



Technical Assistance Report

Project Number: 40156
September 2007

India: Preparing the Sustainable Coastal Protection and Management Project (Financed by the Japan Special Fund)

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 01 September 2007)

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

Re1.00 = \$0.0244

\$1.00 = Rs40.90

ABBREVIATIONS

ADB	–	Asian Development Bank
COBP	–	country operations business plan
CPDAC	–	Coastal Policy Development and Advisory Committee
CRZ	–	coastal regulation zone
CWC	–	Central Water Commission
CWPRS	–	Central Water and Power Research Station
EIA	–	environmental impact assessment
IA	–	implementing agency
IEE	–	initial environmental examination
MFF	–	multitranchise finance facility
MOWR	–	Ministry of Water Resources
NCPP	–	National Coastal Protection Project
PPTA	–	project preparatory technical assistance
TA	–	technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Targeting Classification	–	Targeted intervention
Sector	–	Agriculture and natural resources
Subsector	–	Water resource management
Themes	–	Sustainable economic growth, capacity development
Subthemes	–	Developing rural areas, institutional development

NOTE

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

Vice President	L. Jin, Operations Group 1
Director General	K. Senga, South Asia Department (SARD)
Director	F. Roche, Agriculture, Natural Resources, and Social Services Division, SARD
Team leader	S. Ranawana, Natural Resources Economist, SARD
Team members	P. Bozakov, Water Resources Management Specialist, SARD V. Samarasekara, Natural Resources Management Specialist, SARD



I. INTRODUCTION

1. A \$200 million Sustainable Coastal Protection and Management Project¹ is listed in the 2009 lending pipeline, and the corresponding project preparatory technical assistance (PPTA) of \$1 million is listed in the 2007 nonlending pipeline of India's country operational business plan (COBP) 2007–2009. An Asian Development Bank (ADB) fact-finding mission visited India from 18 April to 7 May 2007 to discuss the scope, financing, and implementation arrangements of this PPTA.² The technical assistance (TA) project will be used to prepare an investment project for sustainable coastal protection and management in the states of Goa, Karnataka, and Maharashtra. Assistance to these states may be considered the first phase of a multiphased assistance program which broadly supports India's National Coastal Protection Project (NCPP). The design and monitoring framework is in Appendix 1.

II. ISSUES

A. Issues and Approaches in Coastal Protection

2. **Nature of Coastal Erosion in India.** All Indian maritime states and union territories are subject to varying degrees of coastal erosion. Approximately 1,450 kilometers (km) or about 26% of the country's mainland coastline is prone to erosion, causing an estimated loss of about 450 hectares (ha) of land each year. Around 20–25% of India's population lives within 50 km of the coast and around 70% of those people are in rural areas. It is these rural poor coastal communities who are the most vulnerable to the impacts of erosion. In fact, destitution is the very reason that draws such people to the coastline in the first place, where they often encroach on state reservations and make a subsistence living from the surrounding natural resource base. Coastal erosion hits such communities hardest since it destroys their property and disrupts their livelihoods. Many of India's rapidly growing urban areas are also vulnerable to coastal erosion; Mumbai, for example, incurs a cost of approximately \$2.5 million per km on capital works alone to protect some of its prime waterfront property. The impact of climate change is likely to aggravate coastal erosion even further. Sea level rise in the Indian subcontinent is projected to be between 15 and 38 centimeters (cm) by the middle of the 21st century, rising to between 46 and 59 cm by the end of the century. A 1 meter (m) rise in sea level in India would inundate about 5,700 square kilometers (km²) of land, affecting around 7 million people.

3. **Financial Issues Relating to Coastal Protection.** In 1991–1992, investment in erosion mitigation suffered a setback due to the cessation of central loan assistance. Constrained by limited funds, state government investment in coastal protection measures has declined, and funds have often been inadequate to address even urgent coastal protection works. Protection measures are typically taken up on an emergency basis, or in a bid to prevent impending disasters. When the problem is addressed at such an advanced stage, the range of possible mitigation options is limited to a few structural measures (such as sea walls and groins). Most often, such measures amount to fixing the immediate symptom rather than addressing the cause of the problem. Since they are treated as emergency measures, coastal protection works are not held up to strict standards of technical and economic viability or environmental and social impact. Furthermore, due to the shortage of funds, maintenance work is rarely carried out. Consequently, most of these structures collapse within 3–10 years of construction.

4. **Institutional Issues Relating to Coastal Protection.** The mandate for coastal erosion mitigation is typically entrusted to a coastal division, which is subsumed within a larger state

¹ The project was formerly listed as the Integrated Coastal Zone Management and Sustainable Coastal Protection Project.

² The TA first appeared in *ADB Business Opportunities* on 15 June 2007.

department with a much broader mandate. Consequently, the budget for coastal protection measures is also subsumed within broader budget areas (such as roads, port development, flood control, and irrigation). Similarly, the technical and human-resource capacity of the coastal divisions is limited; while most staff members are competent civil engineers with experience in executing civil works, they have minimal experience with modern and sustainable coastal protection measures.

5. There is a need to improve coordination of various coastal protection initiatives, both at the central level as well as between central and state agencies. At the central level, the Coastal Policy Development and Advisory Committee (CPDAC)³ coordinates various initiatives and provides states with policy direction and technical advice on coastal protection; however, it lacks the statutory authority to enforce its directives. The Central Water Commission (CWC) is the technical arm of the Ministry of Water Resources (MOWR) and is responsible for coordinating the approval of coastal protection projects proposed by states. However, state-initiated coastal protection projects are frequently carried out without specific approval by CWC. CWC also has the mandate to initiate centrally sponsored schemes for coastal protection but few significant initiatives have been taken thus far. Coordination between technical institutes providing advice to maritime states on coastal protection measures also needs to be improved. The Central Water and Power Research Station (CWPRS) is the lead agency in this regard; in addition there are several other institutes that provide specialized technical services related to designing coastal erosion management measures.⁴ In general, technical institutes in India have had limited experience in designing and implementing modern and innovative coastal protection measures.

6. **Coastal Protection and Coastal Zone Management.** Coastal erosion mitigation is integrally linked with coastal zone management. The notification that regulates activities in the coastal zone⁵ is due to be replaced by a new notification,⁶ and this will also have two significant implications for future coastal protection measures. Firstly, the proposed mapping of the vulnerability zone will determine the type of land uses and the design features of structures (such as buildings) that will be permitted within the coastal zone. This in turn will influence decisions on the nature and extent of protection that must be accorded to different areas of the coastal zone. Secondly, the introduction of a requirement to prepare coastal zone management plans will mandate planning and coordination of development activities in the coastal zone. Coastal protection measures will also need to be incorporated into such integrated coastal zone management plans. However, the preparation and effective implementation of coastal zone management plans is a long-term measure. Priority coastal protection measures and other development activities along the coastal zone will need to be undertaken in parallel with the introduction of the coastal zone planning process. A World Bank project to assist the Ministry of Environment and Forest to implement the new notification is currently under preparation.⁷ Therefore the TA project and the ensuing investment project will be designed to complement the

³ CPDAC is headed by a member of the Central Water Commission (CWC). Representatives of coastal states and related central departments serve as members.

⁴ Other institutes with technical design capabilities are Integrated Coastal and Marine Area Management Project Directorate, Chennai; National Institute of Oceanography, Goa; Indian Institute of Technology, Chennai; National Institute of Ocean Technology, Chennai; National Institute of Technology Karnataka, Suratkal; Centre for Earth Science Studies, Thiruvananthapuram; and Karnataka Engineering Research Station, Maharashtra Engineering Research Institute, and Institute of Hydraulics and Hydrology, Poondi.

⁵ The Coastal Regulation Zone (CRZ) Notification, 1991.

⁶ The new notification has been designed on the basis of recommendations of a technical advisory group that reviewed the existing CRZ notification. The Ministry of Environment and Forest was due to release the notification in mid-2006 but has not yet done so.

⁷ The project, titled Coastal Zone Integrated Management, is expected to commence in mid-2008. The project will assist with (i) vulnerability and ecological mapping, (ii) institution and capacity building for integrated coastal zone management, and (iii) investment in state-level pilot projects. Gujarat, West Bengal, and Orissa will participate in this project; however, the World Bank may consider including one or two more states.

efforts of the Ministry of Environment and Forest by introducing concepts of sustainable coastal protection based on long-term shoreline management.⁸

B. State-Specific Issues

7. Issues Specific to Goa. The coast of Goa is 105 km long and is typically characterized by wide pristine beaches, sand dunes, and cliffs. As a result the coastal region of Goa has been subject to high development pressure, especially for tourism. Poor land-use planning and ineffective enforcement of regulations have resulted in encroachment into ecologically sensitive areas such as sand dunes and wetlands. Partly as a consequence of this, Goa is now facing beach erosion in certain areas such as Utorda and Betalbatim. At present the extent of erosion is relatively small (around 40 km); however, one such section of beach is of prime importance from a tourism perspective. A significant percentage of the state's economy and labor force depends on tourism. Construction of sea walls would clearly negate the tourism potential of these beaches; however, unless sustainable measures are adopted in advance, the options for protection against erosion may be limited to hard structures.⁹

8. Issues Specific to Karnataka. The Karnataka coastline is 280 km long, and about 250 km (89%) is affected by erosion. The most severely affected areas are Ullal, Honnavar, Bhatkal, Kundapur, Bengre, Mulki, Bhavikeri, and Tannirbavi. Coastal protection received some prominence in the state after the Asian tsunami of December 2004. The government of Karnataka has a master plan for coastal erosion management upon which it based its proposal for inclusion in the NCPP. The Karnataka coastline includes several stretches of wide beaches which could be developed into tourism or residential areas. The state wishes to address coastal protection in such areas in a more systematic manner and adopt long-term measures with an emphasis on soft structures¹⁰ or nonstructural interventions¹¹ wherever possible.

9. Issues Specific to Maharashtra. Maharashtra has a coastline of 720 km, of which about 320 km (about 44%) is subject to erosion. Coastal urban areas such as Mumbai have been severely affected by erosion, partly due to clearance of mangroves and associated vegetation along the shoreline and also due to construction of offshore and coastal infrastructure. Rural coastal districts such as Riagat and Palgrave have also been adversely affected by erosion. This has increased the vulnerability of resident coastal communities to natural disasters (such as cyclones) since their dwellings are along the fringes of the shoreline. The government of Maharashtra recognizes the need to address coastal protection in a more systematic manner. The state is interested in identifying alternative coastal protection methods that are compatible with the coastal activities and the environments that are to be protected, particularly innovative coastal protection interventions that can be structured into financially viable projects, especially through public-private partnerships.

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

10. The overall impact of the TA project will be (i) to contribute towards the improved wellbeing of coastal communities, (ii) greater sustainability of coastal ecosystems, and (iii) a reduction in loss of coastal property in Goa, Karnataka, and Maharashtra. The TA project would

⁸ Shoreline management is defined as a process to assess long-term shoreline changes, analyze options, and implement sustainable long-term measures to prevent coastal erosion.

⁹ Examples are sea walls, submerged groins and reefs, and detached breakwaters.

¹⁰ Examples are geotextile tubes, beach nourishment, dune management, sand bypassing (around obstructions), and shelter belts.

¹¹ Examples are set backs and zonation (to regulate land use patterns).

achieve this impact by designing innovative interventions for sustainable coastal protection and shoreline management planning.

11. The outputs of the TA project will comprise (i) a framework and action plan for sustainable shoreline management; (ii) a corresponding investment program for each state, comprising three to six fully appraised priority subprojects¹² and a long list of outline designs for structural and nonstructural interventions that would be studied in detail and financed during the ensuing loan (subject to technical and economic viability and social and environmental acceptability); and (iii) an investment proposal combining outputs (i) and (ii), prepared to meet ADB's technical and economic viability requirements, and other due-diligence requirements of a project loan.

B. Methodology and Key Activities

12. The TA project will operate simultaneously along two parallel paths: (i) it will seek to develop a sustainable (long-term) planning and management process for coastal protection leading to the first output described in para. 11; and (ii) it will address urgent (short-to-medium term) coastal protection requirements of the respective states under the second output listed above. The TA project will seek to integrate the two outputs, thereby guiding state authorities to eventually adopt sustainable long-term coastal protection strategies. The two components required to achieve the TA project outputs are described below.

13. **Component 1: Shoreline Planning, Institutional Development, and Investment Planning.** The TA project will review coastal protection measures adopted by the participating states, including ongoing interventions, policy and institutional frameworks, current strategies, and investment and funding plans. Based on the review, a design framework for sustainable long-term shoreline management will be prepared to cover each stage of the process from planning,¹³ financing, implementation, and enforcement,¹⁴ to monitoring and evaluation. Thereafter, action and investment plans will be prepared to enhance each of the stages mentioned above. Action plans will cover institutional development and capacity building at the central and state level, and investment plans will cover specific interventions for each stage. Finally, these action and investment plans will be packaged into an investment proposal covering the three states.¹⁵ Since these are likely to be sector-like projects, necessary due-diligence will be carried out to ensure compliance with ADB's safeguard and other policies and guidelines.

14. **Component 2: Detailed Designs of Site-Specific Subprojects.** One or two sites from each state will be selected for detailed design and feasibility analysis of appropriate coastal protection interventions.¹⁶ Detailed assessments of coastal processes operating at each site will be undertaken, first by using a combination of existing data and new data.¹⁷ This will be

¹² One or two subprojects will be selected for detailed feasibility study from each state during the PPTA.

¹³ This will include (i) long-term shoreline mapping and trend analysis; and (ii) selection criteria for structural and nonstructural interventions, incorporating vulnerability factors.

¹⁴ This will include appraisal criteria for specific subprojects and procedures for operation and maintenance.

¹⁵ Provision will be made for a separate investment package for central institutions.

¹⁶ The criteria for selecting sites will be determined under component 1. Site selection will also be based on availability of data and other considerations (such as the ability to demonstrate viable public-private partnerships associated with the intervention).

¹⁷ The TA project will utilize the available technical reports and project proposals of the participating implementing agencies, and data and analyses of government institutions. Where such data is unavailable or inadequate for the purpose of undertaking detailed technical designs of coastal protection measures, the TA project will commission field measurements and studies for primary data collection.

followed by numerical modelling¹⁸ (carried out using an iterative approach) to design appropriate coastal protection for each site together with the corresponding social and environmental impacts, associated costs, and detailed feasibility studies. These details will be incorporated into the investment proposal prepared under component 1, and submitted for consideration of ADB financing under the ensuing loan.

C. Cost and Financing

15. The total cost of the TA project is estimated at \$1,260,000 equivalent. The TA project will be financed on a grant basis by the Japan Special Fund, funded by the Government of Japan. The grant will be for \$1,000,000 equivalent and the participating state governments will finance the remaining \$260,000 equivalent through provision of office space, counterpart staff, survey and investigation data, reports, and analyses. Detailed cost estimates and a financing plan are shown in Appendix 3. The Government of India has been informed that approval of the TA project does not commit ADB to finance any ensuing project.

D. Implementation Arrangements

16. The TA project will be implemented simultaneously in the three participating states. MOWR will be the executing agency. The Water Resources Department will be the implementing agency (IA) in Goa, the Public Works Department will implement the TA project in Karnataka, while the Maharashtra Maritime Board will be responsible for implementation in Maharashtra. The three IAs will appoint TA project directors in their respective states with rank no less than superintending engineer. MOWR will form a TA project steering committee chaired by the MOWR secretary, with the participation of the heads of the IAs and representatives of other related union government line agencies (including Planning, Finance, Environment, and Earth Sciences) to provide policy guidance. Each state will establish a TA project working group to provide technical advice and monitor progress at state level. These working groups will comprise senior staff of the IA and other related departments with functional responsibilities for finance, revenue, environment and forests, land-use planning, metropolitan or urban councils, fisheries, tourism, industries, and ports.

17. The TA project will be implemented over a period of 9 months from November 2007 to July 2008. Consulting services will be provided by a team of international and national consultants based in Goa. The total consulting services input of 60 person-months will comprise 19 person-months of international consultants and 41 person-months of national consultants. The breakdown of consultant inputs and the outline terms of reference are shown in Appendix 4. The TA project team will be engaged by ADB through an international firm in association with national firm(s) following *ADB's Guidelines on the Use of Consultants* (2007, as amended from time to time). The firm will be selected following ADB's quality- and cost-based selection method (using a quality-to-cost ratio of 80:20) based on full technical proposals. The TA project equipment will be procured by the consulting firm in accordance with *ADB's Procurement Guidelines* (2007, as amended from time to time). The equipment will pass to the government upon completion of the TA.

IV. THE PRESIDENT'S DECISION

18. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$1,000,000 on a grant basis to the Government of India for preparing the Sustainable Coastal Protection and Management Project, and hereby reports this action to the Board.

¹⁸ Typical data requirements for numerical modelling are bathymetry, wave (height, period, and direction), current (speed and direction), tide (amplitude and phase), sediment (grain size, density, and fall velocity), river discharge, and wind (speed and direction) measurements.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact</p> <p>To contribute towards the improved wellbeing of coastal communities, greater sustainability of coastal ecosystems, and reduction in loss of coastal land in Goa, Karnataka, and Maharashtra.</p>	<p>Reduction in loss of land and crops due to sea erosion.</p> <p>Shoreline stability maintained within predicted levels of changes.</p> <p>Efficiency and effectiveness of coastal protection measures improved.</p>	<p>Measurements against baseline conditions established during the TA project.</p> <p>State statistics on compensation for loss of property and crops.</p>	<p>Assumption</p> <ul style="list-style-type: none"> Individual states accept the terms and conditions of lending offered by the Asian Development Bank (ADB).
<p>Outcome</p> <p>An investment proposal that addresses long-term and medium-to-short term measures for sustainable management of the shoreline of Goa, Karnataka, and Maharashtra.</p>	<p>The overall investment proposal for a project in sustainable coastal protection and management is accepted by the union and state governments and ADB.</p>	<p>Aide memoire of final tripartite mission.</p> <p>TA project draft final report</p> <p>India country operations business plan updates</p>	<p>Risk</p> <ul style="list-style-type: none"> Legal, policy, and institutional changes do not hinder the implementation of the proposed shoreline management framework.
<p>Outputs</p> <p>1. A framework and action plan for sustainable shoreline management.</p> <p>2. An investment program comprising several fully appraised subprojects and a long list of outline designs for structural and nonstructural coastal protection measures.</p>	<p>The proposed design framework for shoreline management is accepted by all stakeholders</p> <p>At least one detailed coastal protection subproject is designed for each state up to the level of detailed feasibility study with accompanying due-diligence requirements by the end of the 8th month of the TA project.</p>	<p>TA project inception report</p> <p>Proceedings of first national workshop</p> <p>Aide memoire of inception mission</p> <p>TA project interim report</p> <p>Proceedings of second national workshop</p> <p>Aide memoire of review mission(s)</p>	<p>Assumptions</p> <ul style="list-style-type: none"> Information and data pertaining to shoreline management is available and accessible. State authorities support the TA project recommendations for improving shoreline management processes. State authorities and beneficiaries agree on selection of sites for detailed assessment of coastal protection measures. <p>Risks</p> <ul style="list-style-type: none"> Weather conditions hinder field work and data collection activities. State elections and other political changes hinder decision-making processes on key outcomes of the TA project.

Activities with Milestones	Inputs
<p>TA project consultants will:</p> <ol style="list-style-type: none"> 1.1 Assess coastal protection measures and processes of participating states. 1.2 Prepare a design framework for sustainable shoreline management (completed 1.5 months after TA project commencement). 1.3 Prepare action and investment plans to enhance each stage of coastal protection process, according to above framework (completed 6 months after TA project commencement). 1.4 Select sites for detailed design and feasibility study (completed 1.5 months after TA project commencement). 1.5 Prepare detailed designs of proposed protection measures, including stakeholder consultation and assessment of environmental and social impacts (completed 7 months after TA project commencement). 1.6 Prepare detailed costing and preparation of social and environmental assessment reports of selected subprojects and the overall investment proposal (completed 9 months after TA project commencement). <p>ADB will:</p> <ol style="list-style-type: none"> 2.1 Recruit TA project consultants in consultation with union and state governments. 2.2 Supervise TA project consultants and review outputs. 2.3 Conduct review missions to discuss TA project outputs with union and state governments and other stakeholders. <p>Union government (MOWR) will:</p> <ol style="list-style-type: none"> 3.1 Serve as liaison between ADB and union and state governments on strategic policy and investment matters relating to the TA project and subsequent loan. 3.2 Establish a TA project steering committee and convene meetings at strategic points during TA project implementation. <p>State governments will:</p> <ol style="list-style-type: none"> 4.1 Support TA project activities by appointing directors, providing office space and facilities, facilitating access to technical documents and data, facilitating the public consultation process, and supporting the preparation of detailed project reports for selected subprojects. 4.2 Establish TA project working groups and convene meetings at regular intervals to supervise TA project activities. 	<p>ADB will provide:</p> <ul style="list-style-type: none"> • \$1 million in grant funds to support the TA project, which will cover 19 person-months of international and 41 person-months of national consultants, some office equipment, and funds for field investigations and computer-modeling fees. • supervision of the TA project through review missions and feedback to consultants. <p>The union and respective state governments will provide:</p> <ul style="list-style-type: none"> • the equivalent of \$260,000 through in-kind contributions by way of office space and facilities, a full-time TA project director (one per state) and other counterpart staff to support the TA project consultants • access to data and information necessary to assess shoreline management and site-specific coastal protection measures.

ADB = Asian Development Bank, MOWR = Ministry of Water Resources, TA = technical assistance.

INITIAL POVERTY AND SOCIAL ANALYSIS

A. Linkages to the Country Poverty Analysis

Is the sector identified as a national priority in country poverty analysis?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is the sector identified as a national priority in country poverty partnership agreement?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Contribution of the sector or subsector to reduce poverty in India:			
<p>The Government's poverty reduction strategy, presented in the 10th Plan of 2002, highlights improvements in infrastructure and the productive base. The Asian Development Bank's (ADB) country strategy and program (CSP) 2003–2006¹ and its updates support the 10th Plan, and bases its poverty reduction assistance on the three strategies of pro-poor growth, social development, and good governance. The CSP emphasizes facilitation of poverty reduction through infrastructure-led growth. Accordingly, ADB has expanded operations in several sectors, including water management, to better achieve this goal.</p> <p>Coastal erosion poses a high risk to human wellbeing, economic development, and ecological integrity. Around 20–25% of India's population live within 50 km of the coast, and the average population density of coastal states (455 persons per km²) is significantly higher than the national average (324 persons per km²). Almost 70% of the coastal population of India lives in rural areas, and it is the poor rural coastal communities that are most vulnerable to the impacts of erosion. In fact, destitution is the very reason that draws many such people to the coastline in the first place, where they often encroach on government-owned land and subsist from the surrounding natural resource base. Coastal erosion hits such communities hardest since it destroys their property and disrupts their livelihoods.</p> <p>Effective coastal erosion can improve the wellbeing of coastal communities through the prevention of losses to property, crops, and livelihoods. The TA project will contribute towards improved human wellbeing and ecological integrity of the coastal zone of Goa, Karnataka, and Maharashtra. This will be achieved by improving shoreline management planning and formulating sustainable coastal protection measures for the abovementioned states. The TA project will also propose a range of structural and nonstructural interventions to arrest the rapid rate of coastal erosion and associated coastal deterioration.</p> <p>The resulting long-term state coastal protection and management plans and implementation investment programs will introduce enhanced sustainable planning, financing, design, implementation, and operation and maintenance procedures. Emphasis will be placed on coastal community participation and public–private partnership, cost effectiveness, efficiency, transparency, and sustainability. These activities will be supplemented by site-specific nonstructural interventions, livelihood enhancement, and coastal-community development programs, and strengthening of the policy and institutional framework to ensure efficient project implementation. Extensive consultation with the project stakeholders throughout the TA project implementation will ensure the ownership of the planning processes and outputs by the participating agencies.</p>			

B. Poverty Analysis

Targeting Classification: General intervention

What type of poverty analysis is needed?

The consultants will (i) prepare brief socioeconomic profiles of the selected subprojects; (ii) assess community willingness to participate in subproject works and recommend participatory mechanisms for planning, selection, design, implementation, monitoring, and maintenance of these works; (iii) conduct public meetings and dialogue to assess stakeholder priorities and the potential impacts of the identified options on the most vulnerable segments of society including the poor and women; (iv) prepare a strategy for incorporation of social development and poverty reduction including gender action plans, following ADB's handbook on poverty and social analysis; (v) suggest subproject-specific interventions to implement poverty reduction and social strategies; and (vi) recommend follow-up actions, including the required resources and funding, for beneficiary participation, social development, and livelihood enhancement. The consultants will also review ongoing programs designed to stimulate inclusive rural economic growth and enhance and diversify the income of coastal communities. Such activities may include community development and empowerment, and livelihood support for the identified vulnerable groups.

¹ ADB. 2002. *India: Country Strategy and Program 2003 - 2006*. Manila.

The poverty analysis will track potential adverse effects over the short, medium, and long term for the poor and vulnerable groups. It will review options to eliminate such negative effects through design changes, or mitigate them through specific measures to be included in the project design and costed as part of the total project cost. The poverty analysis will also review options to extend or enhance the benefits of the poor and vulnerable groups through design changes in the scope or pace of the policy conditions.

C. Participation Process

Is there a stakeholder analysis? Yes No

Preliminary stakeholder assessment and analysis will be undertaken during the TA project. Stakeholders to participate in the project include men and women of the coastal communities in the target area, all tiers of government (central and state governments), research and academic institutions, nongovernment organizations (NGOs), civil society organizations, and the private sector where relevant and appropriate. Initial consultations with the communities will be undertaken during the preparation of the socioeconomic and poverty analysis. Public meetings will also be organized at the community level to assess community priorities and potential impacts and options. Multistakeholder consultations at the local government and national level will be conducted to share results of the assessments and action plans developed.

Is there a participation strategy? Yes No

Based on the stakeholder analysis that will be undertaken during the TA project, a strategy and action plan will be formulated which will seek to define the manner in which stakeholders may most effectively participate during the project cycle. A strong emphasis will be made on ensuring fair representation of the interests and needs of each group, especially the poor and the most vulnerable.

D. Gender and Development

Strategy to maximize impacts on women:

Coastal erosion affects women and men alike, particularly through the loss of their dwellings. In terms of livelihoods, loss of access to the shoreline affects fishing which again affects both men (engaged in capturing fish) and women (engaged in related activities such as net mending and processing) alike. However the TA project will incorporate specific measures to ensure that women effectively and actively participate in (i) the project design, (ii) the identification of options for coastal protection, and (iii) project implementation.

Has an output been prepared? Yes No

E. Social Safeguards and Other Social Risks

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Resettlement	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input type="checkbox"/> None	The TA project will assess and ascertain the precise extent of resettlement implications and will respond accordingly by preparing the necessary resettlement frameworks and plans for sample subprojects involving involuntary resettlement.	Resettlement framework will be prepared and resettlement plans prepared for sample subprojects if considered necessary.

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Affordability	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	Affordability issue does not arise as no additional charges will be levied on people.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Labor	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	No job losses will occur. The ensuing project is likely to contribute to generation of employment opportunities in construction, operation, and maintenance of the ensuing project.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Indigenous Peoples	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input type="checkbox"/> None	The TA project will assess the presence of indigenous groups during the TA project and accordingly will assess if there are any potential issues. If required, an indigenous peoples development framework and indigenous peoples development plan for sample subprojects will be undertaken.	An indigenous peoples development framework and subproject development or action plans will be prepared if considered necessary.
Other Risks and/or Vulnerabilities	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	None.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

ADB = Asian Development Bank, CSP = country strategy and program, km = kilometer, NGO = nongovernment organization, TA = technical assistance.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Total Cost
A. Asian Development Bank Financing^a	
1. Consultants	
a. Remuneration and Per Diem	
(i) International	501.0
(ii) National	248.0
b. International and Local Travel	51.0
c. Reports and Communications	10.0
2. Equipment ^b	20.0
3. Field Investigations and Computer Modeling Fees	60.0
4. Seminars and Workshops	10.0
5. Miscellaneous Administration and Support	10.0
6. Transport ^c	25.0
7. Contingencies	65.0
Subtotal (A)	1,000.0
B. Government Financing	
1. Counterpart Staff and Per Diem	50.0
2. Project Offices	60.0
3. Reports, Analyses, and Administration Support Costs	90.0
4. Travel and Vehicles for Counterpart Staff	25.0
5. Contingencies	35.0
Subtotal (B)	260.0
Total	1,260.0

^a Financed by the Japan Special Fund, funded by the Government of Japan.

^b Equipment will include computers, printers, scanners, fax and photocopy machines, and other minor office equipment.

^c Vehicles will be leased for duration of the technical assistance.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE

A. General

1. The technical assistance (TA) project will support the states of Goa, Karnataka, and Maharashtra to prepare the Sustainable Coastal Protection and Management Project. The TA project will include two components: (i) shoreline planning, institutional development, and investment planning; and (ii) detailed designs of site-specific subprojects. The TA project will be carried out by a team of international and national consultants as described in Table A4.1. The scope of work to be undertaken by the consultants is described below, but may be modified further as determined by the Asian Development Bank (ADB) and the Government.

2. The consultants will fully utilize the project reports, data, and analysis carried out by the respective state governments, central technical agencies, and research institutes, and work closely with the staff of these establishments. The consultants will also consult affected communities and other stakeholders (including the private sector) who have an interest in the development and protection of coastal areas. Close coordination will be maintained with the proposed World Bank-financed Coastal Zone Integrated Management Project to ensure uniform approaches to long-term planning and coordination of the proposed coastal protection works.

Table A4: List of Consultants

Expertise	Person-Months
A. International Specialists	
1. Coastal Planning Specialist and Team Leader	5
2. Coastal Protection Works Engineer	4
3. Coastal Modeler	4
4. Coastal Engineer (Geotextile Specialist)	1
5. Environmental Specialist	1
6. Social Development Specialist (Resettlement and Indigenous People)	1
7. Public-Private Project Development Specialist	1
8. Project Economist	2
Subtotal (A)	19
B. National Specialists	
1. Coastal Engineer and Deputy Team Leader	9
2. Coastal Protection Works Engineers	7
3. Marine Scientist/Ecologist	2
4. Quantity Surveyor	3
5. Geotechnical Specialist	2
6. Natural Resource Economist	4
7. Financial Specialist	3
8. Environmental Specialist	3
9. Institutional Development Specialist	4
10. Social Development Specialist	3
11. Gender Development Specialist	1
Subtotal (B)	41
Total	60

Source: ADB Fact Finding Mission.

B. Scope of Services

1. Shoreline Planning and Institutional Development

3. The consultants will undertake the following tasks.

- (i) Review the institutional arrangements and processes of the relevant state agencies for: (a) identifying erosion problems; (b) assessing the impacts and prioritizing areas that need protection (including the extent to which technical institutes are consulted at this stage); (c) including coastal protection activities in the annual planning and budgeting processes; (d) undertaking field measurements and modeling, and the preparation of technical designs (including the extent to which external technical institutes are consulted in this process); (e) preparing financial and economic analysis of proposed works; (f) consulting with affected communities; (g) liaising with other stakeholders with an interest in coastal area development or conservation; (h) executing works, and monitoring impacts and performance of interventions; and (i) incorporating maintenance of existing works into the annual planning and budgeting process. In the context of the above processes, review the role of central government agencies such as the Central Water and Power Research Station, state-level technical agencies (such as the Karnataka Engineering Research Station and the Maharashtra Engineering Research Institute) and independent research institutes (such as the National Institute of Oceanography, Indian Institute of Technology, National Institute of Ocean Technology, National Institute of Technology Karnataka, and Centre for Earth Science Studies).
- (ii) Review the technical and human-resource capacities of the relevant central and state agencies to (a) undertake oceanographic field measurements and numerical and physical modeling of coastal processes, particularly with respect to vulnerability assessments; (b) analyze coastal processes and design appropriate coastal protection interventions; (c) prepare financial and economic analysis of proposed works; (d) execute works; and (e) monitor impacts and performance of interventions.
- (iii) Collate information on capital and recurrent (i.e., maintenance) expenditure on coastal protection works over the past two decades, the sources of funding and the nature of analysis (technical, economic, social, and environmental) carried out prior to undertaking the works.
- (iv) Review and analyze the impact of coastal protection works carried out over the past two decades in terms of the economic, ecological, and social conditions of the surrounding area that was protected.
- (v) Review coastal protection and shoreline management projects and programs of countries with similar conditions, including those financed by donor organizations. Based on the lessons learned from this review, extrapolate best-practice concepts and models for India.
- (vi) Assess the economic, ecological, and social implications of not addressing coastal protection within each state in a timely manner, paying particular attention to projections of climate-change scenarios. To the extent possible, quantify these implications in terms of lost economic opportunities, cost of social disruptions, and loss of ecological services.

- (vii) Review policies, strategies, plans,¹ and regulations of the union government and state governments pertaining to coastal protection, including the current coastal regulation zone notification, the proposed notification on the coastal management zone and state-level regulations relating to development of the coastal zone.
- (viii) Review and assess (a) the institutional arrangements and capacity of agencies responsible for undertaking nonstructural works to address coastal erosion, (b) the effectiveness of such interventions, and (c) the extent to which such nonstructural measures are undertaken within a holistic strategy for coastal protection.
- (ix) Review and assess (a) the interest of private parties (especially real estate developers) to engage in public–private partnerships with the state on coastal area development projects; (b) the formulation of criteria for identifying areas conducive to such public–private partnership arrangements; (c) the engagement of potential private parties with a view to formulating suitable public–private partnership schemes that include coastal protection.
- (x) Based on (i) to (ix), recommend a comprehensive framework for long-term sustainable shoreline management in each state, including (a) the appropriate policy and legal basis for implementation and regulation of coastal protection measures; (b) institutional arrangements for consultation, planning, implementation, monitoring, and evaluation; (c) financing arrangements including capital and recurrent expenditure budgeting; (d) technical requirements including capability for field measurements and modeling with particular emphasis on the ability to undertake vulnerability assessments; and (e) human-resource requirements including requirements for skills development.
- (xi) Based on above framework, develop specific action plans for each state relating to (a) policy and legal reforms (if applicable); (b) institutional strengthening including links between central and state agencies, research and academic institutes, and nongovernment organizations and civil society groups; (c) capacity building, including procurement of equipment and human-resource development; and (d) information, education, and consultation strategies.
- (xii) Develop action plans for selected central and state technical institutes to strengthen their capacity in (a) field measurement and assessment of coastal processes, (b) design of structural and nonstructural measures for coastal protection.
- (xiii) Conduct workshops to present and discuss the shoreline management framework and action plans listed above.

¹ Including (but not limited to) the National Coastal Protection Project proposal and the Swaminathan Committee Report that proposes amendments to the 1991 Coastal Zone Regulation Notification to improve the overall planning and institutional coordination in coastal zone management.

2. Detailed Designs of Site-Specific Subprojects.

4. During the TA project, three to six sites (one or two per state) will be selected for detailed design of appropriate coastal protection interventions. In this regard the consultants will be responsible for the following tasks.

- (i) Formulate suitable criteria for selection of the sites that will be studied in detail during the TA project.²
- (ii) Analyze all available data pertaining to the site³, determine additional surveys and field measurements that need to be undertaken, and prepare actions for conducting or subcontracting such data collection.
- (iii) Carry out a stakeholder analysis to identify all concerned stakeholders and affected parties. Develop a participation strategy for the Project which establishes protocols for consultations and sharing of information to ensure inclusive participation of the community throughout the project cycle. In addition, develop a gender action plan to address and apply specific measures to enhance the participation of women in the project.
- (iv) Prepare brief socioeconomic profiles of each subproject, which can be used as benchmarks for future monitoring and impact evaluations.
- (v) Assess community willingness to participate in subproject works and recommend participatory mechanisms for planning, selection, design, implementation, monitoring, and maintenance of these works.
- (vi) Conduct public meetings and assess stakeholder priorities and the potential impacts of the identified options on the most vulnerable segments of society, including the poor and women.
- (vii) Assess development scenarios of the particular location,⁴ and on that basis project the potential economic, ecological, and social benefits to be gained by undertaking protection measures.
- (viii) Based on the above (and on best international and India-specific practice), identify innovative and cost-effective coastal protection intervention(s) for the location.⁵
- (ix) Undertake numerical modeling and other technical assessments to verify the suitability of the proposed interventions.⁶

² Apart from urgency for intervention at a particular site, consideration will also be given to factors such as the availability of data pertaining to the site, potential to demonstrate an innovative yet viable coastal protection measure, and the potential to demonstrate viable public-private partnership arrangements.

³ Including (but not limited to) (i) technical data such as bathymetry, wave (height, period, and direction), current (speed and direction), tide (amplitude and phase), sediment (grain size, density, and fall velocity), river discharge, and wind (speed and direction) measurement; (ii) land-use plans and regulations and existing land-use patterns; (iii) economic characteristics; (iv) ecological features; and (v) demographic conditions.

⁴ An appropriate demarcation of the location should be carried out through the consultative process described in (iii) to (vi) above.

⁵ Taking into consideration a range of hard and soft structures and nonstructural measures that can generate multiple benefits.

⁶ Including (but not limited to) (i) wave breaking characteristics with and without the preferred option; (ii) beach sediment dynamics with the preferred option present, including longshore transport, cross-shore transport, short to long-term impacts on the beach system and equilibrium beach conditions; (iii) modeling of wave transitions, with particular emphasis on the wave penetration into the beach, and effects on downstream regions, for a broad range of wave conditions (periods, heights, and tidal state); (iv) modeling of the currents around the preferred option with emphasis on rip currents and any unfavorable currents that may be identified; and (v) modeling of the sediment dynamics around the preferred option with particular emphasis on the formation of salients, tombolos, and scour areas, effects on hot spots, or passage of littoral drift past the preferred option.

- (x) Conduct socioeconomic profiles and environmental and social impact assessments as specified in the section below.
- (xi) Prepare feasibility-level designs, engineering drawings, detailed cost estimates, and implementation schedules covering all aspects of the proposed interventions (i.e., subprojects) including engineering and other technical criteria, resettlement and other social impacts, and environmental impacts and required mitigation measures.
- (xii) Assess the risks arising from the subprojects, particularly risks from projected climate-change scenarios, and identify risk-management measures that could be incorporated into the design and during implementation to mitigate such risks.
- (xiii) Conduct analyses to assess the economic and financial viability of the proposed subprojects according to the relevant Asian Development Bank (ADB) guidelines.
- (xiv) Assist state government agencies to prepare the detailed project report, necessary environmental and social impact assessment reports, and other documents needed to obtain clearance to execute the proposed subprojects.

3. Safeguard Assessments and Financial Management Assessment

5. **Resettlement Assessments.** The consultants will follow ADB's *Involuntary Resettlement Policy* (1995) and the relevant national and state policies as applicable, and prepare the required resettlement framework and resettlement plans for the core and noncore subprojects. In particular, the consultants will be responsible for the following tasks.

- (i) For all core subprojects, determine if there are any structural or nonstructural interventions that require land acquisition, establishment or reestablishment of right-of-way, change in land use or tenure arrangements, or entail livelihood impacts resulting from restricted access to land and coastal resources. If significant involuntary resettlement impacts with or without physical displacement are identified, develop options to avoid or minimize involuntary resettlement impacts and develop a resettlement plan for each core subproject in accordance with ADB's *Involuntary Resettlement Policy*. The resettlement plan will address (a) any full, partial, permanent, or temporary loss of housing, land, or income by any affected business establishment, and (b) the impacts on nontitled and vulnerable people.
- (ii) For any core subproject which requires a resettlement plan, assist the implementing agencies and the government to (a) undertake an inventory of losses and a socioeconomic survey of the affected populations, and ensure that data is disaggregated by gender; (b) conduct a replacement cost survey to determine unit replacement costs of assets lost and ensure that compensation standards are based on replacement value; (c) develop livelihood rehabilitation and improvement programs for affected persons, and prepare an entitlements matrix; (d) prepare a public consultation and disclosure plan, initiate a participatory process for resettlement plan preparation and implementation, and develop a transparent mechanism to redress grievances of affected persons; (e) develop a system to monitor and evaluate the progress of resettlement planning and implementation; (f) develop an implementation schedule with time-bound actions in coordination with the civil works; and (g) prepare a detailed budget with unit cost estimates.
- (iii) For noncore subprojects or components to be identified during loan implementation, develop a resettlement framework in accordance with ADB's *Involuntary Resettlement Policy*. The resettlement framework will guide the preparation of resettlement plans for noncore subprojects and define institutional arrangements for

screening subprojects for involuntary resettlement impacts, and for preparing, approving, and implementing resettlement plans.

6. **Indigenous Peoples Assessments.** The consultants will follow ADB's *Policy on Indigenous Peoples* (1999) and the policies and guidelines of the Government and state governments as applicable, and prepare a framework for indigenous peoples' development, and development and action plans as appropriate.

7. **Environmental Assessments.** The consultants will undertake the following activities.

- (i) Develop a preliminary environmental screening format to determine appropriate environmental assessment requirements of each core subproject.
- (ii) As appropriate, prepare environmental impact assessments (EIAs) and initial environmental examinations (IEEs) of the core subprojects, in accordance with the Government's EIA notification⁷ and ADB's *Environmental Assessment Guidelines*;⁸ and assume overall responsibility for obtaining their approval by the relevant approving agency and for submission of the EIAs and summary EIAs to ADB for public disclosure.
- (iii) In accordance with *ADB Environmental Assessment Guidelines* for sector projects, prepare the environmental assessment and review procedures framework for the overall project, describing the environmental assessment procedures that should be adopted during detailed assessment of noncore subprojects.
- (iv) Assess the institutional capacity of the relevant state departments in (a) undertaking scoping of potential environmental impacts, (b) preparing and supervising environmental assessment studies, and (c) implementing measures recommended in IEEs and EIAs, and recommend essential staffing and training requirements.
- (v) Provide on-the-job training to designated counterpart staff of the relevant state departments assigned to work with the environmental specialist consultants.

8. **Financial Management Assessments.** In accordance with ADB's guidelines for *Financial Management Systems, Financial Analysis and Financial Performance Indicators (OM Section G2)*, the consultants will undertake the following tasks.

- (i) Assess the financial management capacities of the state level implementing agencies to implement the project and operate project assets.
- (ii) Undertake financial management assessments utilizing ADB's financial management assessments questionnaire.
- (iii) Review the audited and unaudited financial statements of the implementing agency as applicable.
- (iv) Assess the adequacy of financial management arrangements and potential financial management risks, and suggest corresponding mitigation measures for institutional strengthening.
- (v) Recommend ways to improve corporate governance in accordance with ADB's policy on governance⁹.

⁷ The Environment (Protection) Act, 1986, amended 1991; and EIA Notification, S.O. 60(E) of 27 January 1994.

⁸ Available: http://www.adb.org/documents/Guidelines/Environmental_Assessment/default.asp

⁹ ADB. 1995. *Governance: Sound Development Management*. Manila.

4. Project Design and Investment Planning

9. Based on the activities undertaken above, the consultants will prepare a comprehensive project proposal in ADB's project appraisal document format that is required for financing under a multitranche finance facility (MFF). This would include the following items.

- (i) An investment program for the overall Sustainable Coastal Protection and Management Project including investment in sustainable coastal protection measures and institutional development for long-term shoreline management. This would comprise (a) investment programs for each participating state spanning 5–6 years which would include structural and nonstructural interventions for coastal protection, with one or two fully assessed priority subprojects; and (b) an institutional strengthening program for each participating state, with corresponding recommendations for capacity and human-resource development to enable long-term shoreline planning and management.
- (ii) A draft framework financing agreement that synthesizes the above, and the draft periodic financing request corresponding to the programs for the first tranche of the MFF.
- (iii) A project design and monitoring framework, including verifiable performance indicators, monitoring mechanisms, and key assumptions.
- (iv) Detailed project implementation arrangements, including effective procedures to identify, plan, design, implement, monitor, and maintain the coastal protection measures, with beneficiary ownership and participation where appropriate.
- (v) Resettlement framework and plans, environmental impact assessments and analyses, and indigenous peoples' action plans or development plans, as required.
- (vi) Detailed cost estimates, financing plans, and implementation schedules covering all project components. Cost estimates must be prepared using COSTAB software.
- (vii) A project procurement plan for each of the proposed tranches, and justification for proceeding with advance actions for recruiting consultants and procurement, wherever appropriate.
- (viii) A program of preconstruction and initial institutional strengthening activities, including further subproject feasibility studies, preparation of tender documents, and implementation of resettlement plans, that could be undertaken prior to formal approval of the overall Project by ADB.

C. Reporting Requirements

10. The consultants will produce the following reports at key stages of TA project implementation. Fifteen copies of each report will be submitted to the Government and ADB. Three digital copies of the final version of each report will be submitted on CD-ROM.

- (i) An inception report after 1.5 months of TA project commencement, to present the shoreline management planning framework, status of data availability, and proposed action for further data collection, subproject selection and ranking criteria, proposed subprojects and their descriptions, and refined TA project program, staff schedule, and terms of reference for each of the TA project specialists.
- (ii) An interim report at the end of 6 months to present (a) overall progress, (b) institutional development action plans for each state and selected central agencies, (c) outline coastal protection investment plans for each state, (d) the outcome of data

collection and model calibration activities, (e) outline feasibility studies of core subprojects, and (f) plans for the remaining project period.

- (iii) A draft final report at the end of 8 months, which will include (but not be limited to) the following: (a) a draft project design and monitoring framework; (b) the investment program for the overall project, including a breakdown of components by state; (c) detailed cost estimates, financing plans, and implementation schedules covering all project components; (d) detailed project implementation arrangements; (e) safeguard and financial management assessments of the overall project; (f) detailed feasibility level design and assessment of subprojects, including corresponding environmental and social impact assessments; (g) framework financing agreement and draft periodic financing request corresponding to the first tranche of the MFF.
- (iv) A final report at the end of 9 months, which will incorporate the comments and views expressed at the workshop and all other official comments. The report will include a summary consistent with the format and content of ADB's report and recommendation of the President .