



Report and Recommendation of the President to the Board of Directors

Project Number: 38412
September 2010

Proposed Multitranche Financing Facility India: Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 16 August 2010)

Currency Unit – Indian rupee/s (Re/Rs)

Re1.00 = \$0.02138

\$1.00 = Rs46.77

ABBREVIATIONS

ADB	–	Asian Development Bank
AIFRERMA	–	Assam Integrated Flood and Riverbank Erosion Risk Management Agency
CBFRM	–	community-based flood risk management
CEO	–	chief executive officer
DMC	–	disaster management committee
DMO	–	disaster management organization
EIA	–	environmental impact assessment
FAM	–	facility administration manual
FFA	–	framework financing agreement
FRERM	–	flood and riverbank erosion risk management
MFF	–	multitranches financing facility
PMU	–	project management unit
SEIA	–	summary environmental impact assessment
SIO	–	subproject implementation office
TA	–	technical assistance
WRD	–	Water Resources Department

GLOSSARY

DMO and DMC	–	Disaster management organizations (DMOs) include (i) disaster management authorities at state and district levels; and (ii) community disaster management committees (DMCs) at block (subdistrict), panchayat (village union), and village levels.
revetment	–	A riverbank protection structure constructed on the bottom or banks of a river by placing a layer of material, such as rock, stones, concrete blocks, or mattresses including sand-filled geotextile containers
spur	–	A river training structure built from the bank of a river in a direction transverse to the current, by placing a large quantity of rocks, stones, or concrete blocks (or earth armored with these heavy materials)

NOTES

- (i) The fiscal year (FY) of the Government of India begins on 1 April and ends on 31 March. "FY" before a calendar year denotes the year in which the fiscal year starts, e.g., FY2009 begins on 1 April 2009 and ends on 31 March 2010.
- (ii) In this report, "\$" refers to US dollars.

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PROJECT AT A GLANCE

1. Project Name: MFF - Assam Integrated Flood and River Erosion Risk Management Investment Program (Facility Concept)		2. Project Number: 38412-01-3	
3. Country: India		4. Department/Division: South Asia Department Agriculture, Natural Resources and Social Services Div	
5. Sector Classification:	Sectors	Primary	Subsectors
	Agriculture and natural resources	✓	Irrigation, drainage, and flood protection
6. Thematic Classification:	Themes	Primary	Subthemes
	Economic growth	✓	Knowledge, science, and technological capacities Promoting economic efficiency and enabling business environment
	Capacity development		Institutional development Client relations, network, and partnership development
	Environmental sustainability		Global and regional transboundary environmental concerns Natural resources conservation
	Social development		Disaster risk management
6a. Climate Change Impact:		6b. Gender Mainstreaming:	
Adaptation		Gender equity theme	
Mitigation		Effective gender mainstreaming	
Medium		✓	
		Some gender benefits	
		No gender elements	
7. Targeting Classification:		8. Location Impact:	
General Intervention	Targeted Intervention		
	Geographic dimensions of inclusive growth	Millennium Development Goals	Income poverty at household level
✓			
		Rural	High
		Urban	High
		National	Low
		Regional	
9. Project Risk Categorization: Complex			
10. Safeguard Categorization:			
		Environment	A
		Involuntary resettlement	A
		Indigenous peoples	B
11. ADB Financing:			
Sovereign/Nonsovereign	Modality	Source	Amount (\$ million)
Sovereign	Multitranches financing facility	Ordinary capital resources	120.0
Total			120.0
12. Cofinancing:			
No Cofinancing available.			
13. Counterpart Financing:			
Source		Amount (\$ million)	
Government (including contributions of beneficiaries) and sponsors		30.0	
14. Aid Effectiveness:			
		Parallel project implementation unit	No
		Program-based approach	No

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed multitranche financing facility (MFF) to India for Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program.

2. The investment program will enhance the reliability and effectiveness of flood and riverbank erosion risk management (FRERM) in Assam. Following a stand-alone project modality, it will focus on three existing flood embankment systems (Dibrugarh, Kaziranga, and Palasbari) protecting key urban and productive rural areas along the Brahmaputra River. These areas are vulnerable to flooding because of infrastructure deterioration, riverbank erosion, and limited involvement of local governments and stakeholders. A holistic risk management system will be put into operation with the establishment of community disaster management committees (DMCs), a balanced combination of structural and nonstructural measures, and sustainability mechanisms for relevant infrastructure. International advanced practices will be introduced, including innovative and cost-effective approaches for riverbank erosion management and progressive knowledge development to cope with flooding and riverbank erosion. Resilience against the possible impacts of climate change will be strengthened, which may increase the frequency and magnitude of water disasters in the region, thereby contributing to the efforts of climate change adaptation. The design and monitoring framework is in Appendix 1.

II. THE INVESTMENT PROGRAM

A. Rationale

3. **Strategic context.** Flooding is a major recurrent natural calamity in India, causing annual damage of \$450 million on average. High flood risk discourages private investments in productive activities, and is thus a key contributor to persistent regional and rural–urban disparity. In many cases, the poorest segment of the society suffers the greatest risk and damage. Vulnerability is particularly high in eastern and northeastern India where poverty is high. The Government of India is promoting state level sector reforms through its National Water Policy revised in 2002, advocating comprehensive structural and nonstructural measures integrated with improved catchment management within a long-term planning framework. Strengthening resilience against flooding is a key element of the government’s Climate Change Action Plan defined in 2009.¹

4. Assam is located in alluvial plains and adjacent low hilly terrain of Brahmaputra River basin. It is one of the lowest income states in India. Despite recent acceleration of its economic growth, led by broad economic and fiscal reforms, the gap between the state and national average income has been widening. Effective flood risk management remains high on the state’s development agenda, since a substantial majority of its urban and agriculture area is located in flood-prone areas, and suffers from devastating damages in high flood years. Yet the task is quite challenging, given massive flood discharges of the Brahmaputra River and its highly dynamic morphology, caused by extreme rainfall and fragile subsoil in its catchment, and heavy sediment transport. Addressing the problems calls for a comprehensive long-term perspective and a sound policy and planning framework, as advocated by the government.

5. Assam state government, through the Water Resources Department (WRD), has extended embankments and associated structures to protect about 50% of its flood-prone area. However, their effectiveness is constrained because of poor designs overlooking local drainage, insufficient maintenance, failure caused by river erosion, and limited stakeholder participation.

¹ Government of India. 2008. *National Action Plan on Climate Change*. New Delhi.

Improving the reliability of existing embankment systems with assured maintenance should be given high priority. Where feasible, riverbank protection needs to be provided systematically and adaptively in response to the dynamic morphology. Substantial opportunities exist to enhance cost-effectiveness and sustainability through new technologies, such as (i) use of sand-filled geotextile containers as revetment materials to provide protection with lower cost, higher reliability, and faster implementation;² (ii) flow-retarding screens to induce silt deposition along eroding bank lines as another low-cost option; and (iii) erosion-prediction modeling that can facilitate advance planning and implementation of mitigation measures. Nonstructural measures (such as risk education, mapping and warning, and flood proofing) should also be introduced and pursued with sound knowledge development to understand complex morphology and floodplain hydrology, and participatory mechanisms to ensure transparency and accountability.

6. **Policy framework.** The state government initiated economic reforms in the early 2000s aimed at inclusive growth with stronger governance and public participation. A partnership with the Asian Development Bank (ADB) was established in strategic sectors including fiscal management, power, transport, and flood management. The state government has initiated reform steps including (i) establishing the state Water Resources Council (headed by the chief minister) and Board as sector apex bodies to guide the reform process; (ii) drafting a state water policy with a view to setting up an integrated water resources management system; (iii) holistic FRERM as a prime element of the draft state water policy, setting out a sound strategy; and (iv) notifying the National Disaster Management Act and establishing disaster management organizations (DMOs) at state and local government levels. To establish and demonstrate holistic and sustainable FRERM in partnership with ADB, in January 2010 the state government set up Assam Integrated FRERM Agency (AIFRERMA), an autonomous body anchored to WRD with a multidisciplinary structure, stable leadership, high level oversight, and timely fund flow. A road map to consolidate effective operation of the AIFRERMA has been prepared, covering strategic planning, improved infrastructure quality, and sustainable maintenance.³

7. **Multitranches financing facility investment plan.** The central government and Assam state government accorded high priority to extending effective FRERM systems in flood-prone areas in their Eleventh Five-Year Plan, 2007–2012.⁴ This provided the basis for the investment program. However, in view of the absence of external assistance for the sector in the past and limited staff experience, the initial engagement will take a focused approach on three selected and appraised subprojects with existing embankments protecting critical urban and productive rural areas. The subprojects cover 90 kilometers (7% of the total reach) of Brahmaputra River in the state. Innovations and international best practices and lessons have been drawn, in terms of (i) knowledge development; (ii) more cost-effective, adaptive, and sustainable alternatives in structural and nonstructural instruments; and (iii) holistic program delivery with improved governance, stakeholder participation, infrastructure quality control, integration with disaster management and livelihood promotion programs, and accountability mechanisms in program management.⁵ The subprojects form a concise investment plan for the investment program. Wider replication is envisaged upon successful implementation and preparation of a long-term sector investment plan, and progressive strengthening of the institutional and knowledge bases.

8. **Rationale for ADB partnership and multitranches financing facility.** The investment program is consistent with ADB's assistance strategy for India, which has extended its operation in water resources and rural infrastructure in states willing to pursue sector reforms in

² Boulders quarried from forests are conventionally used as revetment materials, which are becoming more costly.

³ The road map actions are in the Subsector Assessment (Summary): Flood Protection (Appendix 2).

⁴ Government of India, Planning Commission. 2008. *Eleventh Five-Year Plan 2007-2012*. New Delhi; and Government of Assam. 2008. *Eleventh Five-Year Plan 2007-2012*. Guwahati.

⁵ Lessons learned and incorporated are shown in Lessons Learned (Appendix 2).

partnership with ADB. Primarily focused on infrastructure and associated software for FRERM, which are also needed for climate change adaptation, it is consistent with ADB's Strategy 2020⁶ and Water for All Policy.⁷ From the perspective of the state, the investment program is needed as the first step toward statewide application of comprehensive FRERM over the longer term. The state set up AIFRERMA envisaging long-term partnership with ADB. Although designed as a project loan with three appraised subprojects, the MFF modality is most suitable because of the longer implementation period needed to provide a range of FRERM structures step by step, with strengthening of the state and local institutions and knowledge base, and verification of innovative measures. The multitranche financing facility also provides better opportunities in terms of (i) higher implementation quality as a result of its structure to commit the future tranche based on the performance of the ongoing tranche and the readiness of the new tranche, (ii) progressive improvement of the project design incorporating lessons and findings, and (iii) progress of incremental institutional reform actions that can be more strongly pursued during tranche processing with higher managerial attention. Longer-term sector involvement is also needed to develop sound capacities of the institutions concerned.

9. The investment program will institutionalize comprehensive risk management systems to cope with critical flooding and riverbank erosion in Assam. It will demonstrate the following:

- (i) establishment of a sound planning framework of holistic FRERM as a basis for strategic and systematic implementation of sector programs;
- (ii) comprehensive structural and nonstructural measures, introducing cost-effective, sustainable, and innovative riverbank protection adaptive to natural river processes, and nonstructural measures applied in a limited scale in Assam;
- (iii) focused support for institutional development, including (a) knowledge base, (b) autonomous AIFRERMA with multidisciplinary and accountable implementation with stable leadership, and (c) reforms and capacity strengthening of the WRD; and
- (iv) integration of disaster management and FRERM, with DMOs empowered to join implementation process and the participation of women and vulnerable groups.

B. Impact and Outcome

10. The impact of the investment program will be reduced economic vulnerability and social disruption caused by flood and riverbank erosion in Assam. This will contribute to increased economic growth and reduced poverty in the three priority subproject areas along 90 kilometers of the Brahmaputra River having vulnerable embankments protecting the livelihoods of 1 million people in urban, suburban, and productive rural areas. Its outcome is enhanced effectiveness and reliability of the state's FRERM systems providing enhanced resilience.

C. Outputs

11. The outputs of the investment program comprise (i) FRERM planning, institutional and knowledge bases; (ii) comprehensive FRERM systems in three subproject areas; and (iii) a multidisciplinary project management system. The investment will be split into two projects: (i) project 1 (years 1–4) will provide immediately required investments in the three subproject areas⁸ while providing a basis for institutional outputs, and (ii) project 2 (years 4–7) will complete the appraised investments with necessary refinement following the experience of project 1. The outputs for the investment program and project 1 are summarized in Table 1.

⁶ ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

⁷ ADB. 2003. *Water for All: The Water Policy of the Asian Development Bank*. Manila (adopted in 2001).

⁸ Such as riverbank protection works where erosion is progressing close to the existing embankment systems and renovation of existing deteriorated and vulnerable embankments.

Table 1: Investment Program and Project 1 Outputs

Investment Program (Year 1–Year 7)	Project 1 (Year 1–Year 4)
Component A: FRERM Planning, Institutional, and Knowledge Bases	
(i) State FRERM investment plan Investment plan prepared, and annual review and implementation mechanism established	Draft state FRERM plan prepared
(ii) Institutional basis for FRERM Capacity development, office establishment, holistic FRERM guidelines for replication	Capacity development plan implemented (phase 1), office established, FRERM guidelines drafted
(iii) Data and knowledge base Database on morphology and hydrology, erosion prediction modeling for Brahmaputra, hydrological modeling, and research with academic institutions	Database in three subproject areas, erosion prediction modeling for Brahmaputra in lower Assam, and hydrological modeling in one subproject area implemented
(iv) Knowledge sharing and networking Knowledge sharing in regional countries and international seminars, study tours	Knowledge sharing and study tours (phase 1)
Component B: Comprehensive FRERM Systems	
(i) Nonstructural and CBFRM with DMCs Community DMCs established and CBFRM plans prepared in flood-prone villages Nonstructural programs (awareness campaign; improved warning; strengthened relief and response; hazard maps) delivered CBFRM plan implemented with community participation (community flood shelters, minor infrastructure, livelihood programs)	Community DMCs established and plan prepared in 75 priority villages All program materials developed, and delivered in 75 priority villages CBFRM plan implemented in 75 priority villages delivering intended results
(ii) Structural measures Flood embankments: 43 km renovation Riverbank protection with innovative technologies: 37 km revetment and pro-siltation screens, and rehabilitation of 10 spurs Drainage improvement: 9 sluice gates	Flood embankments: 19 km renovation Riverbank protection: 18 km revetment and pro-siltation screens Drainage improvement: 5 sluice gates
(iii) Sustainable infrastructure maintenance and adaptation Asset inventory and MIS for performance monitoring and maintenance planning Maintenance and adaptation works implemented on the basis of MIS Local resources mobilized for routine maintenance works	Establishing inventory and MIS for the three subproject areas Maintenance works implemented based on performance monitoring through MIS Beneficiary group organized for work monitoring and maintenance at project 1 work sites
Component C: Multidisciplinary Project Management System	
PMU and SIOs set up and made functional with sound MIS Project 2 proposal prepared and appraised Participatory implementation decision making system between SIOs and DMOs	All outputs as depicted in the left column are delivered under project 1

CBFRM = community-based flood risk management, DMC = disaster management committee, DMO = disaster management organization, FRERM = flood and riverbank erosion risk management, km = kilometer, MIS = management information system, PMU = project management unit, SIO = subproject implementation office.

Source: Asian Development Bank.

D. Investment and Financing Plans

12. The investment program is estimated to cost \$150 million (Table 2). The government has requested an MFF in an amount up to \$120 million from ADB's ordinary capital resources to finance a part of the investment program (Table 3). The MFF will consist of two tranches (or more if required), subject to the government's submission of related periodic financing requests, execution of the related loan and project agreements for each tranche, and fulfillment of terms and conditions and undertakings set forth in the framework financing agreement (FFA).

Table 2: Program Investment Plan (\$ million)

Item	Amount ^a
A. Base Cost^b	
1. Component A: Development of FRERM planning, institutional and knowledge bases	11.2
2. Component B: Comprehensive FRERM programs	
a. Nonstructural and CBFM measures with DMCs	2.2
b. Structural measures	91.1
c. Sustainable infrastructure maintenance and adaptation	5.9
3. Component C: Multidisciplinary program management systems	10.3
Subtotal (A)	120.7
B. Contingencies^c	17.2
C. Financing Charges During Implementation^d	12.1
Total (A+B+C)	150.0

CBFRM = community-based flood risk management, DMC = disaster management committee, FRERM = flood and riverbank erosion risk management.

^a Including taxes and duties of \$14.0 million to be financed from the government and the Asian Development Bank loan resources.

^b In mid-2009 prices.

^c Physical contingencies are computed at 12.5%. Price contingencies computed at 0.8% of foreign exchange costs and 5.0% for local currency cost per annum, including provisions for exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

^d Includes interest and commitment charges. Interest during construction has been computed at the 5-year forward London interbank offered rate plus a spread of 0.30%. Commitment charges for an Asian Development Bank loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

Table 3: Financing Plan

Source	Amount (\$ million)	Percent of Total
Asian Development Bank	120.0	80
Government	30.0	20
Total	150.0	100

Source: Asian Development Bank estimates.

13. Tranche 1 is estimated to cost \$71.1 million. This includes taxes and duties of \$7.7 million to be financed by the government and ADB.⁹ The government has requested a loan in an amount of \$56.9 million and has submitted the relevant periodic financing request to ADB. The government will finance a balance of \$14.2 million as counterpart funding. The ADB loan will have a term of 25 years, including a grace period of 7 years, with interest rate determined in accordance with ADB's London interbank offered rate-based lending facility, a commitment charge of 0.15% per year, and such other terms and conditions set forth in the loan and project agreements. Table 4 summarizes the financing plan for project 1.

Table 4: Cost Estimates and Financing Plan for Project 1 (\$ million)

Item	ADB	Government	Total
A. Project Cost, including Contingencies			
1. Institutional and knowledge-based development	5.1	0.7	5.8
2. Comprehensive FRERM programs	47.8	6.2	54.0
3. Project management and institutional strengthening	4.0	1.8	5.8
Subtotal (A)	56.9	8.7	65.6
B. Financing Charges	...	5.5	5.5
Total	56.9	14.2	71.1
Financing Share (%)	80	20	100

... = not available, ADB = Asian Development Bank, FRERM = flood and riverbank erosion risk management.

Source: Asian Development Bank estimates.

⁹ ADB financing will amount to \$3.1 million and cover part of a 4.0%–12.5% value added tax applied to civil works and construction materials that is considered reasonable, transparent, and nondiscriminatory.

E. Implementation Arrangements

14. Assam state government, acting through AIFRERMA, will be the executing agency. AIFRERMA was established by the state government along with its multidisciplinary project management unit (PMU) and the chief executive officer was appointed from its administrative cadre. AIFRERMA will manage its technical, disaster risk management and safeguards, and finance and account divisions. At each subproject level, subproject implementation offices (SIOs) are established augmenting the existing WRD field offices with multidisciplinary staff. The implementation arrangements for project 1 are summarized in Table 5 and described in detail in the facility administration manual (FAM).

Table 5: Project 1 Implementation Arrangements

Aspects	Arrangements		
Implementation period ^a	October 2010–March 2014		
Estimated project completion date	31 March 2014		
Project management			
(i) Oversight body	Governing council of AIFRERMA, chaired by the chief secretary, and comprising an additional chief secretary and heads of relevant departments (agriculture, finance, fisheries, forestry and environment, planning and coordination, revenue and disaster management, rural development, social welfare, and water resources)		
(ii) Executing agency	AIFRERMA		
(iii) Key implementing agencies	SIOs under AIFRERMA		
(iv) Project management unit	Guwahati, 24 staff in three multidisciplinary directorates		
Procurement	ICB – goods	3 contracts	\$16.3 million
	NCB – goods and civil works	9 contracts	\$24.9 million
	Shopping	11 contracts	\$0.6 million
Consulting services	QCBS	753 person-months	\$8.4 million
	CQS	308 person-months	\$0.5 million
	Individual	30 person-months	\$0.1 million
Retroactive financing and/or advance contracting	Advance contracting for procurement and consultant engagement Retroactive financing for up to 20% of the loan amount for expenditures incurred 12 months before loan signing		
Disbursement	The loan proceeds will be disbursed in accordance with ADB's <i>Loan Disbursement Handbook</i> (2007, as amended from time to time) and detailed arrangements agreed between the government and ADB.		

ADB = Asian Development Bank, AIFRERMA = Assam Integrated Flood and Riverbank Erosion Risk Management Agency, CQS = consultant qualification selection, ICB = international competitive bidding, NCB = national competitive bidding, QCBS = quality and cost based selection, SIO = subproject implementation office.

^a The implementation period of the investment program will be from October 2010 to March 2017.

Source: Asian Development Bank estimates.

15. **Institutional strengthening.** Separate institutional strengthening technical assistance (TA) for capacity development of community-based integrated FRERM in Assam is included as a cluster TA subproject and will be implemented in combination with the investment program.¹⁰ The cluster TA subproject aims to enhance the capacity of the FRERM institutions to put into operation comprehensive FRERM systems and a community-based approach.¹¹

¹⁰ ADB. 2009. *Technical Assistance to India for Advanced Project Preparedness for Poverty Reduction*. Manila.

¹¹ The outputs of the TA comprise (i) institutional mechanisms to prepare and implement effective community-based flood risk management programs; and (ii) modern FRERM systems, tools, and guidelines for knowledge base development, structure design and implementation, nonstructural measures, and safeguards management. The estimated TA cost is \$750,000, of which \$600,000 is financed by ADB from funds provided through the Memorandum of Understanding between the Government of the United Kingdom and ADB on the Department for International Development–ADB Partnership for India, 2009–13; the balance is provided by the central government and Assam state government.

III. DUE DILIGENCE

A. Technical

16. The structural measures provided under the investment program include (i) renovation of flood embankments and their ancillary facilities, and (ii) riverbank protection where ongoing erosion is threatening critical flood embankments and populated areas. Flood embankments will be designed to provide protection against 100-year floods in urban areas and 25-year floods in rural areas in accordance with the intended design level of the existing structures.¹² Ancillary facilities (such as sluice gates) will be provided to facilitate optimal water management, including conservation of natural water bodies and drainage improvement. Riverbank protection will pursue an adaptive approach of stabilizing naturally developed bank lines through revetments to minimize impacts on morphology. More cost-effective and sustainable innovations will be applied, including the use of sand-filled geotextile containers, flow-retarding screens, and erosion-prediction modeling (para. 5). The effectiveness of geotextile containers and erosion-prediction modeling was demonstrated in an ADB-financed project in lower Brahmaputra in Bangladesh, and reflected in the country's national guidelines for riverbank protection.¹³ The investment program will consolidate these innovations in Assam with performance monitoring and evaluation.¹⁴ Based on this, standardization and replication in other flood- and erosion-prone areas in Assam and in other parts of India can be explored.

B. Economic Impacts and Sustainability

17. **Economic returns.** In the three subproject areas (Dibrugarh, Kaziranga, and Palasbari),¹⁵ primary benefits include (i) reduced flood hazards, (ii) reduced land loss associated with river erosion, and (iii) reduced cost of flood relief and rehabilitation. Investor confidence is also expected to increase, leading to enhanced investments in rural and urban production. The estimated economic internal rates of return for all subproject level interventions (of the entire life of the investment program) are 18%–20% for the three subprojects, and 17% for the overall investment program (including capacity development). Sensitivity analysis was carried out to assess the impacts of a range of risks, including cost overruns, the need for follow-on adaptation,¹⁶ implementation delay, and reduced incremental crop production. The analysis showed that project returns are generally robust. The greatest risk appears to be the cost overrun, of which the switching value is 44% for the Kaziranga subproject.

18. **Sustainable maintenance and adaptation.** To be effective, the FRERM infrastructure requires maintenance and adaptation. The state government has responsibility for FRERM (as a public good) through budgetary expenditures, although recovery through increased land revenues on urban and agriculture land is envisaged in the longer term.¹⁷ The investment program supports the sustainability of infrastructure through a multipronged approach, including (i) an infrastructure asset management information system to be established starting with the selected subprojects and eventually covering the entire state, as a basis of sound monitoring, planning, and implementation of maintenance and adaptation; (ii) progressively enhanced

¹² A 100-year flood is an extremely destructive flood that has a 1% chance of occurring in any given year. A 25-year flood has a 4% chance of occurring in any given year.

¹³ ADB. 2002. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the Jamuna-Meghna River Erosion Mitigation Project*. Manila.

¹⁴ ADB also facilitated observation and consultation of experts from India (including Assam) and Bangladesh on the application of these new technologies in the lower Brahmaputra (Jamuna) River in April 2010.

¹⁵ Existing embankments in these areas were constructed in the 1950s–1960s but are facing the immediate risk of embankment breach induced by river erosion.

¹⁶ Adaptation is defined as providing additional works to cope with changes in morphological conditions.

¹⁷ The state government is computerizing land records with the objective valuation method, supported by ADB in public resource management sector.

allocation of the annual maintenance budget toward the full requirement;¹⁸ (iii) improved and transparent management of fund utilization, including disclosure to the district administration and DMOs concerned (including local DMCs) regarding fund allocation, procurement, and work orders; (iv) mobilization of available state and central funding for routine maintenance, such as rural employment guarantee programs; (v) delegation of maintenance of minor infrastructure such as sluices and flood platforms to the DMCs concerned; and (vi) utilization of government central flood management programs for major maintenance and adaptation, particularly of riverbank protection structures requiring capital expenditures.¹⁹

C. Governance

19. Good governance is essential for ensuring and sustaining the intended benefits. The WRD's financial management system was assessed and the investment program has incorporated measures for ensuring accountability and transparency, pursuing participatory management of process and outputs with quality control mechanisms.²⁰ Subprojects are prepared by setting out clear input and output targets in their implementation plans. DMOs (including DMCs) are empowered to participate in implementation, such as endorsing community-based flood risk management plans and periodic work plans. Program expenditures—including the civil work scope, quantity, cost, and contractors—will be posted at the subproject sites, monitored by trained DMO members and consultant quality monitors. With awareness campaigns, complaints handling officers will operate grievance mechanisms. AIFRERMA will undertake annual financial audits of SIOs and the PMU through a chartered accounting firm, and establish an internal third-party technical audit mechanism via externally engaged experts with the support of consultants. The specific institutional measures are shown in Schedule 3 of the FFA and the FAM (Appendix 2).

20. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and the state government including AIFRERMA and the WRD. Policy requirements and supplementary measures are described in the FAM.²¹

D. Poverty and Social

21. Some 32%–58% of the population in the three subproject areas falls below the poverty line—most of these people live on less than \$2 a day. The investment program, through reduced flood loss and incremental food production, will enhance the annual average agricultural net income of farm laborers by 27%–51% (Rs1,400–Rs2,400) and marginal farmers by 28%–41% (Rs4,900–Rs5,900). The social development strategy will mainstream stakeholder participation in community DMCs, linking them with existing state government poverty reduction programs and providing them with support prepared under the investment program. The investment program has been classified “effective gender mainstreaming.” In support of the policy principles of the 11th Five-Year Plan for the economic and social empowerment of women, a gender action plan for the investment program has been defined, which will enhance the role of women in project institutions (including 30% women's representation in DMCs); provide at least 30% program benefits to women in accordance with the Assam Women Act,

¹⁸ Fund allocation was increased by 80% to \$6 million over the 5 years up to FY2010, although this is only about 30% of the estimated requirement.

¹⁹ This is in line with the recommendation of the special task force formed after the major flood in eastern and northeastern India, including Assam, in 2004.

²⁰ The WRD operates a financial and accounting system in accordance with the state financial rules and under the supervision of the Finance Department. Under the investment program, a specialized financial unit will be set up within the PMU in AIFRERMA with assignment of finance cadre staff who will be trained in accounting policies and procedures, including ADB disbursement systems.

²¹ Facility Administration Manual (Appendix 2).

2005; and strengthen the capacity of AIFRERMA, the WRD, and other project organizations in addressing gender development issues in promoting integrated FRERM.

E. Safeguards

22. **Social safeguards.** The investment program has been classified category A for involuntary resettlement and category B for indigenous peoples. While its structural measures primarily involve the renovation of existing flood embankments, strip acquisition of land is needed in association with embankment retirement to cope with riverbank erosion, widening, and extension. The majority of acquired lands are located along the eroding bank line, which would be lost without project works. Project 1 will require acquisition of no land in Dibrugarh (embankment widening on the existing right-of-way with squatters, affecting 310 households); 20.6 hectares in Kaziranga (for inner secondary dyke, affecting 80 households); and 29.9 hectares in Palasbari subproject (for shifting, affecting 274 households). Full resettlement plans for project 1 works of these subprojects were prepared and agreed. Indigenous peoples issues were found insignificant for project 1, and any negative impact is addressed in the resettlement plans. For social safeguards issues for the subsequent project(s), a resettlement framework and indigenous peoples development framework have been prepared and agreed following central and state government laws and regulations, and ADB's Safeguard Policy Statement (2009).

23. Under the investment program, all affected persons are entitled to compensation for land acquired and lost assets at their replacement cost. They will also be assisted in improving, or at least restoring, their pre-intervention income and livelihood standards, and productive capacity. Payment for acquired lands, structures, and other eligible benefits will be fully made prior to the commencement of civil works contracts. In case of significant negative impacts on indigenous peoples, an indigenous peoples development plan or actions will be prepared to ensure equal sharing of benefits. The AIFRERMA PMU will supervise preparation and implementation of social safeguards plans by the SIO concerned, with the support of consultants and nongovernment organizations. The estimated cost is \$7 million for the investment program.

24. **Environment.** The overall negative environmental impacts are deemed insignificant. Nevertheless, the investment program has been classified category A to provide the rigorous assessments of the project's implications on diverse riverine environment. Environmental impact assessments (EIAs) were carried out for the three subprojects, along with their summary EIA (SEIA).²² The EIAs cover the impacts of the entire investment program and will be updated prior to project 2 as necessary.²³ The EIAs noted that the investment program will have overall positive impacts on the environment and is overwhelmingly supported by local stakeholders, including (i) increased security against flooding and riverbank erosion, protecting vital assets and enhancing production systems; (ii) an improved aquatic environment with the installment of sluice gates and optimal water management; and (iii) an improved disaster risk management system. Key potential negative impacts include (i) possible impacts on river hydrology and morphology; (ii) impacts from future climate change, earthquakes, and upstream development works; and (iii) construction-related impacts, including possible impacts on endangered species such as river dolphins, loss of trees, health hazards, and pollution from construction camps.

25. Among these, no significant impacts are anticipated on hydrology and morphology, as the project will renovate embankments that have existed since the 1950–1960s. Riverbank protection will adopt revetments and siltation screens that will not intervene against the existing channel flows. Systematic monitoring will be put in place and mitigation measures will be

²² The SEIA was circulated to ADB Board of Directors on 1 July 2009.

²³ An environmental assessment and review framework has also been prepared and agreed for the preparation and implementation of minor CBFMR measures.

provided in case unexpected effects are observed. Other impacts can be mitigated through construction site management and tree plantation programs. These were incorporated in the environmental management plan, which is estimated to cost \$1.8 million. The AIFRERMA PMU and SIOs will be responsible for implementing the environmental management plan; they will engage environment experts and will be assisted by consultants.

F. Risks and Mitigating Measures

26. Major risks and mitigating measures are summarized in Table 6.²⁴ The overall benefits of the investment program are expected to outweigh the potential costs from risks and are detailed in the risk assessment and risk management plan.

Table 6: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Limited institutional capacities	(i) Prior establishment of AIFRERMA with qualified CEO and other staff, (ii) focused implementation of three subprojects, and (iii) capacity building support through separate TA and consultants.
Delayed implementation	(i) Advance procurement and engagement of consultants and NGOs; (ii) advance initiation of land acquisition and resettlement; and (iii) compliance with readiness checklist, including PMU establishment and staffing.
Flood and riverbank erosion protection infrastructure sustainability	(i) Establishment of asset inventory and management information system, (ii) enhanced fund allocation and improved management, (iii) linkage to centrally funded and local government programs, and (iv) mobilization of local resources.

AIFRERMA = Assam Integrated Flood and Riverbank Erosion Risk Management Agency, CEO = chief executive officer, NGO = nongovernment organization, PMU = project management unit, TA = technical assistance.

Source: Asian Development Bank.

IV. ASSURANCES

27. The government and the state government through AIFRERMA have assured ADB that implementation of the investment program 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 FAM and loan documents.

28. The government and the state government through AIFRERMA have given ADB certain undertakings for the MFF, which are set forth in the FFA. Specific covenants agreed by the government and the state government through AIFRERMA with respect to individual tranches under the MFF are set forth in the loan agreement and project agreement for the respective tranches.

V. RECOMMENDATION

29. I am satisfied that the proposed multitranche financing facility would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the provision of loans under the multitranche financing facility in an aggregate principal amount not exceeding \$120,000,000 to India for the Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, and such other terms and conditions as are substantially in accordance with those set forth in the framework financing agreement presented to the Board.

Haruhiko Kuroda
President

27 September 2010

²⁴ Risk Assessment and Risk Management Plan (Appendix 2).

DESIGN AND MONITORING FRAMEWORK (INVESTMENT PROGRAM)

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p>Impact Reduced economic vulnerability and social disruption caused by flood and riverbank erosion risks in Assam</p>	<p>From 2020: Higher economic growth in Assam project areas compared with flood-prone areas</p> <p>Poverty incidence reduced by 5%–10% in project areas</p> <p>Sustained agricultural growth in subproject areas arising from (i) reduced crop production losses caused by floods and riverbank erosion; (ii) 20% increase in monsoon crop yields; and (iii) on-farm employment increased by 900,000 person-days per year</p> <p>Better land value in the benefit areas</p>	<p>State government annual economic development reports</p> <p>State and department statistics on agriculture, fisheries, incomes, revenue, and human development indexes</p>	<p>Assumptions Political and local security conditions are stable</p> <p>State government replicates similar projects in other flood-prone areas</p> <p>Sustainable maintenance of FRERM infrastructure by the state government</p> <p>Risks Natural calamities beyond the design return period</p> <p>International terms of trade for agriculture products turn adverse</p>
<p>Outcome FRERM systems in Assam provide enhanced resilience to flood and riverbank erosion risks in selected flood-prone areas along the Brahmaputra River, benefiting about 1 million people</p>	<p>By 2020: Sustained reduction of annual flood damage and rehabilitation cost from the current average of Rs350 million per year (1988–2008)</p> <p>No flood damages as a result of embankment breach caused by flood or riverbank erosion</p> <p>Land lost by riverbank erosion within project areas reduced from current average loss of 230 ha per year</p> <p>Urban, agricultural, and other flood-prone lands along 90 km critical reaches of the Brahmaputra River totaling 53,000 ha protected from floods and riverbank erosion</p>	<p>Annual reports of CWC, AIFRERMA, WRD, MOWR, ASDMA, and their websites</p> <p>State statistics on agriculture and lands (e.g., Public Works Department: roads and public buildings, district office: residential properties, Department of Fisheries)</p>	<p>Assumptions Political and local security conditions are stable</p> <p>Sustainable maintenance of FRERM infrastructure by the state government</p> <p>Risk Natural calamities beyond the design return period</p>
<p>Outputs 1. Integrated FRERM planning, institutional and knowledge bases developed and effectively implemented in Assam</p>	<p>By 2017: Assam State Water Policy adopted, and integrated FRERM aspects progressively implemented</p> <p>Comprehensive state FRERM plan (prepared and implemented with stakeholder consultation) is adopted and its implementation started</p> <p>Performance of FRERM agencies improved and aligned with the policy and plan, and supported by CDP</p> <p>Sound data and knowledge base developed and strengthened</p> <p>Knowledge sharing and networking established and contributing to knowledge transfer and sharing at national and international levels</p>	<p>State government economic development reports and district statistics</p> <p>State government relevant department reports</p> <p>AIFRERMA and WRD annual reports</p> <p>AIFRERMA project progress and completion reports</p> <p>AIFRERMA MIS</p> <p>WRD MIS for monitoring and planning scheme maintenance</p>	<p>Assumptions State support to sustain and proceed with reforms</p> <p>FRERM institutions including AIFRERMA and DMOs sustain their performance targets</p> <p>Beneficiary willingness to participate in DRM activities</p> <p>Risk High turnover of trained staff in FRERM institutions</p>

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p>2. Comprehensive FRERM nonstructural and structural measures developed, implemented, and sustainably maintained in selected subproject areas, protecting flood-prone areas along 90 km critical reach of the Brahmaputra River having 97,500 ha of urban and productive agriculture land</p>	<p>DMOs established and strengthened at district, block, and gram panchayat and highly vulnerable villages, with women participation (30%)</p> <p>Nonstructural and other CBFRM measures, including CBFRM investments, in place (2017)</p> <p>Cost-effective FRERM structural measures completed in subproject areas with requisite social and environmental safeguards, including:</p> <p>(i) 43 km flood embankments renovated or newly constructed,</p> <p>(ii) 37 km riverbank protection works, and (iii) 10 spurs and 9 sluice gates.</p> <p>Short- to medium-term measures for sustainable maintenance and adaptation, as set out under the sector road map, in place within agreed time frame</p>	As above	<p>Assumptions</p> <p>Qualified consultants and NGOs are engaged</p> <p>Quality of construction and nonstructural works maintained with quality control</p> <p>Staff capacities strengthened and retained with training and consultant support</p> <p>Stakeholder willingness to participate in DMOs</p> <p>Risk</p> <p>Extreme floods and earthquakes</p>
<p>3. Institutional and financial capacities of FRERM institutions in Assam developed and strengthened</p>	<p>Specific measures on participatory mechanisms and social development, including gender actions, as provided in the sector roadmap, incorporated into FRERM operations within agreed time frame</p> <p>Actions to support institutional reforms fully in place by program completion</p> <p>Integrated FRERM programs introduced and replicated in other affected districts from 2017 onwards</p>	As above	<p>Assumptions</p> <p>Qualified consultants and NGOs are engaged</p> <p>Staff capacities strengthened and retained with training and consultant support</p> <p>Stakeholder willingness to participate in DMOs</p>
Activities with Milestones		Inputs	
<p>Activity 1: Tranche 1</p> <p>1.1 Specific policy and institutional actions, as set out in road map, completed (before December 2010)</p> <p>1.2 ADB approves tranche 1 by October 2010</p> <p>1.3 Contract award of consultants and first year civil works by December 2010</p> <p>1.4 Tranche 1 implementation completed in 4 years (by 2014)</p> <p>1.5 Proposal for tranche 2 completed and submitted by AIFRERMA by December 2012</p> <p>Activity 2: Tranche 2</p> <p>2.1 ADB approves tranche 2 by April 2013</p> <p>2.2 Tranche 2 implementation completed by 2017</p>		<p>ADB: \$120 million</p> <p>Civil works and related materials: \$99.0 million</p> <p>Resettlement: \$1.2 million</p> <p>Training: \$2.2 million</p> <p>Research: \$3.2 million</p> <p>Consultants, NGOs, and local institutes: \$7.8 million</p> <p>Project management and others: \$6.6 million</p> <p>Government: \$30 million</p> <p>Counterpart fund for implementation: \$17.9 million (including project personnel)</p> <p>Financial charges: \$12.1 million</p>	

ADB = Asian Development Bank, AIFRERMA = Assam Integrated Flood and Riverbank Erosion Risk Management Agency; ASDMA = Assam State Disaster Management Authority, CBFRM = community-based flood risk management, CDP = capacity development plan, CWC = Central Water Commission, DMO = disaster management organization, DRM = Disaster Risk Management, FRERM = flood and river erosion risk management, ha = hectare, km = kilometer, MIS = management information system, MOWR = Ministry of Water Resources, NGO = nongovernment organization, WRD = Water Resources Department. Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/RRPs/?id=38412-01-3>

1. Framework Financing Agreement and Periodic Financing Request for Project 1
2. Subsector Assessment (Summary): Flood Protection
3. Facility Administration Manual
4. Contribution to the ADB Results Framework
5. Development Coordination
6. Economic Analysis
7. Country Economic Indicators
8. Summary Poverty Reduction and Social Strategy
9. Gender Action Plan
10. Environmental Impact Assessments
11. Environmental Assessment and Review Framework for Community-Based Flood Risk Management
12. Resettlement Plans
13. Resettlement Framework
14. Indigenous Peoples Planning Framework
15. Risk Assessment and Risk Management Plan
16. Lessons Learned
17. Good Governance Measures