 87.20 Percent, achieving the target of 86 percent.

The project was able to achieve or exceed all output and outcome targets. It is not entirely clear to what extent the project was able to improve the quality of weather forecasts due to measurement issues. Taking everything together, the achievement of the objective was **Substantial**.

Rating

Substantial

OVERALL EFFICACY

Rationale

The project was able to upgrade existing systems and provide new systems for hydro-meteorological and agro-meteorological data collection and processing of improved climate data and information. It is not entirely clear to what extent the improvement of quality of weather forecasts was achieved given that the baseline and target of the respective PDO indicator were not comparable. The project was able to improve the use of climate data and information and the purchase of equipment and increased technical capacity allowed the government to integrate climate resilience into its planning. Taking everything together, the project's efficacy rating was **Substantial**.

Overall Efficacy Rating

Substantial

5. Efficiency



Economic Efficiency:

Ex-ante.

The PAD (p. 61) conducted a traditional economic analysis. It defined the benefits of the project as the following: i) benefits of improved forecasts, and associated early warning systems, of extreme meteorological hazards; ii) benefits to enterprises of improved forecasts of routine climate and dissemination of these forecasts; iii) benefits to households of improved forecasts of routine climate and dissemination of these forecasts. Estimates of all three classes of benefits were derived using benefits transfer given the absence of benefits studies for Jamaica itself. Because of uncertainty about the suitability of the estimates transferred, the values of these estimates were varied as part of a sensitivity analysis. To assess the robustness of the conclusions drawn from this analysis, a variety of sensitivity analyses are conducted using different time horizons (five, 10, 15 and 20 years); alternative real discount rates (four percent, 10 percent, and 15 percent), alternative values of the transferred benefits estimates; alternative assumptions about the increase in expected losses from extreme meteorological hazards over time due to climate change; and alternative assumptions about adaptation by households and enterprises that reduces damages from more frequent, or more intense, extreme meteorological hazards even without the project.

The analysis, applying the most conservative set of assumptions such as no climate change were to take place and that the benefits of the project only last for 5 years, calculated a benefit-cost ratio for the project of 3.2. Extending the period over which the benefits of the project accrue from five years to a more plausible 10 years or 15 years increased the benefit-cost ratio to 6.6 and 8.7 respectively with the same assumption that no climate change was to take place. The PAD (p. 21) stated that acknowledging climate change, and the concomitant increase in the frequency or severity of extreme meteorological events, simply increased the benefit-cost ratios for the project, increasing its estimated economic justification. However, it is not clear why the analysis would even assume that no climate change was to take place given the increase in climate change related extreme weather events. Overall, the economic analysis included in the PAD seemed appropriate.

Ex-post.

The ICR (p. 18) conducted an economic analysis based on the same assumptions and methodology as the analysis described above. The analysis defined the main benefits of the project related to the damages avoided through improvement in weather forecasts, evading the consequences of forecast errors that comes from underestimating the weather events (storms stronger than expected) affecting property, crops and mortality. The ICR identified one measurable economic benefit stream as damage avoided from improved forecasts of extreme meteorological hazards, specifically from a marginal reduction in forecast uncertainty. Components 1 and 2 contributed to this benefit stream. The analysis calculated a Net Present Value (NPV) of US\$19 million (lower bound) and US\$52 million (upper bound) over 20 years and applying discount rates between six and nine percent. The benefit-cost ratio ranged between 4.53 and 9.62 and an Internal Rate of Return (IRR) between 26.47 (lower bound) and 33 percent (upper bound). The analysis was robust, and its results indicate that the project was a worthwhile investment.

Operational Efficiency:

According to the ICR (p. 19) the project experienced low disbursement, with the first disbursement only made in July 2016 (eight months into project implementation. Low disbursement continued until October 2020 (42 percent with over 70 percent of project activities implemented) due to delays in the supply and installation of the Doppler Radar. As a result, the project's implementation period was extended by 12 months to accommodate



for these delays. Also, due to cost savings (as a result of exchange rate movements and lower than expected costs for some equipment) the project was able to scale up various project activities (such as procurement) and install additional equipment. When the project closed in August 2022, 98 percent of the financing was disbursed. The ICR (p. 25) stated that more efficiency could have been achieved if the computerized accounting system would have been implemented earlier.

Taking everything together, the project's overall efficacy 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		0	0 <input type="checkbox"/> Not Applicable
ICR Estimate		0	0 <input type="checkbox"/> Not Applicable

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

6. Outcome

Relevance of objective was High given the project's objective being in line with the Bank's most Country Partnership Strategy (FY2014-2017). Efficacy and Efficiency were Substantial. Taking everything together, the project's overall outcome rating is Satisfactory.

a. Outcome Rating

Satisfactory

7. Risk to Development Outcome

Technical risk: The key risk to development outcomes is related to technical capacity. Even though the project was able to build capacity to ensure continued operation and maintenance of the assets financed by the project, retaining technical capacity and experts might pose a challenge in the future. Also, ensuring the availability and deployment of sufficient financial and human resources for maintaining hydro-met equipment including investments made connected to the Doppler Radar might also pose a challenge to the sustainability of these investments. This risk is assessed as substantial.



Governmental commitment: In terms of government commitment, according to the ICR (p. 26) the government was committed to achieving the objective of the project throughout implementation and continues to remain so. The government has also continued the expansion of the real-time data collection after project closure financing it through the national budget. This risk is assessed as low.

Financial risk: The financial risk is considered to be low as the government took over financing the data transmission costs that were before financed by the project. The Bank team (May 1, 2023) stated that as of now, the government is taking project outcomes forward with appropriate budgets for maintenance as well as coordination mechanisms.

8. Assessment of Bank Performance

a. Quality-at-Entry

According to the PAD (p.18) the project was built on lessons learned from previous Bank projects in Jamaica and climate change related projects globally. These lessons learned included; i) engaging partner agencies and community groups from the beginning of the project preparation is critical in order to foster their buy-in; ii) the readiness and ability of countries to increase their resilience to climate change impacts greatly depends on the institutional capacity, knowledge of vulnerabilities and risks and their preparedness to reduce these vulnerabilities and risks; and iii) it is critical for the project's funded behavioral change campaigns to consider different strategies for men and women.

Furthermore, the project utilized a project preparation grant to facilitate project readiness. According to the ICR (p. 21) this allowed the project to conduct extensive consultations with over 110 stakeholders to identify priority areas and demonstrate the value of products and tools developed. In addition, the project was well aligned with the government's policy Vision 2030 Jamaica.

According to the PAD (p. 20) the Bank team identified relevant risks and rated the macroeconomic risk as Substantial. Fiscal space in the Capital Budget would be needed to be secured and authorized by the Ministry of Finance and Planning (MOFP) for the planned project activities each fiscal year. If the fiscal space was not sufficient, it could potentially cause delay in procurement processes and consequently in implementation progress. The project was to mitigate the risk by making the Planning Institute of Jamaica (PIOJ) working closely with the Ministry of Finance and planning early in the budgeting process each year to secure the necessary fiscal space. Lack of experience and coordination among different implementing agencies were considered a moderate risk. The capacity risk was to be mitigated by establishing and locating a dedicated executing unit (PIU) in the PIOJ staffed with the requisite managerial and fiduciary competencies to service all the technical implementing agencies and designating a focal point in each technical implementing agency. However, mitigation measures were not sufficient, and the project experienced some implementation delays related to lack in procurement and financial management capacity.

The project's Results Framework had several shortcomings (see section 9a for more details), which impacted the project's M&E activities for the first four years of project implementation.



Quality-at-Entry Rating

Satisfactory

b. Quality of supervision

According to the ICR (p. 22) the Bank team provided timely support and addressed implementation bottlenecks throughout project implementation. Also, the Bank team provided training in critical areas such as financial management, procurement, and safeguards. The project had three Task Team Leaders (TTLs), with the two incoming TTLs being a member of the task team before becoming the TTL, ensuring a smooth transition and continuity in implementation support.

The Bank team restructured the project three times to adapt the Results Framework. However, the first revision of the Results Framework only took place in May 2019, almost four years into project implementation, indicating that progress towards the achievement of the objective was not adequately measured prior to this revision.

Quality of Supervision Rating

Satisfactory

Overall Bank Performance Rating

Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The project's theory of change and how key activities/inputs and outputs were to lead to the intended outcomes was sound and logical. Also, the objectives of the project were clearly specified.

However, the original Results Framework had significant shortcomings. The original PDO indicators did not adequately measure the project's achievement towards all aspects of its objectives. Also, the definitions of several baselines and targets associated with the Results Framework were incomplete. As a result, during the 2019 restructuring, the three PDO indicators were revised (PDO indicators 1, 2 and 3), two Intermediate Outcome Indicator were revised ("Quality of weather forecasts", and "Targeted vulnerable groups having access to early warning messaging") and moved to PDO indicator level, and all intermediate outcome indicators were revised. When new activities were added to the project due to cost savings, the Results Framework was further revised to increase targets in October 2020.

Most indicators included in the revised Results Framework were measurable, relevant and sufficiently specific. However, PDO indicator 1 ("quality of weather forecasts") used a different data source to determine the baseline and assess the end results, making an assessment of an achievement of the indicator challenging. Also, PDO indicator 3 ("instruments for climate planning and action informed by



improved climate data and information”) was linked to PDO indicator 1 since it measured if instruments for climate planning and action were informed by improved climate data and information.

According to the PAD (p. 19) the PIOJ through the PIU in collaboration with the technical implementing agencies were responsible for the overall monitoring and evaluation (M&E) of the project activities, which seemed like an appropriate arrangement.

b. M&E Implementation

According to the ICR (p. 23) the project’s M&E reporting included the preparation of Implementation Status Reports (ISRs), semi-annual progress reports which were prepared by the PIU, and annual reports, which were prepared by the Bank and shared with the PPCR.

Even though the Results Framework was revised, the first revision only took place in May 2019, almost four years into project implementation, indicating that the project’s progress towards achieving its objectives was not measured adequately for more than half of its implementation period. Also, even though the baseline information for PDO indicator 1 (quality of weather forecasts) was incomplete as it did not rely on accurate and objective observation data, the baseline was not revised during implementation. This resulted in an inability to assess whether this PDO indicator was achieved.

The Bank team (May 1, 2023) stated that M&E data was reliable and of good quality. Also, since the project built improved data collection capacity, M&E functions and processes are likely to be sustained after project closing.

c. M&E Utilization

According to the ICR (p. 24) project data was tracked to assess implementation progress towards the achievement of the objectives and informed decision making. For example, when the project experienced cost savings, the scope of the project was increased. However, given that the project’s Results Framework was not adequate for more than half of the implementation period, the utilization of M&E data to inform decision making must have been limited.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

The project was classified as category B and triggered the Bank’s safeguard policies OP/BP 4.01 (Environmental Assessment). The project prepared an Environmental Management Framework. According to the ICR (p. 24) during preparation, the project screened the sites of the project activities for potential



resettlement impacts but none were identified. The installation of the Automatic Weather Station did not have environmental and social impacts.

The project established a Grievance Redress Mechanism (GRM) during project preparation to address complaints during the design phase and avoid implementation delays as a result of complaints. The Bank team (May 1, 2023) stated that there were no formal grievances lodged. According to the ICR (p. 24) residents were consulted regarding the installation of a new weather radar. Any concerns were included in the project's Environmental Management Plan.

The project's safeguard compliance was Satisfactory throughout implementation.

b. Fiduciary Compliance

Financial Management: According to the ICR (p. 25) the project's financial management arrangements were adequate and complied with laws, regulations, and the loan agreement. While the Interim Financial Reports during the first year of implementation experienced delays and issues with accuracy, they improved thereafter and remained at an acceptable level until project closure. The project was not able to fully implement a computerized accounting system, and kept accounts in excel, resulting in inefficiencies. The Auditor General Department Jamaica conducted the project's external audits, which were timely (with the exception of one conducted in March 2019 which was received four months late) and all had unqualified opinions.

Procurement: According to the ICR (p. 25) the PIU did not have a dedicated procurement officer resulting in the PIU manager being responsible for the project's procurement. Also, the Technical Implementation Agency experienced low procurement capacity resulting in the PIU having to take on procurement activities. As a result, the project experienced some implementation delays during the initial phase of project implementation due to the limited expertise in preparing Terms of Reference (ToR) in some sectors.

The ICR (p. 25) stated that alignment of the national procurement practices with the Bank's procurement positively impacted the project's procurement processes. The project used the government's electronic procurement platform (GOJEP) which resulted in better management of submitted bids and communication with bidders electronically. According to the ICR, if there had been more capacity, the GOJEP could have been fully integrated in the day-to-day management of procurement to avoid errors and the platform could have been used for online evaluation of bids.

c. Unintended impacts (Positive or Negative)

d. Other



11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Highly Satisfactory	Satisfactory	High Relevance of Objective, Substantial Efficacy and Efficiency.
Bank Performance	Satisfactory	Satisfactory	
Quality of M&E	Substantial	Substantial	
Quality of ICR	---	Substantial	

12. Lessons

The ICR (p. 27-28) included several useful lessons learned which were adapted by IEG:

- **Expertise within implementing agencies and continued capacity building may ensure the sustainability of project outcomes.** In this project, the Water Resources Authority staff installed all the equipment within the water monitory system resulting in cost and time savings since no externa specialist had to be hired. Also, when the Meteorological Service of Jamaica (MET Service) lost staff due to retirement, it provided training across all divisions instead of outsourcing the installation, operation, and maintenance of the systems.
- **Identifying and engaging with local stakeholders can positively impact project implementation.** This project conducted stakeholder mapping and a feedback mechanism during the initial phase to ensure representation of all local stakeholder groups in the needs-assessment process as well as their feedback resulting in identifying the most viable and widely accepted solution from a broad range of proposals, which further ensured project effectiveness and sustainability.
- **The availability of a Project Preparation Grant (PPG) may allow for designing a project that is technically sound and identifying potential implementation bottlenecks.** In this project, the Report “State of Jamaican Climate” allowed for conducting all the necessary technical assessments, developing the hydro-met needs prioritization, as well as conducting extensive stakeholder engagement.

13. Assessment Recommended?

No

14. Comments on Quality of ICR



The ICR provided an adequate overview of project preparation and implementation. The ICR furthermore included an adequate Economic analysis, was internally consistent, concise, and sufficiently outcome driven. The lessons learned included in the ICR may be useful for future projects in this area. However, it would have been beneficial if the ICR had explained better what certain indicators measured such as for example the intermediate outcome indicator "Doppler Radar operational with unit of measure number". Taking everything together, the ICR's quality rating is **Substantial**.

a. Quality of ICR Rating
Substantial