Technical Assistance Report

Project Number: 42173-014
Capacity Development Technical Assistance (CDTA)
December 2014

People's Republic of Bangladesh: Strengthening Monitoring and Enforcement in the Meghna River for Dhaka's Sustainable Water Supply

(Financed by the Japan Fund for Poverty Reduction)

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 10 November 2014)

Currency unit	–	taka (Tk)
Tk1.00	=	$0.0129
$1.00	=	Tk77.42

ABBREVIATIONS

ADB	–	Asian Development Bank
DOE	–	Department of Environment
DWASA	–	Dhaka Water Supply and Sewerage Authority
ECA	–	ecologically critical area
NSC	–	national steering committee
TA	–	technical assistance

GLOSSARY

pourashava	–	municipality
union parishad	–	lowest local government body in rural areas
upazila	–	subdistrict

NOTE

In this report, "$" refers to US dollars.

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CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data — **Project Number:** 42173-014

Project Name	Strengthening Monitoring and Enforcement in the Meghna River for Dhaka's Sustainable Water Supply	**Department /Division**	SARD/SAUW
Country	Bangladesh	**Executing Agency**	Department of Environment
Borrower	NA		

2. Sector

	Sector	Subsector(s)	Financing ($ million)
✓	Water and other urban infrastructure and services	Urban policy, institutional and capacity development	1.00
		Total	**1.00**

3. Strategic Agenda

Strategic Agenda	Subcomponents
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive
Environmentally sustainable growth (ESG)	Environmental policy and legislation

Climate Change Information

Climate Change impact on the Project	Low

4. Drivers of Change

Drivers of Change	Components
Governance and capacity development (GCD)	Institutional development
Partnerships (PAR)	Civil society organizations Implementation

Gender Equity and Mainstreaming

Some gender elements (SGE)	✓

5. Poverty Targeting

Project directly targets poverty	No

Location Impact

Not Applicable

6. TA Category: B

7. Safeguard Categorization Not Applicable

8. Financing

Modality and Sources	Amount ($ million)
ADB	**0.00**
None	0.00
Cofinancing	**1.00**
Japan Fund for Poverty Reduction	1.00
Counterpart	**0.05**
Government	0.05
Total	**1.05**

9. Effective Development Cooperation

Use of country procurement systems	No
Use of country public financial management systems	No

I. INTRODUCTION

1. The Government of Bangladesh asked the Asian Development Bank (ADB) for capacity development technical assistance (TA) to strengthen monitoring and enforcement of Meghna River's water quality for Dhaka's sustainable water supply. ADB included the TA in the 2014 program of the country operations business plan, 2015–2017 for Bangladesh.[1]

2. The ADB fact-finding mission during 18–21 August 2014 reached an understanding with the government on the TA impact, outcome, outputs, implementation arrangements, cost, financing arrangements, and outline terms of reference for consultants.[2] The design and monitoring framework is in Appendix 1.

II. ISSUES

3. Dhaka Water Supply and Sewerage Authority (DWASA) provides water across a service area of about 400 square kilometers in Dhaka City and its surroundings. It has been relying heavily on groundwater as a source of water supply, but current groundwater abstraction is beyond sustainable yields, as evidenced by a rapidly falling water table.[3] This and DWASA's plan to further expand its service area to cater to a growing population make it essential to increase the surface water supply. However, the water quality in rivers surrounding Dhaka, such as Buriganga and Sitalakhya rivers, is rapidly deteriorating and the quantity is not adequate. Meghna River, about 30 kilometers east of Dhaka, has been identified as one of the major new sources of water supply for Dhaka.[4] Two water intake points have been proposed, and the ADB-financed Dhaka Environmentally Sustainable Water Supply Project, approved in 2013, is supporting development of one intake point along with a raw water transmission pipeline and a water treatment plant.[5] Once these two water intake points and associated infrastructure are developed, Meghna River will account for more than 40% of the raw water for DWASA's water supply by 2021. To avoid deterioration of water quality and ensure sustainable water supply to Dhaka, it is critical to strengthen the monitoring and enforcement mechanism for Meghna River.

4. However, DWASA does not have the authority to regulate pollution in water bodies. It is the Department of Environment (DOE) under the Ministry of Environment and Forests that is mandated by the government to monitor and control water, air, and soil pollution, and enforce the Environment Conservation Act, 1995 (amended in 2010) if any violation by industries or others occurs. Therefore, the monitoring and enforcement mechanism needs to place DOE at the core of the arrangement. Although DOE is the sole authority for issuing and renewing environmental clearances for potentially polluting activities, it does not have enough staff to regularly monitor such activities and enforce necessary actions, such as ordering suspension of factory operations or imposing fines. Furthermore, enforcing compliance measures is highly politically sensitive, resulting in limited actions against violators. While the water quality of Meghna River at the proposed intake sites is generally very good as of 2014, occasional reports

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[1] ADB. 2014. *Country Operations Business Plan: Bangladesh, 2015–2017.* Manila. The TA was originally titled "Establishing a Regulatory/Monitoring Mechanism for Meghna River Basin."

[2] The TA first appeared in the business opportunities section of ADB's website on 5 September 2014.

[3] Dependence on groundwater is about 80% in 2014.

[4] Meghna River is a major watercourse of the Padma (or Ganges) River delta in Bangladesh. The name is properly applied to a channel of the Old Brahmaputra downstream of Bhairab Bazar, after it has received Surma River. Meghna River receives the combined waters of the Padma and Jamuna rivers near Chandpur. After 264 kilometers, it enters the Bay of Bengal.

[5] ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Loan to the People's Republic of Bangladesh for the Dhaka Environmentally Sustainable Water Supply Project*. Manila (Loan 3051-BAN). The other intake point at Haria, about 5 kilometers downstream, is proposed for the expanded Saidabad water treatment plant.

of pollution in the river have emerged, and industries along the river have begun to increase. Given rapid urbanization and increasing industrialization in Dhaka and its surrounding areas, the monitoring and enforcement mechanism to maintain the good quality of Meghna River water needs major strengthening. This requires (i) boosting the capacity of DOE; (ii) establishing a more collaborative, innovative, and enforceable system by involving all key stakeholders, including the industries themselves; and (iii) raising public awareness of the importance of maintaining the quality of water bodies such as Meghna River.

5. The Environment Conservation Act has a provision whereby areas whose ecosystem is considered likely to reach a critical state will be declared as ecologically critical areas (ECAs) by government notification. The notification will specify which operations or processes cannot be initiated or continued in the ECAs. In addition to the initial seven wetland areas declared as ECAs in 1999, the government, in 2009, declared the four rivers surrounding Dhaka—Balu, Buriganga, Sitalakhya, and Turag—as ECAs and started to strengthen actions to mitigate water pollution. History clearly demonstrates that pollution prevention—by regulating and controlling industrial development and other pollution-prone activities—is essential and far more cost-effective than cleaning up polluted water bodies. Therefore, the TA will look into improvements of the policy and regulatory requirements to protect the water quality of Meghna River, such as declaring a section of the river that is critical to maintaining the water quality of the proposed intakes as an ECA and/or amending or developing relevant regulations, standards, or policies.

6. Excessive water abstraction from the river could have significant impacts on water supply to Dhaka. Although the Water Act of 2013 is intended to control this issue, the issuance of rules and regulations under the act is still pending, leading to unregulated water abstraction. Since the volume of water supply from Meghna River to Dhaka is expected to be a small fraction of the river flow, estimated at less than 1% of the lean flow in 2021, the focus of the TA will be to maintain water quality. Maintaining good water quality will not only benefit Dhaka's population in general, but also a large number of people whose livelihood fully or partially depends on Meghna River, such as fishers and farmers, including the poor.

III. THE CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE

A. Impact and Outcome

7. The impact will be that sustainable water supply from Meghna River to Dhaka City is ensured. The outcome will be that government capacity for monitoring the water quality of Meghna River and enforcing laws to maintain it is strengthened.

B. Methodology and Key Activities

8. **Output 1: Monitoring and reporting system, including water pollution mapping, strengthened in the relevant section of Meghna River.** This output will help develop water pollution mapping and strengthen the monitoring and reporting system to control the water quality of Meghna River, particularly in the relevant section of the proposed intake sites—at Bishnondi and Haria—that serve as source of water supply.[6] Tasks for water pollution mapping include (i) baseline surveys to identify existing pollution sources upstream and downstream of the proposed intake sites, (ii) collection and analysis of development plans of the public and

[6] The relevant section will be upstream and downstream of the proposed intake sites, with measurable impacts on the water quality at the intake sites and will be determined through detailed assessments under the TA. Tidal effects require consideration of downstream impacts as well.

private sectors that are relevant to Meghna River's water quality and volume, and (iii) development of a map based on a geographic information system that includes information on the pollution sources and their extent. As DOE is now developing its geographic information system, the survey findings will be merged with it. The database on pollution sources and loads will be updated throughout TA implementation. Then the level of pollution impacts will be assessed by (i) reviewing the historical trend of water quality and quantity in and around the two intake sites, (ii) assessing the foreseeable pollution impacts and water quality projections that arise from development of upstream and downstream areas, and (iii) determining the allowable pollutant loads and level of pollution control needed to maintain high quality and adequate quantity of water from the intake points with a reasonable safety margin. Other tasks under this output include (i) an analysis of the existing policy and regulatory framework, and identification of requirements to strengthen pollution control and enforcement (this may involve development of a new policy, revision of effluent standards, and establishment of one or more new permanent committees with clear mandates and functions); (ii) formulation of an environmental monitoring plan with clear roles and responsibilities for all agencies concerned; and (iii) establishment of a reporting system whereby neighboring communities and other stakeholders will inform DOE or other pertinent agencies of any unlawful activities that they detect. DOE staff will be the main beneficiaries of this output; they will be trained on the job in how to develop and implement a water pollution mapping and reporting system, and how to maintain and update the database.

9. **Output 2: Incentive or reward system for pollution control piloted.** It is imperative to seek cooperation from existing and potential pollution sources such as industries and real estate developers, to ensure water supply of good quality and in adequate quantity from Meghna River to Dhaka. While the enforcement mechanism will be strengthened under output 1, conventional command-and-control measures alone will not be effective considering the current monitoring capacity and the difficulty of taking action against violators. Moreover, the key objective should not be to penalize violators, but to maintain or even improve the quality of water bodies. Therefore, this output will devise an incentive or reward system (e.g., market-based tools) to motivate polluters to take pollution-control measures. Tasks include (i) conducting stakeholder consultations (mainly with pollution sources) to discuss a workable system; (ii) developing such a system and implementing it on a pilot basis; and (iii) reviewing lessons from the pilot implementation and proposing ways to improve and/or upscale the system. Technical auditing of, and provision of training to, industries will be a part of the pilot program, with a view to enhancing production efficiencies of factory operations while reducing the pollution loads. Industries along the relevant section of the river will benefit from this output. DOE will participate in these tasks to strengthen knowledge and capacity.

10. **Output 3: Ecologically critical area identified and prepared for designation.** Once designated as an ECA, additional measures can be taken to restrict development activities that affect the ecological value of the area. This output will enable the government to designate the relevant section of Meghna River as an ECA. Tasks include (i) undertaking a comprehensive background study to assess the ecological importance of the area, (ii) drafting the documents required for ECA designation, (iii) consulting with stakeholders to finalize the ECA proposal, and (iv) providing support for its approval by the government. DOE staff will be closely involved in each step to ensure effective implementation.

11. **Output 4: Training programs completed.** This output will help equip government officers and other stakeholders with knowledge and skills to operationalize the monitoring and reporting system. Tasks include (i) assessing DOE's capacity gaps, such as the gap between existing and required efficiency levels of its laboratories, with a view to strengthening monitoring

and enforcement, particularly of the water quality of Meghna River; (ii) preparing a plan to gradually boost DOE's capacities both in terms of human resources and facilities and equipment, as required by the gap assessment; (iii) preparing a capacity development program for DOE officials (including staff of district offices), local government bodies, and other organizations concerned; and (iv) implementing the program through classroom training, workshops and seminars, and on-the-job training. Collaboration with laboratories of other organizations, such as those of DWASA and the Department of Public Health Engineering, will be explored. Public awareness programs will target people living along the relevant section of the river, as well as Dhaka's general population. This will raise appreciation of the need to maintain the water quality of Meghna River, and encourage pollution-prevention activities by the public as well as industries.

12. **Assumptions and risks**. A major risk is that the government may not stay committed to stricter enforcement. Political and social implications may make it difficult to suspend factory operations when violations occur. Insufficient staff numbers at DOE also make it difficult to effectively monitor pollution-prone activities. At present, however, the government is strengthening enforcement actions against violators, and DOE is gradually increasing its staff responsible for monitoring. Technical guidance on cleaner production processes is expected to create a win–win situation for industries and the environment. Furthermore, public awareness programs will exert social pressure to take action against violators. With these measures, the risks can be mitigated to a manageable level.

C. Cost and Financing

13. The TA is estimated to cost $1,050,000, of which $1,000,000 will be financed on a grant basis by the Japan Fund for Poverty Reduction and administered by ADB. The government will provide counterpart support in the form of (i) any relevant documents, data, statistics, information, or maps that the government has at its disposal; (ii) adequate number of qualified counterpart staff, mainly from DOE and DWASA, including their field per diem and field transportation; (iii) office accommodation and office equipment, including desks, chairs, and local communication (but excluding minimal office and monitoring equipment); (iv) logistical assistance to the workshops and seminars, including sending invitations to participants; and (v) other in-kind contributions.

D. Implementation Arrangements

14. DOE will be the executing agency and will appoint qualified counterpart staff, including a project director, to take the lead in supervising all tasks performed by the consultants and coordinating the activities with relevant organizations. DWASA will be the partner agency and will appoint a project coordinator. A national steering committee (NSC) and a working committee will be established to monitor TA implementation. The NSC will be chaired by the secretary of the Ministry of Environment and Forests and comprise high-level representatives from the Planning Commission, DOE, DWASA, Board of Investment, Ministry of Industry, Ministry of Works, Ministry of Land, Ministry of Labor, Ministry of Environment and Forests, Local Government Division, Water Resources Planning Organization, Department of Inspection for Factories and Establishments, industrial associations, and environmental nongovernment organizations. The project director will act as the secretary of the NSC. The NSC will meet at least twice a year to discuss overall TA progress, strengthen interministerial coordination, and provide policy guidance for TA implementation. ADB representative(s) will attend the meetings as observer(s). The working committee will be chaired by the director general of DOE and comprise working-level representatives from similar organizations. The working committee may

also invite representatives from local government bodies such as *upazila*, *pourashava*, and *union parishad* at upstream and downstream of the raw water intake sites. The working committee will meet at least quarterly to discuss the progress of each activity, including problems encountered and actions to resolve them. Several consultation workshops will be held during TA implementation to ensure active stakeholder engagement. The workshops will also serve as a venue to share findings, good practices, and project lessons throughout TA implementation. ADB will undertake a TA review at least twice a year during implementation.

15. The TA will be implemented over 24 months, from May 2015 to May 2017. The outline terms of reference for consultants are in Appendix 3. International expertise (16.5 person-months) will be obtained in the areas of environmental management, industrial pollution control, and policy and regulatory development. National consultants (73 person-months) will have expertise in the fields of environmental management, industrial pollution control, environmental monitoring, institutional and policy development, community mobilization and participation, resource economics, surveys, geographic information systems, and fisheries. The consultants will be engaged by ADB in accordance with the Guidelines on the Use of Consultants (2013, as amended from time to time), and recruited through a firm under one package using the quality- and cost-based method of selection with a quality–cost ratio of 90:10. This ratio is justified because the assignments require a high level of expertise and quality. A simplified technical proposal will be used. In addition to the consulting team described in Appendix 3, a few individual consultants may be engaged to cover specific TA needs. Resource persons from Japan will be invited to participate in the workshops and/or training programs as needed. Disbursement under the TA will be made in accordance with ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). Some equipment such as computers and monitoring equipment will be procured using the shopping method, in accordance with ADB's Procurement Guidelines (2013, as amended from time to time). All equipment purchased under the TA will be turned over to DOE after TA completion. ADB will administer procurement and disbursement.

IV. THE PRESIDENT'S DECISION

16. The President, acting under the authority delegated by the Board, has approved ADB administering technical assistance not exceeding the equivalent of $1,000,000 to the Government of Bangladesh to be financed on a grant basis by the Japan Fund for Poverty Reduction, for Strengthening Monitoring and Enforcement in the Meghna River for Dhaka's Sustainable Water Supply, and hereby reports this action to the Board.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Sustainable water supply from Meghna River to Dhaka City is ensured	By 2020: Water quality of Meghna River at the intake sites is maintained above government standards (baseline: present water quality of Meghna River)[a]	DOE and DWASA reports	**Risk** Pollution or water abstraction upstream of the designated section will get out of control.
Outcome Government capacity for monitoring the water quality of Meghna River and enforcing laws to maintain it is strengthened	By 2017: DOE monitors water quality monthly, and semiannually updates pollution-prone activities upstream and downstream of the proposed water intake sites Enforcement actions are taken in accordance with the laws	DOE reports DOE reports	**Assumptions** Government staff who receive training remain in their positions. Government's continued political commitment to enforcement
Outputs 1. Monitoring and reporting system, including water pollution mapping, strengthened in the relevant section of Meghna River	An integrated GIS–water pollution mapping system operational by 2016 First monitoring report issued by the working committee by 2016 Participatory reporting system established by 2016	DOE reports DOE reports DOE reports	
2. Incentive or reward system for pollution control piloted	Incentive program implemented on a pilot basis by 2016 Assessment result of pilot implementation submitted by 2017	TA progress reports TA progress reports	**Assumption** Industrial associations participate in stakeholder consultations.
3. ECA identified and prepared for designation	Draft regulation for declaring relevant section of the Meghna River as ECA submitted by 2017	TA progress reports	**Assumption** Background study confirms the need to designate some sections of Meghna River as ECAs.

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
4. Training programs completed	50 local residents and LGB representatives trained on participatory monitoring mechanism by 2017	TA progress reports	
	40 staff in DOE, DWASA, and other organizations trained on regular monitoring and updates by 2017	TA progress reports	
	Stakeholder consultation process is inclusive (target for women's participation: 20%)	TA progress reports	
	Public awareness programs (five types of activities) are held by 2017	TA progress reports	

Activities with Milestones	Inputs
1. Monitoring and reporting system, including water pollution mapping, strengthened in the relevant section of Meghna River 1.1 Identify existing and future pollution sources such as key polluting industries, housing development, and other development activities in the relevant section of the proposed intake sites (Q3 2015). 1.2 Assess the level of individual and cumulative pollution impacts of identified pollution sources, and propose the level of and measures for pollution control to ensure good water quality (Q4 2015). 1.3 Incorporate the findings in the GIS under development in DOE (Q1 2016). 1.4 Develop an environmental monitoring plan commensurate with the need (Q1 2016). 1.5 Assess the existing policy and regulatory framework and identify requirements for strengthening (Q4 2015). 1.6 Prepare draft policy, regulations, and/or standards based on the above assessment and provide support for government's approval (Q3 2016). 1.7 Develop a reporting system whereby neighboring communities and other stakeholders can inform DOE and other organizations concerned if unlawful activities are detected (Q2 2016). **2. Incentive or reward system for pollution control piloted.** 2.1 Develop an incentive or reward system on a pilot basis to motivate industries to mitigate their pollution levels (Q3 2015). 2.2 Conduct technical audits and provide technical advice for pollution control and cleaner production upon request (Q2 2016). 2.3 Implement the agreed system and review achievements and lessons for improvement and scaling up (Q1 2017). **3. ECA identified and prepared for designation.** 3.1 Undertake a comprehensive background study to assess ecological	**Japan Fund for Poverty Reduction: $1,000,000** Note: The government will provide counterpart support in the form of (i) any relevant documents, data, statistics, information, or maps that the government has at its disposal; (ii) counterpart staff; (iii) office accommodation and office equipment including desks, chairs, and local communication (but excluding minimal equipment); (iv) logistical assistance to the workshops and seminars; and (v) other in-kind contributions.

Activities with Milestones	Inputs
importance and economic value of the areas (Q1 2016). 3.2 Draft necessary regulations and bylaws for designation as an ECA, if the study warrants it (Q3 2016). 3.3 Conduct stakeholder consultations for approval and implementation (Q1 2017). **4. Training programs completed.** 4.1 Assess capacity gaps of DOE (Q3 2015). 4.2 Develop capacity development programs for DOE, LGBs, relevant organizations, and the public (Q4 2015). 4.3 Implement capacity development programs (Q4 2016). 4.4 Stakeholder consultation meetings and public awareness programs are held (continuous until Q1 2017).	

ADB = Asian Development Bank, DOE = Department of Environment, DWASA = Dhaka Water Supply and Sewerage Authority, ECA = ecologically critical area, GIS = geographic information system, LGB = local government body, Q = quarter, TA = technical assistance.

[a] Dissolved oxygen: 4.8 milligram per liter (mg/L); chemical oxygen demand: 26.5 mg/L: (average value monitored by DOE between January 2013 and September 2014 at Meghna Ghat monitoring station).

Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN

($'000)

Item	Amount
Japan Fund for Poverty Reduction[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	374.0
ii. National consultants	319.0
b. International and local travel	62.0
c. Reports and communications	4.0
2. Equipment	40.0
3. Training, seminars, and conferences	
a. Facilitators	5.0
b. Training program	35.0
4. Surveys	60.0
5. Miscellaneous administration and support costs	33.0
6. Contingencies	68.0
Total	**1,000.0**

Note: The technical assistance (TA) is estimated to cost $1,050,000, of which contributions from the Japan Fund for Poverty Reduction are presented in the table above. The government will provide counterpart support in the form of counterpart staff, office accommodation, office supplies, and other in-kind contributions. The value of government contribution is estimated to account for 4.8% of the total TA cost.

[a] Administered by the Asian Development Bank.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Objective

1. The objective of the assignment is to assist the government in strengthening the monitoring and enforcement mechanism for Meghna River to ensure the long-term water security of Dhaka City. Specific outputs will include (i) developing water pollution mapping, and strengthening the monitoring and reporting system in the relevant section of the proposed intake sites of Meghna River; (ii) developing an incentive or reward system on a pilot basis for pollution control; (iii) identifying an ecologically critical area (ECA) in Meghna River and preparing for ECA designation; and (iv) undertaking training programs for relevant government officers and organizations to perform their obligations.

B. Scope

2. The technical assistance (TA) will require about 89.5 person-months of consulting services: 16.5 person-months international and 73 person-months national.

1. Specific Tasks of Consultants

3. The consultants will work to achieve the four outputs of the TA. They will assist the government in organizing workshops during TA implementation. Stakeholder consultation workshops will be held at least three times—(i) during inception to discuss the proposed scope of work and approach; (ii) after 1 year of TA implementation to update participants about progress and achievements made, problems encountered and remedial measures, and the work plan for the second year; and (iii) before completion of all activities under the TA to share good practices, lessons, and recommendations for future activities.

C. Terms of Reference for Team Members

4. **Team leader and senior environmental management expert** (international, 10 person-months). The expert should have a strong background in environmental management, with a master's degree in environmental science, policy, management, engineering, or closely related field. The expert should be knowledgeable about pollution control in large rivers, including in developing countries in Asia, and have experience in strengthening monitoring and enforcement mechanisms to manage water pollution and ensure the water quality of a large river. In collaboration with other experts, the expert will

(i) review existing and potential pollution sources in the relevant section of the two proposed intake sites in Meghna River, prepare water pollution mapping, and assess the level of pollution from these sources;
(ii) review literature on market-based initiatives and mechanisms for pollution control;
(iii) review studies conducted in Bangladesh that are relevant to the TA;
(iv) develop an incentive or reward system on a pilot basis through stakeholder consultations, and introduce the mechanism;
(v) assess the existing policy and regulatory framework and their effectiveness, and identify gaps to be bridged to strengthen monitoring and enforcement;
(vi) advise the government on international best practices for pollution control and water quality management in large rivers, including incentive mechanisms for industries, and provide specific guidance in the context of Bangladesh;
(vii) consult with stakeholders on draft rules, regulations, standards, and other TA outputs;

(viii) work with other team members on developing and implementing the capacity development program, and take the lead on environmental management aspects of the program;
(ix) organize and lead the workshops;
(x) assess progress and achievements of the TA and regularly update the executing agency;
(xi) consolidate findings, lessons, and recommendations to be followed after TA completion to ensure sustainability;
(xii) guide, supervise, and support the activities of other experts called on for the tasks, and ensure quality of work; and
(xiii) ensure that all tasks are performed on time and satisfactorily.

5. **Deputy team leader and environmental management specialist** (national, 22 person-months). The expert should have an environmental engineering or management background and experience working in wastewater management, pollution control (water quality), or river basin management. The expert will support the team leader in managing overall TA implementation and carrying out all tasks as required. The expert will

(i) review existing and potential pollution sources in the relevant section of the two proposed intake sites in Meghna River, prepare water pollution mapping, and assess the level of pollution from these sources;
(ii) review literature on market-based initiatives and mechanisms for pollution control;
(iii) draft technical sections of regulations to designate a relevant section of Meghna River as an ECA, along with regulations or bylaws to establish a permanent committee(s) (if considered necessary) to oversee water quality management of Meghna River, with clear mandates and responsibilities;
(iv) prepare ECA management guidelines for Meghna River;
(v) assess the capacity gaps at the Department of Environment (DOE), including the gap between existing and required efficiency of its laboratories, with a view to strengthening monitoring and enforcement of the water quality of Meghna River;
(vi) assist the government in obtaining formal approval of the rules, regulations, standards, and/or bylaws drafted under the TA, including preparation of summary materials and/or presentation in local language;
(vii) take the lead in consulting with stakeholders on the draft outputs of the TA;
(viii) devise a participatory environmental monitoring and reporting mechanism by working with the communities upstream and downstream of the proposed intake sites;
(ix) develop and implement a capacity development program in coordination with government agencies;
(x) ensure close coordination with all major stakeholders in Bangladesh, including members of the water supply and sanitation and/or environment subgroup of the local consultative group; and
(xi) guided by the team leader, supervise and support other experts' activities.

6. **Senior industrial pollution control expert** (international, 4 person-months). The expert should have an engineering background and experience in industrial pollution control, particularly water pollution, and cleaner production. The expert should be knowledgeable about various pollution control and cleaner production technologies available and proven in the international market, including developing countries in Asia. Experience working in industries is an advantage. Under the supervision of the team leader and deputy team leader, the expert will

(i) draft and introduce an incentive or reward system to motivate industries to reduce pollution to an acceptable level, possibly beyond the relevant effluent standards;
(ii) review the implementation of the above system, compile findings and lessons from it, and make recommendations for improving or expanding it;
(iii) advise industries on international best practices for pollution control and cleaner production, and provide, upon request, technical guidance to industries in the context of Bangladesh;
(iv) conduct technical audits of, and provide technical training to, interested industries on a pilot basis; and
(v) provide inputs into the deliverables.

7. **Senior policy and regulatory development expert** (international, 2.5 person-months). The expert should have a strong background in environmental policy and regulations, with a master's degree in environmental law, policy, or management. Experience working in the environmental sector is highly desirable. Under the supervision of the team leader and deputy team leader, the expert will

(i) review the legal and regulatory framework that now governs water management, including pollution, and identify gaps that need to be bridged;
(ii) draft regulations and/or bylaws for strengthening the regulatory framework and for establishing an ECA, and for setting up permanent committee(s) (if considered necessary) to monitor Meghna River's water quality and quantity—Regulations need to take into account the local context and must be implementable in the context of Bangladesh;
(iii) develop institutional arrangements to monitor activities, and water quality and quantity, in the relevant section of the proposed intake sites, to safeguard the ECA that is to be declared;
(iv) develop and implement the capacity-building program with regard to policy and regulatory aspects; and
(v) provide inputs into the deliverables from policy and regulatory perspectives.

8. **Industrial pollution control specialist** (national, 6 person-months). The expert should have an engineering background and experience in industrial pollution control (particularly water pollution) and cleaner production. Experience working in industries is an advantage. In close coordination with the international senior industrial pollution control expert, the expert will

(i) draft and introduce an incentive or reward system to motivate industries to reduce pollution to an acceptable level, possibly beyond the relevant effluent standards;
(ii) review the implementation of the above system, compile findings and lessons from it, and make recommendations for improving and expanding it;
(iii) advise industries on pollution control and cleaner production, and provide specific guidance to industries if requested;
(iv) conduct technical audits of, and provide technical training to, interested industries on a pilot basis; and
(v) provide inputs into the deliverables.

9. **Institutional and policy development specialist** (national, 4 person-months). The expert should have a strong background in institutional analysis and policy development in the environmental sector. In close coordination with the international senior policy and regulatory expert, the expert will

(i) review the legal and regulatory framework that governs water management now, including pollution, and identify gaps that need to be bridged;
(ii) draft regulations and bylaws necessary to strengthen the regulatory framework and to establish an ECA, and to set up permanent committee(s) (if considered necessary) to monitor the water security of Meghna River;
(iii) assess the capacity requirements of DOE and other relevant government organizations in line with the required monitoring and enforcement mechanism and their mandates;
(iv) develop and implement the capacity development program; and
(v) provide inputs into the deliverables from institutional and policy perspectives.

10. **Environmental monitoring specialist** (national, 7 person-months). The expert should have a strong background in water quality monitoring, and knowledge about water-testing laboratories. Under the supervision of the team leader and deputy team leader, the expert will

(i) take the lead in assessing the level of individual and cumulative pollution impacts of identified pollution sources, and propose an environmental monitoring plan commensurate with the need;
(ii) propose improvements to the effluent monitoring system for quality control and quality assurance;
(iii) recommend ways to deepen coordination between DOE's laboratory and other laboratories qualified to monitor water quality; and
(iv) work with the geographic information system (GIS) specialist to develop a system to disclose key results of environmental monitoring.

11. **Community mobilization and participation specialist** (national, 15 person-months). The expert should have a strong background in communication, community mobilization, participatory development, or related work. The expert should preferably have experience working in environmental management. Under the supervision of the team leader and deputy team leader, the expert will

(i) develop and implement a consultation and participation plan for the TA, and ensure that materials to be used in meetings and workshops are suitable for the target audience;
(ii) propose and implement public awareness programs, using various media and methods, on the importance of protecting the water quality of Meghna River;
(iii) provide sensitivity training to local government bodies and communities living upstream and downstream of the proposed intake sites, to raise awareness of pollution prevention and the participatory environmental monitoring and reporting mechanism;
(iv) hold public consultations and ensure that the process is inclusive, particularly with regard to the poor and women;
(v) link TA activities with ongoing and planned activities of nongovernment organizations to create synergies; and
(vi) provide inputs into the deliverables to ensure inclusiveness and participation of civil society.

12. **Geographic information system specialist** (national, 5 person-months). The expert should have a strong background in information technology, particularly in GIS application. The expert should preferably have experience working on environmental monitoring. Under the supervision of the team leader and deputy team leader, the expert will

(i) develop output 1 in GIS format and update the data during TA implementation;

(ii) incorporate the TA outputs into the GIS system being developed by DOE, and make necessary improvements to enhance user-friendliness and applicability; and
(iii) provide training to government officials so that updates of GIS data can be made in a sustainable way even after TA completion.

13. **Resource economist** (national, 4 person-months). The expert should have a strong background in environmental economics and valuation of ecological importance. Under the supervision of the team leader and deputy team leader, the expert will

(i) assess the economic value of the relevant section of Meghna River in the background study under output 3;
(ii) analyze and propose an appropriate market-based mechanism to motivate industries for pollution control;
(iii) prepare guidance on loss-and-damage assessments of environmental pollution that DOE can use to determine the fines it will impose on polluters; and
(iv) provide training to government officials.

14. **Environmental surveyor** (national, 8 person-months). The expert should have adequate experience in environmental surveys, particularly of ecology and pollution in rivers. Under the supervision of the team leader and deputy team leader, the expert will

(i) take the lead in surveys and studies under the TA, including but not limited to, a baseline survey for water pollution mapping and a comprehensive background study on the ecological importance;
(ii) collect secondary data relevant to the surveys and studies;
(iii) guide and supervise junior and support staff engaged by the TA consultants (using the survey budget) to ensure the study's quality; and
(iv) provide coordination support to ensure the study results are fully incorporated into other outputs of the TA.

15. **Fisheries specialist** (national, 2 person-months). The expert should have adequate knowledge of and experience in surveys of river fisheries. Under the supervision of the team leader and deputy team leader, and in close coordination with the environmental surveyor, the expert will

(i) take the lead in surveying the fisheries in the relevant section of Meghna River as part of a comprehensive background study to assess the ecological importance;
(ii) collect secondary data relevant to the survey; and
(iii) guide and supervise junior and support staff engaged for the fisheries survey to ensure study quality and output.