Report and Recommendation of the President to the Board of Directors

Project Number: 45207
June 2014

Proposed Loan
People's Republic of Bangladesh: Irrigation Management Improvement Project

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 15 May 2014)

Currency unit	–	taka (Tk)
Tk1.00	=	$0.0129
$1.00	=	Tk77.58

ABBREVIATIONS

ADB	–	Asian Development Bank
BWDB	–	Bangladesh Water Development Board
C-IMO	–	construction phase irrigation management operator
ha	–	hectare
IMO	–	irrigation management operator
M-IMO	–	management phase irrigation management operator
MIP	–	Muhuri Irrigation Project
MOM	–	management, operation, and maintenance
O&M	–	operation and maintenance
PMDC	–	project management and design consultant
PMU	–	project management unit
PPP	–	public–private partnership
TA	–	technical assistance

NOTES

(i) The fiscal year (FY) of the Government of Bangladesh and its agencies ends on 30 June. "FY" before a calendar year denotes the year in which the fiscal year ends, e.g., FY2013 ends on 30 June 2013.
(ii) In this report, "$" refers to US dollars.

Vice-President	W. Zhang, Operations 1
Director General	J. Miranda, South Asia Department (SARD)
Director	T. Matsuo, Environment, Natural Resources and Agriculture Division, SARD
Team leader	A. Cauchois, Senior Water Resources Specialist, SARD
Team members	Z. U. Ahmad, Senior Water Resources Officer, SARD
	M. Amerasinghe, Environment Specialist, SARD
	B. Debnath, Senior Social Development Specialist (Safeguards), SARD
	L. Gore, Water Resources Specialist, SARD
	N. Selim, Social Development Officer (Gender), SARD
	J. Versantvoort, Principal Counsel, Office of the General Counsel
Peer reviewer	S. Teoh, Natural Resources Specialist, Southeast Asia Department

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PROJECT AT A GLANCE

1. Basic Data — **Project Number:** 45207-002

Project Name	Irrigation Management Improvement Project	**Department /Division**	SARD/SAER
Country	Bangladesh	**Executing Agency**	Bangladesh Water Development Board
Borrower	People's Republic of Bangladesh		

2. Sector	**Subsector(s)**	**ADB Financing ($ million)**
✓ Agriculture, natural resources and rural development	Agricultural drainage	10.00
	Agricultural production	1.00
	Irrigation	32.50
	Rural flood protection	2.50
	Total	**46.00**

3. Strategic Agenda	**Subcomponents**	**Climate Change Information**	
Inclusive economic growth	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Adaptation ($ million)	15.00
		Climate Change impact on the Project	Medium
Environmentally sustainable growth	Global and regional transboundary environmental concerns		
	Natural resources conservation		

4. Drivers of Change	**Components**	**Gender Equity and Mainstreaming**	
Governance and capacity development	Civil society participation	Effective gender mainstreaming (EGM)	✓
Knowledge solutions	Pilot-testing innovation and learning		
Private sector development	Public sector goods and services essential for private sector development		

5. Poverty Targeting		**Location Impact**	
Project directly targets poverty	Yes	Rural	High
Geographic targeting (TI-G)	Yes		

6. Risk Categorization: Complex

7. Safeguard Categorization **Environment:** B **Involuntary Resettlement:** C **Indigenous Peoples:** C

8. Financing

Modality and Sources	Amount ($ million)
ADB	**46.00**
Sovereign Loan: Asian Development Fund	46.00
Cofinancing	**0.00**
None	0.00
Counterpart	**12.00**
Government	7.60
Beneficiaries	4.40
Total	**58.00**

9. Effective Development Cooperation

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

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of Bangladesh for the Irrigation Management Improvement Project.[1]

2. The project is designed to realize the full production potential of large-scale irrigation schemes in Bangladesh. It will address the recurrent lack of sustainable management, operation, and maintenance (MOM) and increase water productivity by transferring MOM schemes to private operators and introducing innovative infrastructure modernization.[2] The project will focus on modernizing the Muhuri Irrigation Project (MIP) in Chittagong division. It will also finance a feasibility study and detailed design for modernizing the Ganges–Kobadak Irrigation Project in Khulna division and the Teesta Irrigation Project in Rangpur division.

II. THE PROJECT

A. Rationale

3. The primary sources of water in Bangladesh are local rainfall (about 250 cubic kilometers (km^3) annually) and transboundary inflows (about 1,000 km^3 annually), derived mainly from the Brahmaputra, Ganges, and Meghna rivers. Bangladesh occupies only 8% of the total drainage area of these rivers but is located at their downstream end. The result is an abundant excess of surface water during the summer monsoon months and water shortfalls during the winter dry months. The impossibility of developing dam facilities prevents flow regulation throughout the year. Despite being scarce, water is not well managed. Minimal attention is given to water use efficiency and equitable allocation. Many farmers rely on groundwater to supplement the limited and irregular surface water supplies. However, in many areas, the use of groundwater is significantly constrained by arsenic contamination and aquifer limitations. Consequently, the minimum flows required to meet total dry season demands are less than what is available from surface and groundwater. Competition for water is increasing between sectors including agriculture, domestic and industrial water use, navigation, fisheries, and conservation of natural eco-habitats. Possible changes in temperature and rainfall patterns due to global warming may also modify crop-water requirements and water availability, and adversely widen the current gap between supply and demand.

4. **Performance of irrigated agriculture and large irrigation schemes.** In 2010, 31.5% of the population was living below the poverty line. Although agriculture's share of gross domestic product has declined, it is the primary economic sector in rural areas and provides 63% of rural employment. Bangladesh has a net cultivable area of around 8 million hectares (ha). In FY2012, about 5.3 million ha were irrigated; total rice production was 33.5 million tons with 56% being produced during the dry season.[3] Irrigated agriculture productivity remains chronically low; since FY2004 paddy yields have averaged 3.6 tons/ha.[4] The low land productivity is attributable to unreliable irrigation supply; inadequate agriculture extension services; and poor access to farm inputs, markets, and agricultural credit services. Around 550,000 ha or 11% of the total irrigated area is under large irrigation schemes.[5] However, only 46% of this area is currently irrigated during the dry season.

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[1] The design and monitoring framework is in Appendix 1.
[2] The Asian Development Bank (ADB) provided project preparatory technical assistance (TA) for Preparing the Irrigation Management Improvement Project (TA 8154-BAN).
[3] Bangladesh Bureau of Statistics. 2011. *Yearbook of Agricultural Statistics.* Dhaka.
[4] Bangladesh Bureau of Statistics. 2003–2012. *Yearbook of Agricultural Statistics.* Dhaka.
[5] Large irrigation schemes have command areas of 2,000 ha or more.

5. The lack of efficient and sustainable MOM continues to impact the productivity of large irrigation schemes. In 2012, MOM cost recovery from project beneficiaries of the Muhuri, Ganges–Kobadak, and Teesta irrigation schemes averaged 24%: Muhuri 63%, Teesta 18%, and Ganges–Kobadak 0.26%. As a consequence, the schemes' infrastructure is degraded and needs rehabilitation and modernization. Other factors include inadequate government financing,[6] lack of beneficiary empowerment and engagement in MOM, and limited capacity of public agencies resulting in weak service delivery. Specific issues in MIP are (i) inadequate budget for system MOM; (ii) lack of distinction between annual, periodic, or emergency maintenance of a system; and (iii) poor cost recovery from water management groups.[7]

6. Since 2000 substantial efforts have been made to improve irrigation MOM through the introduction of participatory irrigation management, which has been generally successful on small and medium-sized schemes in Bangladesh but yielded limited results for large schemes. The variable performance of participatory irrigation management in improving irrigation MOM is internationally documented and private sector participation through public–private partnership (PPP) is seen as an alternative approach. It has demonstrated promising results in a few developing countries such as Brazil, Ethiopia, and Morocco but is still to be developed in Asia. In 2009, the Asian Development Bank (ADB) provided technical assistance (TA) to the Bangladesh Water Development Board (BWDB) to examine alternative approaches of service delivery agreements and management arrangements including PPP for sustainable irrigation MOM in large irrigation schemes.[8] The TA proposed a conceptual framework for engaging a third party operator to address the shortcomings of the MIP's MOM. It established the basis for the social and economic feasibility of the approach and confirmed farmers' willingness to pay.

7. The National Water Policy, adopted in 1999, sets out a comprehensive framework for the water sector in general and for large surface water irrigation schemes, including a strategic vision comprising private irrigation MOM through leasing, concession, or management contracts. The government has established policy, legal, institutional, and planning frameworks for the water sector, which provide a suitable environment for developing necessary sector reforms. The Water Act, promulgated in May 2013, revised and consolidated existing laws that govern the ownership, utilization, and financial management of water.

8. The Sixth Five-Year Plan, 2011–2015 recognizes the need to increase agricultural productivity, foster crop diversification, and boost public spending on rural infrastructure.[9] The plan also presents a strategic direction for medium- and large-scale surface water irrigation. At its highest level, the strategy focuses on modernization and improved management of existing irrigation systems and expansion of irrigation areas. To reduce public costs in sustainably operating these schemes and to improve delivery service, the strategy encourages the use of PPP wherever appropriate. As part of an overall investment program for the water sector, the government has approved an investment plan to rehabilitate and modernize all large surface water irrigation schemes at an estimated total cost of $745 million. The project will support the modernization of the MIP's infrastructure and MOM, including transferring MOM to the private sector. The project will finance preparation of a modernization strategy, including feasibility studies and detail designs, for the Ganges–Kobadak and Teesta irrigation projects.

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[6] The government's budget appropriation for maintenance met about 50% of requirements for the three schemes.

[7] For 2009–2010, the budget was $126,000 against a demand for $710,000; the irrigation service charge was $12,000 against a target of $430,000.

[8] ADB. 2009. *Technical Assistance to Bangladesh for Developing Innovative Approaches for Management of Major Irrigation Systems*. Manila (TA 7260-BAN).

[9] Government of Bangladesh, Planning Commission, Ministry of Planning. 2011. *Sixth Five-Year Plan, 2011–2015.* Dhaka.

9. MIP construction was completed in 1986. The design enabled dry season irrigation as well as supplemental wet season irrigation by constructing the Feni Closure Dam and Regulator to create a reservoir downstream of the confluence of the Feni, Muhuri, and Kalidash–Pahalia rivers. The backwater from the barrage enters the natural *khals* (channels) and canal network by gravity. From there it was to be lifted by about 800 low-lift diesel pumps to irrigate the fields. The project was to increase the dry season rice area from about 6,000 ha to 20,000 ha. Initially, farmers experienced major improvements in production and were able to cultivate much larger areas with rice; however, siltation of the reservoir and *khals* due to lack of maintenance and reduced runoff in the river has reduced the benefits over the years. The area irrigated in the dry season decreased to 11,300 ha. The increased cost of diesel fuel combined with low pump efficiency and decrease in the rice price contributed to discouraging farmers from cultivating. Opportunities to substantially increase water use efficiency and reduce pumping cost through innovative design modernization and improved MOM were identified during the project preparatory TA and will be supported by the project.

10. The project is consistent with ADB's Strategy 2020[10] and country partnership strategy for Bangladesh, 2011–2015[11] by reinforcing core areas of operations (such as infrastructure and water resources management) and investing in irrigation infrastructure modernization. It proposes recruiting the private sector to achieve effective and sustainable management, which follows five of the seven key thematic drivers of the country partnership strategy: (i) good governance and capacity development, (ii) environmental sustainability and climate resilience, (iii) private sector development, (iv) gender equity, and (v) knowledge solutions through the promotion of innovative irrigation modernization designs. The project is in accordance with ADB's Water Operational Plan, 2011–2020 as it has a strong focus on improving water use efficiency and water productivity.[12]

B. Impact and Outcome

11. The impact will be sustained high growth in agriculture. The outcome will be increased productivity and sustainability of the MIP.

C. Outputs

12. The project will have three outputs:

(i) **Performance-based irrigation management and agriculture support services established.** The output will include contracting private irrigation management operator under 5-year performance-based management contracts. The construction phase irrigation management operator (C-IMO) will supervise modernization works, establish sustainable MOM, and provide agricultural support services for the MIP. Efficient management systems will be adopted to maximize water use efficiencies, and develop sustainable and reliable irrigation service delivery. Viable and effective operation and maintenance (O&M) cost recovery mechanisms will be set up to achieve 100% cost recovery. The objective will be to bring the MIP scheme to the profitability and sustainability required to enable recruitment of a long-term (15 years) management phase

[10] ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020.* Manila.
[11] ADB. 2011. *Country Partnership Strategy: Bangladesh, 2011–2015.* Manila.
[12] ADB. 2011. *Water Operational Plan, 2011–2020.* Manila.

irrigation management operator (M-IMO) through a PPP modality. The project will support preparation of the long-term PPP transaction.

(ii) **Irrigation system infrastructure rehabilitated and modernized.** The output will include physical rehabilitation and modernization of irrigation infrastructure including (a) repair of about 460 km of canals and about 23 km of coastal embankments with ancillary facilities; (b) development of about 17,000 ha of a modern and highly efficient piped water distribution system to improve timely water access and reduce water losses; (c) provision of prepaid card meters to allow water allocations to be on a volumetric basis and ensure full and transparent payment and accounting; (d) full electrification of pumping to reduce operating costs and increase management flexibility; and (e) pilot of solar pumping for about 60 ha.

(iii) **Project efficiently managed with effective institutional development.** The output will include (a) establishment of competent project management and a project implementation unit; (b) timely procurement and disbursement; (c) timely completion of remaining detail designs for MIP civil works, (d) appraisal of Ganges–Kobadak and Teesta irrigation project modernization, and provision of required feasibility studies and detail designs and strategies to transfer MOM to the private sector; and (e) institutional support, and capacity and awareness building of BWDB and water management organizations to successfully administer and support PPP contracts.

D. Investment and Financing Plans

13. The project is estimated to cost $58.0 million (Table 1).

Table 1: Project Investment Plan
($ million)

Item	Amount[a]
A. Base Cost[b]	
1. Performance-based irrigation management	7.7
2. Rehabilitated and modernized irrigation schemes	34.2
3. Strengthened project management	9.1
Subtotal (A)	51.0
B. Contingencies[c]	5.1
C. Financing Charges during Implementation[d]	1.8
Total (A+B+C)	**58.0**

Note: Numbers may not sum precisely because of rounding.
[a] Including taxes and duties of $5.3 million to be financed by the government.
[b] In mid-2013 prices.
[c] Physical contingencies are computed at 0%–10% depending on the types of expenses. Price contingencies computed on foreign exchange costs at 2.2% in year 1, 1.9% in year 2, and 1.9% thereafter, and on local currency cost at 8.5% in year 1, 7.5% in year 2, and 7.0% thereafter, including provisions for exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
[d] Includes interest computed at 2.0% per year.
Source: Asian Development Bank estimates.

14. The government has requested a loan in various currencies equivalent to SDR29,551,000 ($46,000,000) from ADB's Special Funds resources to help finance the project. The loan will have a 25-year term including a grace period of 5 years, an interest rate of 2.0% per annum during the grace period and thereafter, and such other terms and conditions as set forth in the draft loan and project agreements. MIP beneficiaries will contribute $4.2 million through payment of water service charges and $0.17 million to the development of farm canal

systems. The government will finance the balance of $7.6 million as counterpart funding, including project management unit (PMU) staff, taxes, and physical works staff. The financing plan is in Table 2.

Table 2: Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank	46.0	79.4
Beneficiaries[a]	4.4	7.6
Government[b]	7.6	13.1
Total	**58.0**	**100.0**

Note: Numbers may not sum precisely because of rounding.
[a] Contribution to irrigation operation and maintenance costs of each project funded by water charges levied on farmers. Irrigation management operator costs for initial 5 years paid by ADB.
[b] Includes financing by the Bangladesh Water Development Board of project level 1 (primary irrigation) infrastructure and project management.
Source: Asian Development Bank estimates.

E. Implementation Arrangements

15. The implementation arrangements are summarized in Table 3 and described in detail in the project administration manual.[13] BWDB will be the executing agency. A PMU led by a project director with at least the rank of superintending engineer will be established in BWDB's main office in Dhaka. A project implementation unit will be established in the MIP, with a director appointed to supervise MIP modernization implementation in the field. For the Teesta and Ganges–Kobadak irrigation projects, a design support unit led by an executive engineer will be set up at each project site. The design support unit will support preparation of the modernization strategy, feasibility, and detail designs for the two schemes. A project steering committee chaired by the secretary of the Ministry of Water Resources and comprising representatives from all relevant departments will review project progress, resolve critical implementation issues, and provide strategic and policy guidance when required. An implementation coordination committee will be established in the MIP under the leadership of the BWDB chief zonal engineer with representatives from relevant department local offices, farmer organizations, and the C-IMO. The committee will be tasked with resolving conflicts and issues related to implementation of the works and the C-IMO performance-based management contract.

16. Additional financing may be considered if the project performs well. The output (iii) of the project will support the preparation of additional financing. These include feasibility studies and detail designs for modernizing the Ganges–Kobadak and Teesta irrigation projects.

17. For the MIP, BWDB will recruit a private consulting company or consortium through competitive selection and enter into a 5-year management contract agreement. The C-IMO will be responsible for (i) the delivery of efficient service and revenue collection to recover the cost for MOM, (ii) construction supervision of MIP civil works, (iii) participatory design of level 3 system modernization,[14] and (iv) development of pilot agricultural demonstrations and income generating activities. It is envisaged that after 5 years the M-IMO will be recruited through a 15-year lease contract to maintain the MOM levels established during the 5-year first stage. The contract will be awarded through a competitive tender based on (i) a fixed fee for the lease with bidders presenting a financial offer for the water charge, or (ii) a predetermined water charge

[13] Project Administration Manual (accessible from the list of linked documents in Appendix 2).
[14] Levels 1, 2, and 3 correspond to primary, secondary, and tertiary drainage and irrigation networks.

with bidders presenting a financial offer for the lease. After 15 years, the contract will be retendered.

18. Procurement of works, goods, and services financed by ADB will be carried out in accordance with ADB's Procurement Guidelines (2013, as amended from time to time). Consultant selection and engagement will be carried out in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). In view of BWDB's lack of experience with performance-based management contracts and the need to ensure expeditious mobilization, the government requested ADB to recruit the project management and design consultant (PMDC) and the C-IMO. BWDB retains the responsibility for negotiating and signing the contract with the PMDC and C-IMO, issuing the notice to proceed, and supervising their services. The PMDC and C-IMO recruitment will adopt a 90:10 quality–cost ratio since a high level of expertise is essential to design performance-based irrigation management approaches for the Ganges–Kobadak and Teesta irrigation projects and to establish a strong and sustainable management organization for the MIP. In addition, incentives linked to the performance of the C-IMO consultant will be paid against achievement of key milestones. BWDB, with support from the PMDC, will monitor the C-IMO's performance against the milestones. Least-cost selection will be used for small consulting assignments, including external audits, independent safeguards monitoring, and simple studies.

Table 3: Implementation Arrangements

Aspects	**Arrangements**		
Implementation period	June 2014–June 2019		
Estimated completion date	30 June 2019		
Management			
(i) Oversight body	Project steering committee Ministry of Water Resources secretary (chair) Ministry of Agriculture, Ministry of Local Government Rural Development and Cooperatives, Ministry of Environment and Forests, Economic Relations Division, Implementation Monitoring and Evaluation Division, Planning Commission, Bangladesh Water Development Board, Department of Agriculture Extension, Ministry of Fisheries and Livestock and a representative of the ADB		
(ii) Executing agency	Bangladesh Water Development Board		
(iii) Implementation unit	Project management unit in Dhaka and in the field (77 staff)		
Procurement	International competitive bidding	8 contracts (works)	$34.00 million
	Shopping	7 contracts	$0.31 million
Consulting services	Project management and design consultant (quality- and cost-based selection) Full technical proposal 90:10	580 person-months (82 person-months international and 498 person-months national)	$7.10 million
	Construction phase irrigation management operator (quality- and cost-based selection) Full technical proposal 90:10	868 person-months (47 person-months international, 821 person-months national)	$8.00 million
	Panel of experts Individuals	14 person-months (4 person-months international and 10 person-months national)	$0.15 million
	Safeguard monitoring, studies, audits (least-cost selection)	Several contracts	$0.30 million

Aspects	Arrangements
Retroactive financing and/or advance contracting	ADB may, subject to its policies and procedures, allow on request, advance contracting and retroactive financing of eligible expenditures incurred for civil works, equipment, materials, and consulting services. Any approval of advance contracting will not constitute a commitment by ADB to finance the project. Retroactive financing will not exceed the equivalent of 20% of the amount of the relevant ADB financing and will only apply to expenditures incurred before loan effectiveness but not more than 12 months before the signing of the relevant loan agreement.
Disbursement	The loan and/or grant proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2012, as amended from time to time) and detailed arrangements agreed upon between the government and ADB.

ADB = Asian Development Bank.
Source: Asian Development Bank estimates.

19. A PPP unit will be established within BWDB to prepare the bid documents, and support the bidding process and the administration of the C-IMO contract and later the M-IMO contract. The PPP unit will become permanent. A project monitoring cell will be established in BWDB's monitoring division. It will provide independent verification of the performance of various stakeholders and monitor project progress against outputs and targets set out in the design and monitoring framework.

III. DUE DILIGENCE

A. Technical

20. The modernization of the MIP irrigation infrastructure will substantially improve water delivery services and revenue collection for MOM, and promote overall water use efficiency. The MIP modernization option relies on the latest innovations and is tailored for the scheme. The MIP, which relies on low-lift pumps at the tertiary level, will adopt prepaid smart card meters and control systems combined with a piped tertiary distribution system. Pumping costs will be reduced by using efficient electric motors and axial pumps. Power surveys confirm that the additional load of 5.8 megawatts can be accommodated under the current and planned substation capacity and power generation. As per regulation, the pumps would not operate during the peak period from 5:00 p.m. to 11:00 p.m. As a precaution, mitigation measures were built in the design to reduce the possible impact of load shedding. The project will test solar-powered pilot pumps.[15] All technologies have been successfully adopted under the Barind Multi-Purpose Development Authority scheme, and local and regional capacity is sufficient to ensure quality construction and maintenance. The MIP modernization program will bring several benefits including (i) estimated 39% water use efficiency gains from reduced conveyance losses and adoption of volumetric pricing; (ii) flexible, on-demand irrigation supply to support intensification and diversification; (iii) 100% recovery of MOM costs through prepaid system with a 10% reduction of pumping charges paid by farmers to pump operators; and (iv) a substantial mitigation of corruption risk by eliminating cash payments to pump operators.

21. Water balance studies for the MIP reassessed the maximum potential command areas, factoring climate change impacts and transboundary issues. The water balance and land use studies for MIP reveal that of a potential cultivable area of 38,600 ha, about 11,300 ha are currently irrigated from surface water during the dry season. With efficiency gains through modernization and crop diversification, the command area of combined schemes would be expanded to about 17,000 ha. This factors climate change, which anticipates by 2050 a possible increase in temperature of 2°C with increased monsoon rainfall pattern of 0%–20% and peak

[15] The pilots were designed with the support of the Energy for All Initiative.

rainfall intensities of around 15%. Climate adaptation is incorporated into the design by increasing the drainage capacity from a 1:10-year to 1:25-year return period.

B. Economic and Financial

22. Economic analysis undertaken for the MIP indicates that the project is economically viable. The project provides benefits by increasing the irrigated area from 11,300 ha to about 17,000 ha, increasing crop intensity from 107% to 187%, increasing yields by up to 50% for paddy rice, and increasing cash crop production. The economic internal rate of return for the MIP is estimated at 21%. The sensitivity analysis indicates that the economic internal rate of return remains at 12% under the scenarios of project costs increasing by up to 103%, and project benefits reducing by up to 33%. However, incremental benefits to the project are sensitive to a reduction in the area irrigated and construction delays. The direct beneficiaries of the project are the MIP farmers and the benefit distribution analysis confirms that small farmers and sharecroppers will share a substantial proportion of the total project benefits.

23. Financial analysis was carried out to assess the conditions for ensuring financial sustainability of the proposed M-IMO approach under the MIP and its affordability for farmers. Currently, only 60% of the potential irrigable area is irrigated and farmers pay the tariff of $138/ha to private pump operators. Due to the high inefficiency of the diesel pumps and reduced command area, this tariff is only sufficient to cover the cost of pump O&M. It does not cover any other MOM costs, and this has led to the deterioration of the scheme infrastructure and its productivity. The project will increase the irrigated area to about 17,000 ha through increased water use efficiency. It will reduce O&M pumping cost by switching from diesel to electricity pumps. Combined, these will raise the overall revenue of the scheme to sufficiently cover its sustainable MOM. The farm budget analyses reveal that the farmers will generate an average income of $460/ha (with the project) as against $50/ha (without the project). In principle, farmers could afford to pay for the full cost of the capital investment and level 1 MOM; however, this would require raising the tariff to $260/ha, which is significantly more than they currently pay and hence may not be immediately acceptable.[16] A tariff of $124/ha may be considered as an interim tariff. It would fully finance MOM of levels 2 and 3 of the system including a reasonable profit margin for the M-IMO. Once farmers' incomes increase to the level expected at project completion, level 1 O&M cost may also be transferred to the farmers and the water tariff would be increased by about $26/ha.[17]

C. Governance

24. ADB's Anticorruption Policy was explained and discussed with the government and BWDB. Measures are included in the project to mitigate risks including (i) independent construction supervision, (ii) reduced number of contracts, and (iii) provision of procurement experts. Financial management and procurement capacity assessments of BWDB conclude that BWDB has sufficient experience and capacity to manage the project funds as well as adequate fund flow, accounting, and budgeting arrangements. However, improvements are required in several areas including (i) the need for a full-time accountant at the PMU, (ii) training in ADB disbursement and procurement guidelines, (iii) requirement to produce internal audit reports for the relevant zone and circle 6 months after project effectivity, and (iv) provision of a statement of audit needs to ensure that audited project financial statements are received on a timely basis.[18]

[16] Levels 1, 2, and 3 correspond to primary, secondary, and tertiary drainage and irrigation networks.
[17] Excluding BWDB establishment costs.
[18] Project Administration Manual (accessible from the list of linked documents in Appendix 2).

D. Poverty and Social

25. The project is consistent with the broad development goal of the Sixth Five-Year Plan of Bangladesh, which includes achieving food security, making adequate infrastructure available, and pursuing environment-friendly development. A poverty and social analysis was completed for the MIP. The irrigation scheme modernization will reduce poverty incidence in the project area by about 7%.[19] The beneficiaries will be marginal, small, medium, and large landholders, sharecroppers, landless, destitute women, households headed by women, minority groups, as well as the general population in the area of influence, numbering about 1.4 million people, of which more than 60% live below the poverty line. The MIP will create direct employment opportunities for the poor during the construction of water-related infrastructure. The project supports effective gender mainstreaming. The key gender issues in the MIP area generally include noninvolvement of women directly in farming, wage labor, trading, skilled crafts, and running businesses and market stalls. They also do not migrate seasonally for work, although they do manage their household economy when husbands are absent. The gender action plan prepared has measurable targets and responsibilities. The proposed activities are mainstreamed, with no separate resource allocation. Specific gender design features are included in 50% or more project outputs. The project will contribute to improving women's access to the project benefits. Under the MIP, 5% of employment generated from civil works and 20% of employment related to smartcard recharge vending will be reserved for women.

E. Safeguards

26. **Resettlement (category C).** The requirement for temporary relocation and resettlement during the scheme rehabilitation was avoided by reducing the cross sections (steeper side slopes) of canals in populated areas. A resettlement framework was prepared, in accordance with the government's laws and regulations and ADB's Safeguard Policy Statement (2009), as a prudent measure to address any involuntary resettlement-related uncertainty during project implementation, should any issue arise. BWDB has experience in dealing with safeguards including with ADB projects and will be supported by appropriate consultant specialists.

27. **Indigenous peoples (category C).** No indigenous peoples, as defined for operational purposes by the Safeguard Policy Statement, are affected by the MIP.

28. **Environment (category B).** An initial environmental examination was prepared in accordance with the Safeguard Policy Statement. The negative impacts are typical for any construction activities involving earth works and can easily be mitigated through adoption of measures described in the environmental management plan. Consultations were undertaken with affected stakeholders and a suitable grievance redress mechanism proposed to resolve any project-related grievances. PMDC environment specialists will support the PMU in monitoring and supervising implementation of the MIP environmental management plan.

F. Risks and Mitigating Measures

29. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[20] The integrated benefits and impacts of the project are expected to outweigh the costs.

[19] About 36% of country residents have a monthly household income of less than $112 (categorized as "extreme poor"); 23% have a monthly income of $112–$150 (categorized as "poor").
[20] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Changes in government affects commitment to develop PPP for irrigation	ADB maintains close dialogue with the government and other stakeholders to ensure commitment remains and the project communication campaign keeps farmers and local politicians engaged.
BWDB personnel resist transfer to private operators	BWDB field staff are provided opportunities to join private operators.
Private sector is reluctant to engage in PPP for irrigation	The project follows a two-stage approach. First stage, financed by ADB, will establish the sustainability of the scheme. Private sector interest was tested for stage 1 and six expressions of interest were received. PMDC will be provided with a PPP transaction advisor to structure the PPP for stage 2, including risk analysis and allocation to the parties that can best control them. Appropriate PPP policies and legal framework are in place for the government to consider financing the viability gap if required for stage 2.
Low quality of civil works due to corruption	Increased transparency through the project communication strategy Independent construction supervision Procurement centralized in Dhaka project management unit with support from PMDC procurement experts.

ADB = Asian Development Bank, BWDB = Bangladesh Water Development Board, PMDC = project management and design consultants, PPP = public–private partnership.
Source: Asian Development Bank.

IV. ASSURANCES AND CONDITIONS

30. The government and BWDB have assured ADB that implementation of the project shall conform to all applicable ADB policies including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the project administration manual and loan documents. The government and BWDB have agreed with ADB on certain covenants for the project, which are set forth in the loan agreement and project agreement.

31. No disbursement will be made for electrification works under the project until BWDB and the Rural Electrification Board have entered into a memorandum of understanding, acceptable to ADB, regarding the supply of power in the project area generally as well as the tendering of the electrification works and the ownership of the resulting assets more specifically.

V. RECOMMENDATION

32. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan in various currencies equivalent to SDR29,551,000 to the People's Republic of Bangladesh for the Irrigation Management Improvement Project, from ADB's Special Funds resources, with an interest charge at the rate of 2.0% per annum during the grace period and thereafter; for a term of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Takehiko Nakao
President

6 June 2014

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Sustained high growth of agriculture in Bangladesh	By 2025: Annual real agricultural growth remains at 4.5% (baseline: average of 4.5% for 2010–2012)	Bangladesh Bureau of Statistics reports BWDB annual reports	**Assumption** Government remains committed to financing the agriculture and natural resources sector. **Risk** Input prices (i.e., fertilizer, pesticides, electricity) increase sharply.
Outcome Increased productivity and sustainability of the MIP	By 2019: Dry season irrigation area in the MIP increased by 50% to 17,000 ha (baseline 2013: 11,300 ha) O&M funding (from farmers and government) increased to 100% (baseline 2013: 84%) Average yield of irrigated winter paddy (boro) increased to 4 tons/ha (baseline 2013: 3 tons/ha)	BWDB project monitoring and evaluation reports Annual statements of cost recovery by PPP operators and government records BWDB annual reports for MIP	**Assumption** Rural Electrification Board supplies power to the MIP as per agreement (memorandum of understanding signed with BWDB). **Risk** Future climate change impact exceeds projections and affects negatively the project.
Outputs 1. Performance-based irrigation management and agriculture support services established	By 2019: Long-term lease contract in place for MIP large-scale irrigation project Efficient irrigation management in place with 100% recovery of cost of management, operation, and maintenance for levels 2 and 3 achieved (baseline 2013: 63%)[a] 300 trained farmers adopt more productive irrigated agriculture methods; at least 20% of trainees are women	Signed lease agreement Annual statements of cost recovery by PPP operators and government records PPP operator records	**Assumptions** Private sector shows interest in PPP for irrigation. Government continues to promote PPP for irrigation.
2. Irrigation system infrastructure rehabilitated and modernized	By 2019: The MIP rehabilitated and modernized with construction workers comprising 5% women and 20% poor and socially excluded 23 km of coastal embankment repaired, 460 km of canal drains re-excavated One barrage rehabilitated, 800 lift pumps with prepaid meters	For all indicators: BWDB, C-IMO records, and MIS data	

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
	installed, employing at least 10% women as pump operators and 30% as mobile water unit vendors 17,000 ha modernized with piped tertiary distribution		
3. Project efficiently managed with effective institutional development	By 2015 : The project MIS established with sex-disaggregated database By 2018: PPP unit permanently established with adequate capacity By 2019: The project meets annual contract award and disbursement schedule	BWDB project progress reports BWDB project progress reports ADB records Financial records	
Activities with Milestones **1. Performance-based irrigation management and agriculture support services are established** 1.1 Award PPP management contract for one large-scale irrigation scheme by September 2014 1.2 Establish implementation coordination committee to support scheme management for the Muhuri subproject by October 2014 1.3 Assess C-IMO viability (October 2017) and prepare lease bidding documents (January–October 2016) 1.4 Award long-term irrigation management lease contract for Muhuri M-IMO (April 2019) **2. Irrigation system infrastructure rehabilitated and modernized** 2.1 Award contract for 30% of works including (i) *khal* excavation and embankment rehabilitation and (ii) 2,000 ha pumps and pipe irrigation (September 2014) 2.2 Undertake detail design for remaining works including (i) structures, river protection, and buildings; (ii) electrification; and (iii) remaining pumps and pipe irrigation (September 2014– September 2016) 2.3 Award all civil works contracts (October 2017) 2.4 Complete detail designs of Ganges–Kobadak and Teesta irrigation project modernization (April 2016) **3. Project efficiently managed with effective institutional development** 3.1 Establish PMU (July 2014) 3.2 Award PMDC contract (July 2014) 3.3 Establish project MIS (August 2014) 3.4 Establish BWDB PPP unit (December 2014)		**Inputs** **ADB: $46 million** **Government: $7.6 million** **Beneficiaries: $4.4 million**

ADB = Asian Development Bank, BWDB = Bangladesh Water Development Board, ha = hectare, IMO = irrigation management operator, km = kilometer, MIP = Muhuri Irrigation Project, MIS = management information system.
[a] Levels 2 and 3 correspond to secondary and tertiary drainage and irrigation networks.
Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=45207-002-3

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Agriculture, Natural Resources and Rural Development
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Economic and Financial Analysis
8. Country Economic Indicators
9. Summary Poverty Reduction and Social Strategy
10. Gender Action Plan
11. Initial Environmental Examination
12. Resettlement Framework
13. Risk Assessment and Risk Management Plan

Supplementary Documents

14. Stakeholder Communication Strategy
15. A Project Climate Risk Assessment and Management Reporting
16. Economic and Financial Analysis: Supporting Tables
17. Road Map for Modernization of Large Irrigation Systems
18. Financial Management Assessment of Bangladesh Water Development Board