Technical Assistance Report

Project Number: 49107-006
Transaction Technical Assistance (TRTA)
August 2018

India: Strengthening Smart Water Management and Climate and Disaster Resilience in Selected Districts of West Bengal
(Cofinanced by the Urban Climate Resilience Trust Fund under the Urban Financing Partnership Facility)

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 1 July 2018)

Currency Unit	–	Indian rupees
$1.00	=	₹68.4585
₹1.00	=	$0.01460

ABBREVIATIONS

ADB	–	Asian Development Bank
GWOB	–	Government of West Bengal
PHED	–	Public Health Engineering Department
TA	–	technical assistance

NOTE
In this report, "$" refers to United States dollars.

Vice-President	Wencai Zhang, Operations 1
Director General	Hun Kim, South Asia Department (SARD)
Director	Sekhar Bonu, Urban Development and Water Division, SARD
Team leader	Neeta Pokhrel, Senior Urban Development Specialist, SARD
Co- Team leader	Saugata Dasgupta, Senior Project Officer (Urban), SARD
Team members	Cielo Añon, Operations Assistant, SARD Saswati Belliappa, Safeguards Specialist, SARD Luca Di Mario, Urban Development Specialist, SARD Bebedel Fabe, Project Officer, SARD Prabhjot Khan, Social Development Officer (Gender), SARD Maria Laureen Laurito, Senior Social Development Officer (Safeguards), SARD Rhina Ricci Lopez-Tolentino, Associate Financing Partnerships Analyst, Office of Cofinancing Operations (OCO) Takafumi Mafune, Financing Partnerships Specialist, OCO Sourav Majumder, Project Officer (Urban), SARD Takako Morita, Counsel, Office of General Counsel Jaemin Nam, Financial Management Specialist, SARD Ninette Pajarillaga, Environment Specialist, SARD Zarah Pilapil, Associate Safeguards Officer, SARD Virinder Sharma, Senior Urban Development Specialist, Sustainable Development and Climate Change Department (SDCC)
Peer reviewer	Michael White, Urban Development Specialist, Southeast Asia Department

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I. THE PROPOSED PROJECT

1. The proposed West Bengal Drinking Water Sector Improvement Project will ensure drinking water security through continuous piped water supply schemes to about 1.65 million people in arsenic-, fluoride-, and salinity-affected areas of selected districts in West Bengal. It will strengthen institutional structures and build capacities of stakeholders at all levels for sustainable service delivery and public health improvements. Three districts—Bankura, North 24 Parganas and Purba Medinipur—will be covered under the West Bengal Drinking Water Sector Improvement Project.[1] The executing and implementing agency of the project will be the Public Health Engineering Department (PHED) of the Government of West Bengal (GOWB). Through grant support, the Asian Development Bank (ADB) mobilized 16 international and national consultants, including the British Geological Survey and an international climate risk vulnerability assessment expert, who assisted the PHED in conducting project preparation and due diligence in accordance with the requirements of the Government of India, the GOWB, and ADB.

2. The project will supply a minimum of 70 liters per capita per day of continuous potable water through metered connections to each household in the selected rural areas, and potable bulk water at the prescribed national standard to the en route urban and rural areas. The project's water distribution systems will be designed on a district metering area basis, and connections will be provided up to the household level, including to community and government institutions. The water distribution systems will be integrated with smart water management and monitoring tools such as supervisory control and data acquisition, geographic information systems, and data analytics and feedback systems incorporating domestic and bulk water meters, to be established at the PHED and at the gram panchayat (governing bodies working at the village level) levels.[2] Bulk water supply systems will be interconnected on a grid-based supply system, where feasible, to improve the system's redundancy and resilience. The project will create and strengthen sustainable service delivery institutional structures at the district, block, and gram panchayat levels, as well as in the PHED. The project will introduce innovative practices and technology-driven digital smart water management to create a model for rural water service delivery and bulk water supply systems for adoption throughout West Bengal and India. The project is highly gender focused, assisting skills development and employment creation for around 350 locals, of whom at least 33% will be women.

II. THE TECHNICAL ASSISTANCE

A. Justification

3. **Climate change in West Bengal.** Realizing the state's vulnerability to climate change, the GOWB has prepared and approved the West Bengal State Action Plan on Climate Change.[3] The action plan outlines strategies to be adopted by the state, which were developed after extensive consultations within and among concerned departments of the GOWB. The international climate risk vulnerability assessment consultant engaged by ADB assisted the PHED in preparing a climate risk vulnerability assessment for the project. Based on the findings of this assessment, the proposed transaction technical assistance (TA), which is predominantly for capacity building, will verify and support the local-level climate vulnerability and disaster risk

[1] One neighboring block in 24 South Parganas district is also included under the project based on economy of scale and community demand.

[2] The PHED is responsible for (i) rural water supply in the state, fully managing drinking water supply to most of the state's rural population of 74.6 million; (ii) managing drinking water supply in 80 of the state's 114 municipalities; and (iii) providing bulk water to many urban agglomerations and municipal corporations in the state.

[3] Government of West Bengal. 2016. *West Bengal State Action Plan on Climate Change*. Kolkata.

assessment for selection and prioritization of *gram panchayats* or villages and municipalities in the selected districts. This work is a precursor to the design of a flood forecasting and early warning system and a district-level smart water management information and monitoring system, which aim to enhance the resilience of West Bengal to climate change.

4. **Smart water management.** Water systems face sustainability and resilience challenges such as water leaks, overuse, and quality issues. Floods, droughts, and natural disasters impact water systems through, for example, climate change impacts on water supply technologies, flood damage to infrastructure, increased contamination, deteriorating water quality, increased treatment requirements, and reduced water availability. Piped distribution networks are typically vulnerable to contamination and will be at increased risk where more frequent flooding occurs. In drying environments, piped water supplies may become more intermittent unless resource management measures conserve drinking water sources.[4]

5. Information and communication technology could help address these challenges through the development of smart water grids that network and automate monitoring and control devices. Water losses and inefficient use stand out as promising areas for applications of smart water grids. A smart water grid begins at the water source, where meters, smart valves, smart pumps, and flood sensors are installed. It continues on to the water treatment plants with more smart meters, valves, and pumps. At the end user locations (homes and businesses), end user sensing devices, smart irrigation controllers, contaminant sensors, and smart meters may be used. Finally, water moves through the sewage system to wastewater treatment and final use or discharge, where the same technologies used at the beginning of the system are used at the end.[5] The Urban Climate Change Resilience Trust Fund[6] under the Urban Financing Partnership Facility will support the exploration of linkages and efforts to make the water supply grid based with smart technologies in the project districts.[7] The TA is predominantly for capacity building.

B. Outputs and Activities

6. The major outputs and activities are summarized in Table 1.

Table 1: Summary of Major Outputs and Activities

Major Outputs	Delivery Dates	Key Activities with Milestones
Output 1: PHED-level smart management system for water supply schemes established for the project	Q2 2021	1.1 Review existing information, reports, data, and information management of the water service delivery system of the PHED for selected districts to develop a smart water implementation plan (Q4 2018) 1.2 Conduct gap analysis and finalize the scope and functional requirements of the envisioned smart water management system (Q4 2018) 1.3 Conduct workshops (i) on the smart water implementation plan with stakeholders, including representatives from the PHED, *gram panchayats* (governing bodies working at the village level), and the

[4] World Health Organization. 2009. *Summary and Policy Implications Vision 2030: The Resilience of Water Supply and Sanitation in the Face of Climate Change*. Geneva.

[5] G.J Falco and W.R. Webb. 2015. Water Microgrids: The Future of Water Infrastructure Resilience. *Procedia Engineering*. 118 (2015) pp. 50–57.

[6] Financing partners: the Rockefeller Foundation and the governments of Switzerland and the United Kingdom.

[7] Approaches and methodologies for smart water management are described in Project Smart Water Management System (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

Major Outputs	Delivery Dates	Key Activities with Milestones
		community; and (ii) on the development of a capacity building collinear smart system deployment plan (Q1 2019) 1.4 Execute the smart water implementation plan by (i) introducing elements of the plan into the PHED's work practices and future development contracts for the water supply system, (ii) providing training and support to the *gram panchayats* to develop the knowledge and skills required for the rollout of the plan to the villages, and (iii) assisting the *gram panchayats* in establishing the necessary monitoring and support systems (Q2 2021) 1.5 Monitor the implementation plan and continue to train and support the PHED and the *gram panchayats* in the use of smart water systems (Q2 2021) 1.6 Document results achieved and share the approach with the central and state level water sector stakeholders to maximize the benefits of the investment and increase India's resilience to water-related impacts of climate change (Q2 2021)
Output 2: Flood forecasting and early warning system for Purba Medinipur district commissioned	Q1 2021	2.1 Review existing information, reports, and data on climate change, early warning systems, and water-related disaster vulnerability of West Bengal and Purba Medinipur district (Q4 2018) 2.2 Conduct information and education campaigns, including doing the following: (i) consult with the district administration and *gram panchayats* in flood-affected areas, (ii) conduct a workshop on how to develop a meaningful continuous flood warning system, (iii) engage with disaster management agencies and the media, and (iv) prepare protocols for alerting communities in flood-affected areas (Q1 2019) 2.3 Conduct data analyses, mapping of existing information technology, flood and drought forecasting, and an assessment of existing situations and needs (Q4 2019) 2.4 Design and implement flood and drought forecasting and early flood warning system models (Q3 2020) 2.5 Work with district administration, municipalities, and *gram panchayats* to develop response plans for incorporation into an annual event (e.g., "flood warning day") involving all affected communities (Q4 2020) 2.6 Conduct a district-wide, full-scale flood warning simulation event involving international observers to improve the flood warning system using lessons learned in the drill (Q1 2021)
Output 3: Capacity and community awareness on drinking water supply efficiency, climate change, and disaster resilience in project districts improved	Q2 2021	3.1 Standardize the training and capacity building on (i) early warning systems installed to (a) respond to flood warnings and flood and drought events, and (b) manage cleanup after floods in the district administration, municipalities, and *gram panchayats*; and (ii) PHED management regarding smart water systems and climate and disaster resilience planning (Q2 2020) 3.2 Disseminate best practices by undertaking at least two community awareness programs on climate change and disaster resilience (Q2 2020) 3.3 Produce one knowledge product on climate change and disaster resilience in West Bengal (Q1 2021) 3.4 Conduct training and capacity building for the PHED on administering smart water management (Q2 2021)

PHED = Public Health Engineering Department, Q = quarter.
Source: Asian Development Bank.

C. Cost and Financing

7. The TA is estimated to cost $2 million and will be financed on a grant basis by the Urban Climate Change Resilience Trust Fund (footnote 6) under the Urban Financing Partnership Facility and administered by ADB. The key expenditures items are listed in Appendix 1. The government will provide counterpart support in the form of staff, office space, and other in-kind contributions.

D. Implementation Arrangements

8. The TA will be implemented over 36 months. The PHED, which is both the executing agency and the implementing agency, has established a project steering committee to make strategic decisions. ADB has informed the government that approval of the TA does not commit ADB to finance any ensuing project. Table 2 summarizes the implementation arrangements.

9. ADB will administer the TA. The South Asia Department, Urban Development and Water Division (SAUW) will select, supervise, and evaluate consultants.

Table 2: Implementation Arrangements

Aspects	Arrangements		
Indicative implementation period	July 2018–June 2021		
Executing agency	PHED		
Implementing agency	The PHED will play the principal role in administration and supervision of the TA together with ADB, including implementation oversight, accountability for the outputs, and communication with consultants and stakeholders[a]		
Consultants	To be selected and engaged by ADB		
	QCBS[b]	82 person-months	$1.0 million
	ICS	26 person-months	$0.2 million
Procurement[b]	Conducted by consulting firm following ADB's Procurement Guidelines (2015, as amended from time to time)		
	NCB	Multiple packages	$0.5 million
	Shopping	Multiple packages	$0.1 million
Advance contracting	Advance contracting will be used for consultant recruitment		
Disbursement	The TA resources will be disbursed following ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time).		

ADB = Asian Development Bank, ICS = individual consultants selection, NCB = national competitive bidding, PHED = Public Health Engineering Department, QCBS = quality- and cost-based selection, TA = technical assistance.
[a] The PHED will be the signatory for supply contracts for all equipment purchased under the TA. All equipment and fixed assets will be handed over to the PHED upon TA completion. For the definition of fixed assets, refer to ADB. 2016. Asset Management and Inventory Control. *Administrative Orders*. AO 4.02. Manila.
[b] The contract will include training and surveys.
Source: Asian Development Bank.

10. **Consulting services.** The TA will require about 108 person-months of consulting services, of which 82 person-months (18 person-months international and 64 person-months national) will be under a firm recruited through a full technical proposal and quality- and cost-based selection method with a quality–cost ratio of 90:10. The remaining 26 person-months will be for recruiting a national water supply information system expert, who will support implementation and quality control. ADB will recruit the consultants in accordance with its

Guidelines on the Use of Consultants (2013, as amended from time to time).[8] The summary of consulting services requirements is presented in Table 3.

Table 3: Summary of Consulting Services

Position	Person-Months
Firm	
1. Team Leader and Water Utility and Smart Water Management Expert (International)	12
2. Water Resource and Flood Management Expert (International)	6
3. Deputy Team Leader and Water Utility and Smart Water Management Expert	26
4. Water Resource and Flood Management Expert	6
5. Disaster Risk Management and Planning Expert	4
6. Climate Change Resilience Expert	3
7. Community Engagement and Development Expert	4
8. Water Supply Network Expert	5
9. Hydrologist and Flood Modeling Expert	3
10. Instrumentation, Control, and SCADA Expert	4
11. IT Expert	6
12. GIS Expert	3
Individual	
13. Water Supply Information Systems Expert	26

GIS = geographic information system, IT = information technology, SCADA = supervisory control and data acquisition.
Source: Asian Development Bank.

11. **ADB procurement.** Procurement will follow ADB's *Procurement Guidelines* (2015, as amended from time to time). SAUW will have the authority to approve (and sign where applicable) (i) requests for information or advertising bid invitations; (ii) bidding documents; (iii) bid evaluations; (iv) recommendations for awards; (v) contract and amendment signatures;[9] and (iv) payments.

12. **Cofinancier requirements.** SAUW will ensure timely disbursement of funds and will (i) share (draft) terms of reference; (ii) prepare a fund flow and disbursement procedure diagram (delivery chain) for the grant funds; (iii) report on gender-disaggregated results; and (iv) submit (a) quarterly progress reports on activities; (b) quarterly reports on disbursements; and (c) the inception, interim, final, and completion reports to the Urban Climate Change Resilience Trust Fund.

[8] Terms of Reference for Consultants (accessible from the list of linked documents in Appendix 2).
[9] The executing agency will be a cosignatory for all supply contracts.

COST ESTIMATES AND FINANCING PLAN

($ '000)

Item			Amount
Urban Climate Change Resilience Trust Fund[a] under the Urban Financing Partnership Facility			
1.	Consultants		
	a.	Remuneration and per diem	
		i. International consultants	389.3
		ii. National consultants	567.4
	b.	International and local travel	98.2
	c.	Reports and communications	20.0
2.	Training, seminars, and conferences[b]		70.0
3.	Equipment for smart water management, flood forecasting, and early warning systems[c]		600.0
4.	Surveys and data (including geographic information system and remote sensing, satellite imagery, and other data purchases)		225.1
5.	Contingency		30.0
	Total		**2,000.0**

[a] Financing partners: the Rockefeller Foundation and the governments of Switzerland and the United Kingdom. Administered by the Asian Development Bank.

[b] A total of three training and community awareness events are expected. For each event, 30–50 participants are targeted, with Kolkata and Purba Medinipur as possible venues. A minimum of 100 Public Health Engineering Department staff will be trained on smart water management.

[c] Taxes and duties for equipment will be funded by the government.

Source: Asian Development Bank estimates.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/LinkedDocs/?id=49107-006-TAReport

1. Terms of Reference for Consultants