



# Technical Assistance Report

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Project Number: 38411  
July 2006

**India: Preparing the Orissa Integrated Irrigated  
Agriculture and Water Management Project**  
(Cofinanced by the Government of the United Kingdom and the  
Cooperation Fund for the Water Sector)

Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 16 June 2006)

Currency Unit	–	Indian rupee/s (Re/Rs)
Re1.00	=	\$0.0217
\$1.00	=	Rs45.99

## ABBREVIATIONS

ADB	–	Asian Development Bank
CSPU	–	country strategy and program update
DOWR	–	Department of Water Resources
DPR	–	detailed project report
EARP	–	environmental assessment and review procedure
EIA	–	environmental impact assessment
IEE	–	initial environmental examination
ISC	–	irrigation service charge
IWRM	–	integrated water resources management
MIS	–	management information system
NGO	–	nongovernment organization
NWP	–	National Water Policy
O&M	–	operation and maintenance
OSG	–	Orissa state government
PIM	–	participatory irrigation management
SWP	–	state water policy
TA	–	technical assistance
WRB	–	Water Resources Board
WUA	–	water users association

## TECHNICAL ASSISTANCE CLASSIFICATION

<b>Targeting Classification</b>	–	Targeted intervention
<b>Sector</b>	–	Agriculture and natural resources
<b>Subsector</b>	–	Irrigation and drainage
<b>Themes</b>	–	Sustainable economic growth, governance, capacity development
<b>Subthemes</b>	–	Developing rural areas, public governance, institutional development

## NOTES

- (i) The fiscal year (FY) of the Government of India ends on 31 March. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2000 ends on 31 March 2000.
- (ii) In this report, "\$" refers to US dollars.

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## I. INTRODUCTION

1. The Asian Development Bank (ADB) *India Country Strategy and Program Update (CSPU) (2005-2007)*, approved by ADB's Board of Directors on 28 September 2004, included support for irrigated agriculture development. Following consultations, the Orissa state government (OSG) and the Government of India (the Government) confirmed a request for technical assistance (TA) to prepare the Orissa Integrated Irrigated Agriculture and Water Management Project. The Fact-Finding Mission was undertaken in December 2005 to prepare the TA project. The Mission held discussions with the representatives of the Government, OSG, and a cross section of stakeholders to reach an understanding on the objectives, scope, costs, and implementation arrangements of the TA.<sup>1</sup> The TA design and monitoring framework is in Appendix 1.

## II. ISSUES

2. **National Agriculture, Irrigation, and Rural Sectors.** India has seen rapid economic growth over the past decade and had achieved a per capita income of \$560 by FY2003. However, many people remain poor: some 390 million people were living on less than \$1 a day in 2000, most of them in rural areas. Agriculture growth has slowed recently, despite the fact that major crop yields are still lower than those of other developing countries.<sup>2</sup> The Government announced a "Common Minimum Programme" in 2004, stressing its resolve to achieve more broad-based and inclusive growth. High priority has been accorded to pro-poor growth in rural areas, through aggressive investments in agriculture, rural infrastructure, and irrigation.

3. Irrigation is essential for agriculture throughout the year in most of India, with 40% of the net cultivated area of 142 million hectares (ha) having irrigation access. It has become the major issue for the water sector, as irrigation represents 84% of total water use and more will be needed to meet growing food demands. At the same time, per capita water availability is rapidly declining with increasing water stress in many river basins. These have prompted calls for more storage and better water management. However, the subsector is facing fundamental challenges. There is a huge portfolio of unfinished new irrigation schemes (requiring additional \$20 billion to create 14 million ha of land under irrigation), most of which suffer from large time and cost overruns. Moreover, many completed schemes are underused (at least 14 million ha remain unutilized) because of insufficient operation and maintenance (O&M). State irrigation agencies are also unable to deliver services with adequate farmer participation.

4. The Government revised the National Water Policy (NWP)<sup>3</sup> in 2002 to address these challenges, promoting state-level policy and institutional reforms to (i) manage water efficiently with integrated water resources management (IWRM), (ii) pursue higher system utilization and sustainable O&M with participatory irrigation management (PIM), and (iii) reorganize irrigation departments to effectively carry out these measures. While several states have begun reforms to implement IWRM and PIM, the process is still at an initial stage in the country as a whole.

5. **Rural Economy and Agriculture in Orissa.** Orissa remains one of the poorest states in India, with a per capita income of \$220 in FY2003. About 47% of the population was poor in 2000. Most of the poor live in rural areas. Agriculture is the backbone of the economy, accounting for some 30% of the state domestic product and employing over 60% of the total

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<sup>1</sup> The TA first appeared in *ADB Business Opportunities* on 28 May 2005 as Integrated Irrigation Development Project. The ensuing loan is included in ADB's lending program for 2007 in the CSPU (2006–2008): India.

<sup>2</sup> The annual growth rate was 3.2% from FY1981 to FY1996, 1.9% up to FY2002, and 0.9% in FY2003–2004 (against a target of 4%). The average rice yield is half that in Indonesia and Viet Nam.

<sup>3</sup> Government of India, Ministry of Water Resources. 2002. *National Water Policy*. New Delhi.

workforce and 80% of the workforce in rural areas. Yet productivity remains low, with (i) low cropping intensity (130–140%), (ii) low levels of irrigated land (about 30%) and other input use, and (iii) a predominance of paddy cropping (70% of cultivation), with yields much lower than the national average. With an average landholding size of 1.3 ha, and over 80% of holdings operated by small farmers, agriculture is largely based on traditional practices, although 10% of the total cultivated area is also devoted to fruit and vegetable cultivation.

6. To enhance agricultural productivity, a state agriculture policy was launched in 1996 to increase crop intensity and diversity through better water management, input distribution, extension systems, and infrastructure. The state is now introducing a market act, which will (i) permit private investments in marketing and storage facilities, and (ii) provide a framework for contract farming. Although there are still key bottlenecks in public seed and fertilizer supply and extension systems, sporadic development with significant paddy and/or high-value crop intensification can be seen in many places, particularly where irrigation is assured with good connections to the market. Concerted efforts are needed to (i) identify suitable area-specific farming systems by analyzing local production and marketing conditions and farmer incentives, (ii) set realistic output targets, and (iii) define programs to address local constraints while meeting the specific needs of the poor. Innovative methods that have been effective in India should be pursued, including the use of private providers of agricultural services and inputs.

7. **Status of Irrigation and Water Resources.** Orissa has relatively abundant water resources. Yet irrigation is an essential input for agriculture throughout the year, as 80% of the annual rainfall occurs erratically during the June–September period. Its net sown area is 6.0 million ha, and 2.7 million ha of net irrigation potential has been created through ongoing and completed projects.<sup>4</sup> However, the area with assured irrigation remains only about 1.7 million ha because of (i) ineffective water distribution with lack of field channels, (ii) chronic system deterioration due to insufficient O&M, and (iii) lack of farmer participation to support O&M, causing hardship and poverty in tail reach areas of canal systems. Following the NWP, the OSG is now according high priority to restoring and sustaining created irrigation potential at higher productivity, since this will be cheaper and quicker than creating new irrigation potential.

8. **Policy and Institutional Environment.** Since the late 1990s, OSG has progressively improved the policy and institutional environment. Supported by externally funded programs,<sup>5</sup> (i) a draft state water policy (SWP) and a state water plan have been prepared, following the NWP and adopting key principles of PIM and IWRM; (ii) legislation has put in place a water user association (WUA) framework to implement PIM; (iii) a principle of full O&M financing by beneficiaries has been adopted; and (iv) steps towards establishing institutions and functions for IWRM have been initiated on the basis of river basins. The Department of Water Resources (DOWR) has been reorganized and its management strengthened. Nevertheless, the implementation of the reforms is at an early stage, and will require close support to transform these initiatives into sound sector operations.

9. **Irrigation Service Delivery.** The state has begun management transfer of minor irrigation canals to WUAs and joint management of other facilities, with (i) WUA formation and training, (ii) a sixfold increase in the irrigation service charge (ISC), and (iii) the introduction of grant provisions to WUAs to support O&M of the transferred canals. While WUAs now cover

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<sup>4</sup> Comprising 1.24 million ha in major (more than 20,000 ha of irrigation command area) and medium (2,000–20,000 ha) schemes, 0.88 million ha in minor (less than 2,000 ha) schemes, and 0.57 million ha in other areas.

<sup>5</sup> Including the Orissa Water Resources Consolidation Project, funded by the World Bank for \$290 million in 1996–2002, which covered irrigation scheme rehabilitation with PIM, and institutional strengthening for IWRM. Irrigation rehabilitation followed a sector project approach. The project was rated successful in its completion report.

1 million ha of irrigated area, progress has been affected by their inability to perform O&M work, and by the poor infrastructure of many irrigation systems. Provider–recipient relations between DOWR and WUAs are yet to be well developed to support accountable service delivery and O&M cost recovery. There is a vicious cycle of modest irrigation performance, limited ISC collection, and insufficient maintenance funding, leading to further facility deterioration and lower irrigation performance.<sup>6</sup> This needs to be transformed to a self-sustaining management cycle through effectively sequenced WUA strengthening and facility renovation of individual schemes.

10. In DOWR, there is significant support for PIM and good analytical capacities to plan and design irrigation projects. However, DOWR still remains an engineering agency with high establishment costs and an aging staff structure. It needs to become a genuine service-oriented agency capable of delivering accountable services to farmers, with a smaller setup and enhanced multi-disciplinary management skills. Support systems for PIM need strengthening with effective arrangements for establishing viable WUAs and promoting productive agriculture systems.<sup>7</sup> Sound management information systems (MIS) is also needed to monitor, plan, and implement O&M to ensure sustainability.<sup>8</sup> These are required to fully operationalize OSG's well-intended initiatives for PIM with significant WUA empowerment.

11. **IWRM.** In recognition of increasing competition for water, the draft SWP proposes IWRM on the basis of river basins. OSG is also contemplating establishing river basin organizations under the Water Resources Board (WRB), an existing sector apex body chaired by the chief secretary. These reforms need to be advanced while operationalizing specific IWRM functions, such as (i) participatory and holistic basin planning incorporating water investments, watersheds, agriculture, and other support services; (ii) the introduction of regulatory functions for water use and quality management; and (iii) database and its management for sound monitoring.

12. **Opportunities for ADB Support.** Against this backdrop, OSG has requested ADB support for irrigated agriculture development, focusing on enhancing productivity and assuring the sustainability of existing, weakly-performing irrigation schemes, including traditional tanks and lift irrigation, in selected river basins.<sup>9</sup> This is expected to be the first phase of a long-term partnership. To this end, an intervention package needs to be prepared that is ready for prompt implementation. This package needs to generate high returns and revenues commensurate with ADB's lending terms, while strengthening and operationalizing the policy and institutional framework for PIM and IWRM. The TA will support this process by assessing the most effective way of addressing the aforementioned issues. It is also consistent with ADB's water policy.

### III. THE TECHNICAL ASSISTANCE

#### A. Impact and Outcome

13. The overall impact of the TA will be the increased rural incomes and reduced poverty in selected river basins in Orissa<sup>10</sup> with improved irrigated agriculture development planning and program delivery systems. The TA outcome will be a project design agreed by OSG, the

<sup>6</sup> ISC is collected by district collectors as state revenue, and there is no link between the amount collected and that provided to WUAs as an O&M grant at present. This is a constraint on enhancing ISC collection performance.

<sup>7</sup> Vast opportunities exist to expand irrigation through coordinated crop planning by WUAs, including rotational planting of high-value crops that use less water. WUAs may also be trained as local agriculture agents to liaise with local input and service providers and markets and to use collective bargaining power.

<sup>8</sup> An alternative institutional modality under public–private partnerships may also be explored.

<sup>9</sup> Including the four river basins north of the Mahanadi river basin, and the Mahanadi delta irrigation systems. DOWR is preparing detailed project reports, including feasibility studies for the requested schemes.

<sup>10</sup> In addition to proposed basins in footnote 9, the possibilities for including other basins, such as southern basins of the states suffering from high poverty and frequent droughts, will also be explored during the TA.

Government, and ADB that will (i) enhance productivity and sustainability of existing irrigation systems with increased state revenues; and (ii) strengthen institutions including DOWR delivering accountable irrigation services, WUAs fulfilling specified O&M tasks, other agencies providing sound support services, and a WRB and RBOs carrying out IWRM functions.

14. In view of the OSG's progressively developing policy and institutional basis including SWP, state water plan, and DOWR capacities, a sector loan modality will be adopted for the ensuing project.<sup>11</sup> This TA will have three specific outputs: (i) a basin irrigated agriculture investment strategy and plans; (ii) an investment package, including implementation guidelines and appraised subproject proposals that meet safeguard and other requirements; and (iii) an institutional development strategy and actions for PIM and IWRM, with a program of capacity building and project management.

## **B. Methodology and Key Activities**

15. The TA outputs will utilize (i) detailed project reports (DPRs) prepared by DOWR that include feasibility studies of proposed subprojects; (ii) existing policy, planning, and institutional documents; and (iii) other information on the sector. Building on these, the TA will carefully analyze local conditions while applying lessons and best practices learned in India and other countries. A consultative approach will be taken, including focus group meetings with representatives of poor communities. The policy and institutional framework will be harmonized with other state programs. Activities will be divided into three phases.

16. **Phase 1—Strategic Framework Studies** (1.5 months). During this phase, the TA will conduct sector and institutional studies to define a strategic framework to formulate the ensuing project. The TA will assess and define (i) an irrigated agriculture development strategy, with updated irrigation scheme inventories; (ii) action agendas for institutional development, defined by applying a diagnostic analysis of public agencies;<sup>12</sup> (iii) a preliminary social development strategy and safeguard assessment frameworks (including environment, resettlement, and indigenous peoples); and (iv) a project implementation framework (subproject selection criteria and implementation arrangements). An initial poverty and social analysis is in Appendix 2.

17. **Phase 2—Subproject Proposals and Institutional Actions** (4 months). There will be two parallel activities. First, the TA will prepare detailed subproject proposals, building on the DPRs prepared by DOWR. Covering at least four major, six medium, and six minor schemes, the DPRs will be expanded through baseline surveys; stakeholder consultations; supplementary planning to define clear output targets and specific programs for irrigation, agriculture, and associated services in accordance with the holistic strategy defined in phase 1; feasibility analysis; and safeguard plans. Second, the TA will prepare and recommend, through detailed institutional studies, immediate reforms and medium-term institutional action plans.

18. **Phase 3—Project Package** (2 months). This phase will prepare and finalize the draft TA outputs specified above (para. 14). Among these, the basin investment plan will be based on scheme inventories and resource assessments. The investment package will set out component designs, and the implementation sequence and arrangements, including the establishment of a MIS with clear process and output targets for irrigated agriculture development. An institutional

<sup>11</sup> Its preliminary scope include (i) participatory subproject planning and WUA formation; (ii) improvement of irrigation (including field channels) and associated infrastructure (such as drainage); (iii) support services for (a) agriculture and fishery development, (b) livelihood enhancement for the poor, and (c) watershed management of reservoirs and tanks; (iv) sustainable O&M; and (v) institutional strengthening (for PIM and IWRM) and project management.

<sup>12</sup> Including (i) O&M financial sustainability; (ii) DOWR's resources, management infrastructure, and vision and strategy; (iii) a WUA framework; (iv) private sector involvement; and (v) institutions for IWRM, among others.

support program will be designed to fill in capacity and resource gaps through training and outsourcing to ensure high-quality implementation, while pursuing the institutional actions.<sup>13</sup>

### **C. Cost and Financing**

19. The total cost of the TA is estimated at \$875,000 equivalent. The TA will be cofinanced on a grant basis by the Government of the United Kingdom for \$590,000 equivalent and by the Cooperation Fund for the Water Sector for \$110,000 equivalent, both of which will be administered by ADB. OSG will finance the remaining \$175,000 equivalent through provision of office space; counterpart staff; data and analysis, including DPRs; and other administrative costs. Details of the cost estimates and financing are in Appendix 3. The Government has been informed that approval of the TA does not commit ADB to finance any ensuing project.

### **D. Implementation Arrangements**

20. DOWR will be the Executing Agency of the TA. It will appoint a TA director at the level of chief engineer. DOWR will also form (i) a project preparatory working group including (a) specialists in irrigation, drainage and flood control, hydrology, PIM, water resources planning, and MIS nominated by DOWR, and (b) specialists in agriculture, horticulture, fisheries, watershed, soil conservation, and forestry nominated by the departments concerned; (ii) an interdepartmental TA steering committee chaired by the secretary of DOWR; and (iii) an advisory group of renowned sector specialists, to implement and guide the TA activities. At the outset, DOWR will provide (i) the DPRs for the proposed subprojects to be studied in detail under the TA; (ii) irrigation scheme inventories for the river basins; and (iii) other available materials related to the sector and its policy and institutional framework.

21. The TA will be implemented for 7.5 months from August 2006 to April 2007. It will require 8.5 person-months of international and 39 person-months of domestic consultants covering irrigation planning and management, irrigation institutions, PIM, IWRM, agronomy, agriculture economics, sociology, environment, and resettlement, along with studies, surveys, and consultations. Outline terms of reference for consultants are in Appendix 4. The consultants will be engaged by ADB on an individual basis according to ADB's *Guidelines on the Use of Consultants*, and other arrangements acceptable to ADB for engaging domestic consultants. The consultants will submit an inception report within 2 weeks, interim reports for phase 1 within 1.5 months and for phase 2 within 5.5 months, and a draft final report within 6.5 months of the start of the TA. Tripartite meetings with OSG, ADB, and the consultants will be held to discuss these reports, along with workshops with stakeholders. A final report will be submitted within 2 weeks after the Government, OSG, and ADB comment on the draft final report.

## **IV. THE PRESIDENT'S DECISION**

22. The President, acting under the authority delegated by the Board, has approved ADB administering (i) technical assistance not exceeding the equivalent of \$590,000 to the Government of India to be financed on a grant basis by the Government of the United Kingdom, and (ii) technical assistance not exceeding the equivalent of \$110,000 to the Government of India to be financed on a grant basis by the Cooperation Fund for the Water Sector for preparing the Orissa Integrated Irrigated Agriculture and Water Management Project, and hereby reports this action to the Board.

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<sup>13</sup> A work plan for conducting (i) further subproject planning, (ii) preconstruction works, and (iii) training prior to loan signing will also be prepared, to support OSG through a separate TA facility included in CSPU (2006–2008): India.

## DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/ Reporting Mechanisms	Assumptions and Risks
<p><b>Impact</b> Enhanced economic growth and reduced poverty in rural areas of selected river basins in Orissa, together with increased state revenues (brought about through a project prepared under this technical assistance [TA])</p>	<ul style="list-style-type: none"> <li>• Incomes: Incremental farm household incomes (to be quantified during the TA)</li> <li>• Poverty: Incremental poverty reduction in rural households in subproject areas</li> <li>• Food security: Incremental food self sufficiency among farmers</li> <li>• State total revenue: Incremental revenue from land, crop sales, and irrigation levies</li> <li>• Institutions: Similar interventions are replicated, accelerating agriculture growth</li> </ul>	<ul style="list-style-type: none"> <li>• National and district statistics on agriculture, incomes, and human development index</li> <li>• Budget monitoring and evaluation (BME) reports</li> <li>• Other appropriate statistics including those related to the improved management information system (MIS) system of the Department of Water Resources (DOWR)</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• The Orissa state government (OSG) will accept loan terms and conditions offered by the Government of India for the follow-on investment project.</li> <li>• Ensuing loan project is feasibly designed, funded, and implemented.</li> </ul>
<p><b>Outcome</b> An investment project design agreed by the borrower and Asian Development Bank (ADB) to achieve enhanced productivity and sustainability of existing irrigation systems suffering from low productivity and poverty in the selected river basins, through components tentatively comprising:</p> <p>(i) Delivering services for (a) detailed project report (DPR) preparation and water users association (WUA) development; (b) irrigation and associated infrastructure; (c) support for agriculture and livelihood enhancement; and (d) monitoring, evaluation, and support for sustainable operation and maintenance (O&amp;M).</p> <p>(ii) Strengthening institutions to operate the above functions while delivering intended benefits and sustaining O&amp;M and integrated water resources management (IWRM) as appropriate.</p>	<p>Specific results to be defined at project and subproject levels, with individual subproject targets fixed in DPRs, and monitored:</p> <p>(i) cropping intensity increased, and irrigated area extended</p> <p>(ii) increase in annual cereal and other crop production</p> <p>(iii) increase in gross margin per farm family</p> <p>(iv) increase in permanent employment, and annual family income of landless laborers</p> <p>(v) increase in state revenue</p> <p>Specific institutional performance targets to be defined under the TA:</p> <p>(i) individual outputs for institutional actions</p> <p>(ii) improved irrigation service delivery system is operated</p> <p>(iii) effective IWRM functions are defined and operated</p> <p>(iv) effective support systems for agriculture development identified and operated</p> <p>(v) effective joint irrigation management system defined and operated in all schemes in the project basins</p> <p>(vi) WUAs are functioning, achieving DPR targets, and sustaining O&amp;M including finance aspects</p>	<ul style="list-style-type: none"> <li>• BME reports</li> <li>• National statistics</li> <li>• Project MIS comprising baseline, targets, process and management, and impacts</li> </ul> <ul style="list-style-type: none"> <li>• Project MIS comprising baseline, targets, process and management, and impacts</li> <li>• Executing Agency's (EA's) MIS of irrigation schemes (asset and performance inventory)</li> <li>• Joint irrigation management / WUA performance audit reports</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• Project institutions are willing to promote participatory irrigation management (PIM) and IWRM.</li> <li>• WUAs will strengthen their institutional basis while managing the facilities effectively.</li> <li>• WUAs are willing to adopt modern cropping patterns.</li> <li>• Damage from natural disasters is manageable or can be rehabilitated.</li> <li>• Political conditions remain conducive.</li> <li>• Project institutions are willing to strengthen irrigation service delivery and IWRM.</li> <li>• WUAs are willing to strengthen their institutional basis adopting new cropping practice.</li> <li>• A system is in place to monitor performance.</li> <li>• Leadership and support exist within and outside EA.</li> </ul>

Design Summary	Performance Targets/Indicators	Data Sources/ Reporting Mechanisms	Assumptions and Risks
<p><b>Outputs</b></p> <p><b>A. Irrigated Agriculture Strategic Framework</b>            (i) An irrigated agriculture development strategy, (ii) policy and institutional action agendas for PIM and IWRM, (iii) preliminary safeguard frameworks, and (iv) a preliminary implementation strategy</p>	<p>Constraints and action agenda/ strategy defined within 1.5 months of the start of the TA, covering</p> <p>(i) irrigated agriculture development            (ii) institutional agendas for PIM, IWRM and WUA development            (iii) preliminary frameworks for safeguards            (iv) draft implementation procedures and arrangements</p>	<ul style="list-style-type: none"> <li>• Inception report</li> <li>• Draft framework reports</li> <li>• EA, working group, advisory group, and steering committee meeting minutes</li> <li>• Aide memoire (AM) of ADB inception and review missions</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• EA and support agencies provide support, including data and information.</li> <li>• Monitoring and quality support are effective.</li> </ul>
<p><b>B. DPR Expansion and Institutional Studies</b></p> <p>1. Draft DPRs prepared by the EA enhanced in consultation with stakeholders, with clear (i) program implementation plan, (ii) feasibility analysis, and (iii) safeguards plans. The TA would support at least four major, six medium, and six minor schemes.</p>	<p>Sound DPRs are prepared within 5.5 months of the start of the TA in consultation with stakeholders with:</p> <p>(i) output targets in terms of            (a) WUA development (with indicators such as membership, registration, and contributions)            (b) irrigation and associated infrastructure            (c) irrigated agriculture (irrigation intensity, cropping patterns, inputs and yields)            (d) sustainable O&amp;M (with performance indicators)            (ii) specific program inputs to achieve the output targets            (iii) economic and feasibility assessments of the above            (iv) safeguards plans including initial environmental examination/ environmental impact assessment (IEE/EIA) including environmental management plan, resettlement plan (if needed), and indigenous people's development plan (if needed)</p>	<ul style="list-style-type: none"> <li>• Prepared draft DPRs</li> <li>• EA, working group, advisory group, and steering committee meeting minutes</li> <li>• Consultants' progress reports</li> <li>• AM of ADB review missions</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• Participatory process is duly followed by all.</li> <li>• Monitoring and quality support are effective.</li> <li>• Beneficiaries support collective action.</li> </ul>
<p>2. Institutional action plans defined through consultative studies</p>	<p>Appropriate actions defined within 5.5 months of the start of the TA, prospectively including</p> <p>(i) irrigation service delivery systems by DOWR            (a) institutional vision/strategy            (b) human, financial, and other resources            (c) management infrastructure including business process, decision support system, M&amp;E, and quality control            (d) alternative institutional models (ring-fenced corporation, private management contract, etc.)            (ii) IWRM institutions (IWRM functional expansion, operationalization, and organizational change)            (iii) DOWR-WUA joint management</p>	<ul style="list-style-type: none"> <li>• Institutional study reports</li> <li>• EA, working group, advisory group, and steering committee meeting minutes</li> <li>• Consultants' reports</li> <li>• AM of ADB review missions</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• Participatory process is followed by all.</li> <li>• Monitoring and quality support are effective.</li> </ul>

Design Summary	Performance Targets/Indicators	Data Sources/ Reporting Mechanisms	Assumptions and Risks
	(a) joint management framework (b) O&M financing and implementation mechanisms (c) WUA legal/regulatory framework (d) broad-based WUA participation including women (iv) support institutions including private providers, and nongovernment organizations (v) policy and other enabling framework (vi) institutional support needs assessed and defined to address the above agendas		
<b>C. Project intervention package</b> Project proposal including sector strategy and investment plan, institutional actions, investment package; impacts and risk assessments, and DPRs for implementation	Intervention package is drafted within 6.5 months of the start of the TA that tentatively includes: <ul style="list-style-type: none"> <li>• irrigated agriculture strategy and investment plan</li> <li>• irrigation service delivery and IWRM institutional actions</li> <li>• project framework and design synthesis with outcome, outputs, activities, and indicators</li> <li>• representative DPRs</li> <li>• implementation arrangements and procedures, including MIS</li> <li>• institutional development support</li> <li>• training programs for EA, support institutions, and WUAs</li> <li>• economic and financial analyses including state fiscal impacts and O&amp;M sustainability</li> <li>• safeguards framework/plans</li> <li>• risk analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Draft final and final reports of the TA</li> <li>• Prepared DPRs</li> <li>• IEE/EIAs, resettlement plans, indigenous peoples development plan</li> <li>• Project MIS including baseline data for DPRs</li> <li>• Consultants' reports</li> <li>• AM of ADB's final TA review mission</li> </ul>	<b>Assumptions</b> <ul style="list-style-type: none"> <li>• Project institutions are supportive.</li> <li>• Sufficient counterpart support is provided.</li> <li>• Stakeholders are willing to participate.</li> <li>• Consultants perform in line with expectations.</li> </ul>
<b>Activities with Milestones</b>		<b>Inputs</b>	
<b>A. By Government/OSG</b> <ol style="list-style-type: none"> <li>(i) Appoint counterpart staff and form steering committee, working group, and advisory group by OSG, and appoint advisors by the Government (prior to TA start)</li> <li>(ii) Prepare draft DPRs (4 major, 6 medium, and 6 minor schemes prior to TA start)</li> <li>(iii) Regularly work with consultants to provide surveys and other support, and to organize meetings</li> <li>(iv) Provide office space, data and information and documents, DPRs (and other inputs as appropriate), and other support to the TA</li> </ol> <b>B. By Consultants</b> Undertake TA activities in close collaboration with the Government, stakeholders, and ADB <ol style="list-style-type: none"> <li>(i) strategic frameworks for irrigated agriculture (within 1.5 months)</li> <li>(ii) DPR preparation and institutional studies (within 5.5 months)</li> <li>(iii) project intervention package as draft final report (within 6.5 months) and final report (within 7.5 months)</li> </ol>		<ul style="list-style-type: none"> <li>• Counterpart staff, operating, and other implementation expenses (in kind)</li> <li>• Engineering designs and other activities for DPR preparation as appropriate (in kind)</li> <li>• 8.5 person-months of international consultants: irrigation management specialist (team leader, 5 person-months), agriculture economist (2 person-months), and sociologist (1.5 person-months)</li> <li>• 39 person-months of domestic consultants: irrigation specialist (deputy team leader, 6 person-months), irrigation institutional specialist (5 person-months), PIM/WUA specialist (3 person-months) IWRM specialist (3 person-months), agriculture economist (5 person-months), agriculture specialist (5 person-</li> </ul>	

Activities with Milestones	Inputs
<p><b>C. By Stakeholders</b></p> <p>(i) Participate in TA workshops organized at various stages</p> <p>(ii) Participate in DPR preparation process</p> <p><b>D. By ADB</b></p> <p>(i) Recruit consultants in coordination with the Government</p> <p>(ii) Monitor and supervise TA activities regularly</p> <p>(iii) Guide TA activities through inception and review missions</p>	<p>months), sociologist (5 person-months), environment specialist (4 person-months), and resettlement specialist (3 person-months)</p> <ul style="list-style-type: none"> <li>• Special studies for fisheries, public expenditure review, and other state opportunities, and study tours</li> <li>• Workshop and participatory inputs</li> <li>• Internal staff resources</li> <li>• Inception and three review missions</li> </ul>
<b>TA Cost</b>	<b>Total</b> <b>\$875,000</b>

ADB = Asian Development Bank, AM = aide memoire, BME = benefit monitoring and evaluation, DOWR = Department of Water Resources, DPR = detailed project report, EA = executing agency, EIA = environmental impact assessment, IEE = initial environmental examination, IWRM = integrated water resources management, M&E = monitoring and evaluation, MIS = management information system, O&M = operation and maintenance, OSG = Orissa state government, PIM = participatory irrigation management, TA = technical assistance, WUA = water users association.

## INITIAL POVERTY AND SOCIAL ANALYSIS

### A. Linkages to the Country Poverty Analysis

<b>Is the sector identified as a national priority in country poverty analysis?</b>	<input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No	<b>Is the sector identified as a national priority in country poverty partnership agreement?</b>	<input type="checkbox"/> Yes  <input checked="" type="checkbox"/> No
<b>Contribution of the sector or subsector to reduce poverty in India:</b>			
<p><b>India.</b> Since the 1960s, agriculture improvement led by the Green Revolution has been the major contributor to poverty reduction in India. Irrigation is essential for agriculture throughout the year in most of the country. Nationwide, 40% of net cultivated land has irrigation access. However, the utilization of water resources has remained uneven. India will reach a state of water crisis in 2025<sup>a</sup> and significant water scarcity is already being experienced in some regions. Although the economy is no longer predominantly dependent on agriculture, about two thirds of the population living in rural areas depends on agriculture for its livelihood. Irrigated agriculture has become the prime engine of agricultural production. Although significant strides have been made in poverty reduction in both rural and urban areas, food grain surpluses co-exist with chronic poverty in the form of entrenched poverty pockets in many states. There is an urgent need to examine (i) intervention strategies, (ii) resource distribution, and (iii) inclusive and participatory development to sustain development efforts.</p> <p>According to the <i>National Human Development Report</i>,<sup>b</sup> the incidence of poverty declined from 44.5% in 1983 to 26.1% in 1999–2000. The report highlighted the marked differences in poverty incidence within the country. Poverty reduction is a joint responsibility of the central and the state governments and programs fall into four main groups: (i) group-oriented poverty programs, (ii) area development programs, (iii) infrastructure development, and (iv) public distribution. Landless laborers will not benefit directly from public irrigation interventions. Rather, they will benefit indirectly through increases in demand for their services as agricultural wage laborers.</p> <p><b>Orissa State.</b> Orissa is one of the poorest states of India. Its per capita income was \$220 in FY2003 and about 47% of the population lives below the poverty line. Although there has been a steady decline in poverty incidence, it remained stagnant in the second half of the 1990s. This may be related to the poor performance of the agriculture sector, but it also reflects regional trends within the state, as poverty has increased in northern and southern Orissa. Since almost 75% of the state's poor live in these regions, this has influenced the overall poverty ratio. Poverty is overwhelmingly a rural phenomenon. The rural poverty ratio in the southern region is more than two and a half times that of the coastal region and in the northern region it is more than one and a half times that of the coastal region. This partly reflects the incidence of poverty among scheduled tribes and castes, which are concentrated in these regions.</p> <p>Orissa is predominantly an agrarian economy and agriculture contributes 30% of the state domestic product. Although this share declined in the 1990s, the percentage of the workforce engaged in agriculture remained unchanged. The ratio of agricultural wage laborers to owners/cultivators has increased substantially because of an increase in landlessness or near landlessness caused in turn by population growth and the subdivision of landholdings among legal heirs. As the pace of industrialization is slow, agricultural growth is essential to the overall development of the state as it (i) creates employment, (ii) generates income, (iii) provides raw materials for the industrial sector, and (iv) ensures food security. However, agricultural productivity remains low, with (i) low cropping intensity (130–140%), (ii) a small amount of irrigated land (32% of gross cultivated area), and (iii) limited use of other agricultural inputs and a predominance of food grain cropping (85% of gross cultivated area).</p> <p>Irrigated agriculture has the potential to raise productivity and diversify agricultural practice. Underutilized irrigation schemes need to be expanded and rehabilitated. Poor management of water resources needs to be reduced by participatory irrigation management (PIM) and water user associations (WUAs). Modern agricultural technology needs to be applied and productivity raised through intercropping and diversification of agricultural produce (from mainly paddy cultivation to high-yield rice varieties), cash crops, and fisheries. This can provide additional income to farmers, making them less vulnerable. The ensuing project will adopt irrigation schemes that are operated mostly by smallholders with a poverty incidence significantly higher than the national average.</p>			

### B. Poverty Analysis

#### Targeting Classification: Targeted Intervention

#### What type of poverty analysis is needed?

Participatory poverty analysis is required to analyze specific groups of the poor and disadvantaged sections of the population, such as scheduled tribes and scheduled castes, irrigation users, landless people, and sharecropping tenants in the project area and to develop specific strategies to meet their needs and priorities for enhancing livelihoods.

**Analysis of Vulnerability and Access to Livelihood Assets.** Underlying the concept of sustainable livelihoods is the notion that poverty is a multidimensional and impermanent condition. The challenge is to focus on the many aspects of farm households and to analyze their poverty characteristics. The technical assistance (TA) will provide a comprehensive picture of rural poverty in the project area, focusing on selected irrigation schemes, and formulating options for enhancing and developing the asset base of the poor for income-generating activities, e.g., diversification of cropping patterns, fisheries, and upper watershed management. The livelihood strategy and activities will be reflected in the project synthesis with sample subproject proposals developed with active participation of stakeholders.

**Distribution Analysis and Poverty Impact Ratio Analysis.** Poverty impact ratio and distribution analyses will assess the distribution of project benefits and show how the costs and benefits are shared among the poor and other stakeholders. They will also analyze how much of the net economic benefits will accrue to the poor. The feasibility study will identify (i) how the costs will be incurred and benefits realized, (ii) gains from the distribution of project effects, (iii) how the cost burden can be made acceptable to those who will pay, (iv) overall project performance and returns on equity considerations, and (v) modifications of the project design and components to enhance the impact on target beneficiaries.

### C. Participation Process

**Is there a stakeholder analysis?**  Yes  No

The TA will carry out a stakeholder analysis through a participatory process with communities, public agencies, the private sector, and external financiers.

**Is there a participation strategy?**  Yes  No

The TA will prepare a stakeholder participation strategy with particular emphasis on PIM and the transfer of irrigation management to WUA. However, this will not necessarily improve the situation of poor farmers. Research suggests that even participatory irrigation management transfer processes based on strong voting rights for farmers, irrespective of farm size, may not necessarily be pro-poor. Poor farmers are less informed about their rights and tend to have a smaller share of the potential benefits of management transfer. They participate more in repair and rehabilitation work, while the larger farmers are more involved in the decision-making process, dominating the meetings and committees.<sup>c</sup>

Hence, pro-poor irrigation management transfer issues addressed by the participation strategy will have to take into account (i) the need for a high level of farmer participation in the WUA; (ii) the fact that poor and nonpoor farmers may not be equally well informed about WUAs and may not participate equally in their activities; (iii) farm size can be a reliable proxy indicator of poverty; (iv) poor farmers rely more on canal waters and have less access to alternative sources (as they tend to have fewer pumps and wells).

The participation strategy will complement the WUA study and will assess the performance of WUAs in terms of their awareness, membership, roles and responsibilities in operation and maintenance (O&M) in particular, and the management and capacities needed to meet those responsibilities. It will identify gaps and actions needed, including the need to modifying the existing framework.

### D. Gender Development

#### Strategy to maximize impacts on women:

A strategy to maximize the impact of irrigated agriculture and water resources management on women will be prepared under the TA. Women play a significant role in irrigated agriculture, especially if they are targeted early. Women are engaged in vegetable farming and sell their produce at local markets and consume it at home—if adequate access to irrigated fields is provided this will increase their productivity.

Apart from specifically targeting women as project beneficiaries, their participation will be ensured throughout the project cycle by mainstreaming gender. Women play an active role in both household affairs and in such activities as shifting cultivation (where men do the land clearing and women all other agricultural operations). In addition to this, they often take up wage labor. In parts of Orissa, women from scheduled tribes and castes work night shifts in canal and tunnel excavation work for irrigation projects. Women may be paid less than men for equal work.

**Has an output been prepared?**  Yes  No

This will be prepared during the TA.

**E. Social Safeguards and Other Social Risks<sup>d</sup>**

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
<b>Resettlement</b>	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	It is anticipated that resettlement issues will be insignificant, as the project intends to rehabilitate existing irrigation schemes. However, some land acquisition may be caused by construction work. A resettlement framework and a short sample resettlement plan will need to be prepared.	<input type="checkbox"/> Full <input checked="" type="checkbox"/> Short <input type="checkbox"/> None
<b>Affordability</b>	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	It may be difficult for poor farm households to pay increasing irrigation service charges to cover O&M needs, although the benefits of irrigation far outweigh its O&M costs. An affordability assessment will be undertaken under the TA.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Labor</b>	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	Labor-based, machine-assisted technologies will be explored for the rehabilitation and construction work required at existing irrigation schemes.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Indigenous Peoples</b>	<input checked="" type="checkbox"/> Significant (possibly) <input type="checkbox"/> Not significant <input type="checkbox"/> None	Orissa is the heartland of India's indigenous peoples. Apart from indigenous systems of terracing and dams in the up-hills area, indigenous peoples usually have little access to government-sponsored irrigation schemes as most of their settled agriculture is carried out in the lower hill slopes, which are usually not included in irrigation schemes. Agricultural practices are characterized by rain-fed annual cropping, producing millet, sorghum, maize, and pulses. The ensuing project's focus on rehabilitation and improvement of existing irrigation schemes will have an insignificant impact on indigenous peoples. Efforts will be made to ensure scheduled tribes and castes benefit from and are not negatively affected by the project. The TA will prepare an indigenous peoples development plan (or indigenous peoples action plan, if the impacts are found to be insignificant).	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Other Risks and/or Vulnerabilities</b>	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	Other risks and vulnerabilities will be examined during the TA and will be reflected in the final report and summary poverty reduction and social strategy.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

O&M = operations and maintenance; PIM = participatory irrigation management, TA = technical assistance; WUA = water users association.

<sup>a</sup> International Water Management Institute and Asian Development Bank. 2004. *Pro-Poor Intervention Strategies in Irrigated Agriculture in Asia*. Colombo.

<sup>b</sup> Government of India. 2002. *National Human Development Report*. New Delhi.

<sup>c</sup> IWMI-TATA. 2003. *Pro-Poor Irrigation Management Transfer? Water Policy Briefing*. Issue 6. Vallabh Vidyanagar.

<sup>d</sup> To be further updated during the TA based on field findings.

**COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

Item	Total Cost
<b>A. Government of the United Kingdom and the Cooperation Fund for the Water Sector Funding<sup>a</sup></b>	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants	220
ii. Domestic Consultants	190
b. International and Local Travel	
i. International Travel	40
ii. Local Travel <sup>b</sup>	20
2. Surveys and Studies	
a. Specialist Studies <sup>c</sup>	20
b. Socioeconomic Survey and Assessment <sup>d</sup>	40
c. Resettlement Survey and Assessment	20
d. Technical Surveys	20
3. Workshops, Seminars, and Training	20
4. Administrative and Support Services	
a. Office Administration	20
b. Office Refurbishment	10
5. Contingencies	80
<b>Subtotal (A)</b>	<b>700</b>
<b>B. Government Financing</b>	
1. Office Facilities and Administrative Support	30
2. Counterpart Staff	30
3. Local Travel and Vehicles for Counterpart Staff <sup>e</sup>	30
4. Studies, Surveys, Data Analysis, and Reports	85
<b>Subtotal (B)</b>	<b>175</b>
<b>Total (A+B)</b>	<b>875</b>

<sup>a</sup> Financed on a grant basis by the Government of the United Kingdom (\$590,000) and the Cooperation Fund for the Water Sector (\$110,000). Both grants will be administered by the Asian Development Bank, and the TA expenditure items will be financed on a pro-rata basis.

<sup>b</sup> Includes vehicle rental and operation and local airfares.

<sup>c</sup> Includes country irrigation study, fisheries study, and communication strategy and programs.

<sup>d</sup> Includes at least four major, six medium, and six minor schemes.

<sup>e</sup> Includes vehicles for the consultants during field trips.

Source: Asian Development Bank estimates.

## OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The technical assistance (TA) will support the preparation of the Orissa Integrated Irrigated Agriculture and Water Management Project (the Project) in three phases: (i) strategic framework studies, (ii) subproject proposals and institutional actions, and (iii) project package. The team of consultants will comprise international and domestic consultants engaged as individual consultants. The consulting services will include those described below, which may be augmented by Asian Development Bank (ADB) staff to improve the quality of the outputs as needed. The consultants should closely coordinate with and use the outputs provided by the Orissa state government (OSG), including the draft detailed project report (DPR), and materials prepared with the assistance of other external financiers. Extensive consultation is needed to ensure the full ownership of the processes and outputs by OSG agencies.

### A. International Consultants

2. **Irrigation/Water Resources Management Specialist/Team Leader** (5 person-months). The consultant will guide overall direction of the TA team ensuring team integration (in terms of expert outputs and deliverables) and quality control through regular meetings with team members and reporting to Department of Water Resources (DOWR) and ADB. The consultant will manage the relations with the project preparatory working group and TA steering committee, form and liaise with advisory groups, and conduct TA workshops. Tasks in phase 1 will include (i) preparing an inception report; (ii) leading the review of similar projects synthesizing lessons; (iii) guiding the institutional assessment for participatory irrigation management (PIM) and integrated water resources management (IWRM) while identifying action agendas; (iv) arranging for specialist studies for fisheries, public expenditure, and other specific issues; (v) guiding the preparation of irrigated agriculture development strategy and social and safeguards assessment frameworks; (vi) preparing a preliminary implementation strategy, selection criteria, procedures, and options for beneficiary contribution; (vii) reviewing the technical robustness of draft DPRs, proposing schemes for TA assessment, and preparing a work plan for their strengthening; and (viii) compiling the strategic framework reports encompassing the above. The tasks in phase 2 will include (i) monitoring and guiding the TA activities to strengthen DPRs, and (ii) leading the institutional specialists' tasks in addressing the agendas, including (a) DOWR institutional actions; (b) measures to ensure full maintenance funding; (c) alternative models of irrigation service delivery; and (d) actions to implement IWRM, among others. During phase 3, the consultant will prepare the project package and plan and program institutional strengthening, project management, and training programs for DOWR and water user associations (WUAs) so preparation for implementation can begin upon completion of the TA.

3. **Agriculture Economist** (2 person-months). Guiding all tasks undertaken by the domestic agriculture economist and agronomist following the relevant ADB guidelines,<sup>1</sup> the consultant will (i) support and guide the preparation of the irrigated agriculture and fishery development strategies for productivity enhancement and crop diversification (assessing the state's competitive position, market opportunities and input availability, farmer incentives, standards of social equity, and institutional capacity);<sup>2</sup> (ii) develop economic and financial analyses, methodology and spreadsheets for different categories of subprojects under the TA, and prepare a work plan for data collection and analyses; (iii) monitor and support the economic and financial analyses undertaken during the TA to ensure their quality; (iv) develop practical

<sup>1</sup> Including ADB. 1997. *Guidelines for the Economic Analysis of Projects*. Manila; and ADB. 2005. *Technical Note 12: Improving the Relevance and Feasibility of Agriculture and Rural Development Operational Designs: How Economic Analysis Can Help*. Manila.

<sup>2</sup> Current state and national policies and systems affecting irrigated agriculture will also be analyzed in this context.

procedures and approaches for baseline data collection, economic and financial analyses, and impact monitoring of subsequent subprojects to be used by DOWR; (v) assess (a) fiscal impacts of the overall project, taking into account changes in operation and maintenance (O&M) expenditure, increased revenue from irrigation tax and/or service charges, land and other sales taxes, changes in subsidies and cost recovery arrangements; and (b) the financial sustainability of the ensuing project in terms of the capacity of DOWR, WUAs, and farmers to bear the costs of investments and O&M; and (vi) assist in synthesizing the TA reports into a consolidated appraisal document.

4. **Sociologist** (1.5 person-months). Guiding all tasks undertaken by domestic sociologists, the consultant will (i) support and guide the preparation of the strategies for social development and poverty reduction, gender development, and indigenous people's development, and assist in drawing appropriate strategies and in preparing the strategy reports (including identification of subproject selection criteria); (ii) design data collection and field consultations (including socioeconomic surveys and participatory rural appraisals) to be undertaken during the DPR strengthening stage of the TA; (iii) monitor and support the DPR stakeholder consultation with the WUAs concerned, social impact assessments (including social and poverty analysis and stakeholder analysis, and an indigenous people's development plan as required), and livelihood development programming undertaken during the TA to ensure their quality; (iv) develop procedures and approaches for baseline survey, social assessments, and impact monitoring of subprojects to be used by DOWR during project implementation; and (v) help to synthesize the TA reports into a consolidated appraisal document covering social development aspects.

## B. Domestic Consultants

5. **Irrigation Specialist/Deputy Team Leader** (6 person-months). During phase 1, the consultant will (i) assess the performance of various irrigated agriculture projects in India, and synthesize lessons; (ii) support DOWR to ensure draft DPRs provide sufficient technical data and analyses; (iii) review and assess DOWR's technical guidelines and identify gaps if any; (iv) pursue opportunities for enhancing water distribution and utilization efficiency; (v) assist institutional specialists to identify action agendas; (vi) review and synthesize technical constraints on expanding groundwater irrigation (as an input to an irrigated agriculture strategy); (vii) review and synthesize the status and issues of irrigation, including command area development; and (viii) develop an appropriate O&M framework (following the guidelines developed in Orissa and other states), comprising effective monitoring of system performance and planning and implementation of maintenance works; (ix) assist DOWR to prepare an updated irrigation scheme inventory for the selected river basins; and (x) support the team leader to prepare a draft implementation strategy. During phase 2, the consultant will (i) support institutional specialists in addressing the identified agendas, including the improved DOWR technical and administrative functions; (ii) support DOWR in undertaking necessary technical works; (iii) support (a) adoption of water-efficient cropping patterns to expand coverage of irrigation areas, and (b) inclusion of command area development works; (iv) take the overall responsibility for compiling information and analysis in the expanded DPRs; (v) design (a) management information system (MIS) for O&M monitoring, planning, and implementation, and (b) plans for DOWR's overall data and information systems; and (vi) arrange and organize study tour(s) for DOWR staff to other state(s) in India that can serve as models. During phase 3, the consultant will (i) support the team leader in proposing and finalizing the project design, including the estimated contract packaging and draft project administration memorandum; and (ii) synthesize the irrigated agriculture investment plan for the selected river basins.

6. **Irrigation Institutional Specialist** (5 person-months). During phase 1, the consultant will undertake diagnostic institutional analysis of DOWR and identify action agendas covering

(i) policy and legal framework, (ii) organizational structure, (iii) human resource management, (iv) knowledge base and asset management, (v) business processes and management, (vi) maintenance funding arrangements, (vii) DOWR's affiliated corporations, and (viii) other administrative matters. During phase 2, the consultant will (i) work with DOWR to identify specific options to address the action agendas, and lay out specific short- to medium-term actions and supporting arrangements, including technical assistance activities and resources; (ii) assess alternative institutional arrangements such as forms of corporate organization and management contracts being piloted elsewhere; and (iii) assess options and steps that need to be taken by the state, DOWR, and WUAs to ensure full maintenance funding. During phase 3, the consultant will (i) identify appropriate arrangements and programs for capacity strengthening and project management, and (ii) prepare immediate training programs for DOWR and WUAs to undertake implementation preparation.

7. **PIM/WUA Specialist** (3 person-months). During phase 1, the consultant will (i) review the existing legal framework and supporting systems for WUAs; (ii) assess WUA performance in terms of awareness, membership, roles and responsibilities, particularly with regard to O&M, and associated organizational management and capacities; (iii) identify gaps and actions needed, including any possibility or need to modify the existing framework; (iv) assess various models pursued in terms of WUA legal framework, supporting arrangements for its establishment, strengthening and monitoring, and key lessons learned; (v) assess in this context the appropriate means to enhance the participation and power of poorer people within the WUAs; and (vi) synthesize the findings in the PIM institutional assessment and options report. During phases 2 and 3, the consultant will (i) support in finalizing the institutional arrangements for the WUA establishment and strengthening, (ii) assist the initial WUA formation process in the selected subprojects, and (iii) prepare project management and capacity strengthening programs that can be immediately implemented for the ensuing project.

8. **IWRM Specialist** (3 person-months). During phase 1, the consultant will (i) review existing IWRM-related documents, and synthesize (a) resources status, (b) policy and institutional framework (at state and basin levels), and (c) functions and capacities (such as basin planning and programming including watershed management, database and management, and regulatory functions such as allocation and water quality control including groundwater); (ii) identify issues, constraints, and action agendas; and (iii) synthesize these in the IWRM assessment report. During phases 2 and 3, the consultant will (i) work with DOWR to propose specific options to address the identified action agendas, including the possibility of a future separation of DOWR's IWRM functions as the state apex body; (ii) provide recommendations for the ongoing finalization processes of the draft state water policy and River Basin Organization; and (iii) develop programs for strengthening IWRM functions and capacities of the state, including the programs for institutional strengthening of IWRM, and training.

9. **Agriculture Economist** (5 person-months). During phase 1, the consultant will (i) review and synthesize the current performance of irrigated agriculture and fisheries, including production and productivity, policy and institutional arrangements and performance for input delivery, extension services, finance, and output marketing, and farmer incentives for adopting intensified and diversified cropping; and (ii) draw up a strategy and arrangements for subproject planning and implementation under the ensuing project, including the alternative options for delivering extension services and possible linkage with research organizations. During phase 2, the consultant will (i) arrange for and undertake data collection, and economic and financial analysis (including risk analysis<sup>3</sup> of specific subprojects carried out under the TA), differentiating

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<sup>3</sup> Addressing major project risks, including beneficiary capacity for capital and O&M cost recovery, impacts from floods and mitigation measures.

the farm budget of each irrigation system's head, middle, and tail-reach areas and/or small, marginal, and large farmers under with- or without- project conditions; and (ii) undertake (a) an analysis of affordability and willingness to pay by WUA beneficiaries, in coordination with the sociologist, and (b) a poverty impact assessment, including distribution analysis using the relevant ADB guidelines. During phase 3, the consultant will (i) provide a detailed costing using COSTAB software; (ii) prepare simple draft procedures for economic analysis of subsequent projects to be used during project implementation; and (iii) propose a final irrigated agriculture strategy, and arrangements and programs for project management and capacity strengthening for the subject matter while supporting preparing the irrigated agriculture investment plan.

10. **Agriculture Specialist** (5 person-months). During phase 1, the consultant will (i) assess the performance of various irrigated agriculture projects, and synthesize lessons and good practices; (ii) review, assess, and synthesize key technical and other constraints, marketing prospects, and farmer incentives for intensified and diversified cropping in the project area; (iii) support preparation of the irrigated agriculture development strategy, including options for delivering more effective, responsive and sustainable extension systems to WUAs; and (iv) identify options and strategies for (a) an alternative extension approach (such as private providers and research institutions), (b) using WUAs to address complementary farm activities such as extension systems, input purchases, and marketing, and (c) effective linkage with research organizations. During phases 2 and 3, the consultant will (i) assist in collecting data, analyzing constraints, estimating realistically achievable cropping pattern and yield levels, and identify appropriate targets for post-project cropping patterns and yields, along with design of effective extension arrangements and promotion of command area development works; (ii) work with the Central Rice Research Institute and other research institutions to identify appropriate research and extension activities in particular for saving irrigation water; and (iii) propose the final arrangements and programs for project management and institutional strengthening.

11. **Sociologist** (5 person-months). During phase 1, the consultant will (i) review the existing documentation on irrigated agriculture projects, conduct a brief field survey, and develop a framework strategy for social development and poverty reduction, gender development and indigenous people's development, following ADB's *Policy on Indigenous Peoples* (1999) and other policies and regulations of OSG and the Government, including a profile of poverty, social development, scheduled tribes and scheduled castes, and women's involvement and status in irrigated agriculture; (ii) identify potential areas for livelihood opportunities and the means to increase involvement of the poor in the WUAs; (iii) support the development of subproject selection criteria from social perspectives; and (iv) support the WUA performance assessment through WUA interviews. During phases 2 and 3, the consultant will (i) plan and organize a socioeconomic survey and WUA consultation to strengthen the DPRs under the TA, and undertake social impact assessments (including social and poverty analysis and stakeholder analysis) for individual DPRs based on the collected data; (ii) prepare (a) a sample indigenous people's development plan as necessary, and (b) a gender action plan; and (iii) propose the final strategies for poverty reduction and social development, and arrangements and programs for project management and institutional strengthening.

12. **Environment Specialist** (4 person-months). The consultant will undertake tasks according to ADB's *Environmental Policy* (2002) and the environmental laws and regulations of OSG and the Government. During phase 1, the consultant will (i) prepare a draft environmental assessment and review procedure (EARP), to be applied to the subprojects under the TA and the ensuing project, based on (a) a review of OSG and Government environmental policy, legislation, guidelines, and arrangements, (b) a broad assessment of likely environmental impacts, (c) an assessment of environmental examination, review and approval process by DOWR and OSG and the Government, and capacities and training needs, and (d) formulation of

environmental criteria and guidelines followed as a part of the subproject selection criteria; and (ii) review and synthesize the performance and impacts of watershed management activities in the state, and propose a potential method of upper catchment treatment of reservoirs or tanks, for reflection in an irrigated agriculture development strategy. During phases 2 and 3, the consultant will (i) arrange and organize information collection and undertake an initial environmental examination (IEE) (or environmental impact assessment [EIA] as necessary) and prepare its summary, proposing any environmental management and monitoring plans to mitigate the negative impacts and their corresponding costs; (ii) prepare the final EARP; (iii) compile IEE/EIAs for subprojects, and (iv) define arrangements and programs for project management and institutional strengthening for the environmental issues.

13. **Resettlement Specialist** (3 person-months). The consultant will follow ADB's *Policy on Involuntary Resettlement* (1995), the section in the Operations Manual on involuntary resettlement (OM Section F2/BP), OSG's Resettlement and Rehabilitation (R&R) Policy for Water Sector (1994) and its amendment (1998), and other policies of the Government as applicable. During phase 1, the consultant will prepare a draft resettlement framework, based on (i) an assessment of all potential involuntary resettlement impacts; (ii) a review of national and state R&R, land acquisition, and other relevant policies and guidelines while assessing any discrepancies between the state and national policies and ADB's *Involuntary Resettlement Policy* requirements and procedures; and (iii) an assessment of DOWR's arrangements and capacities to address R&R issues. During phases 2 and 3, the consultant will (i) organize necessary surveys of and consultations with affected people and to ensure that women are involved in the process, and prepare sample resettlement plans for the subprojects concerned, with appropriate institutional arrangements to fully mitigate negative impacts; (ii) work with Director, R&R, DOWR, and ADB to propose the final resettlement framework and sample resettlement plans, and arrangements and programs for project management and institutional strengthening of resettlement issues. The consultant will also (i) ensure that any voluntary land donations are addressed in accordance with the above Operations Manual, and, in coordination with other specialists, and (ii) ensure that resettlement planning and implementation arrangements are integrated into the overall project design.

### C. Reporting and Schedule

14. The consultants will prepare the following reports during the course of the TA: (i) an inception report (within 2 weeks of fielding), describing the consultants' detailed work plans, including the methodology to be employed, a list of potential schemes with data, sampling processes, field visit schedule, and the structure of the TA reports, with a brief description of each section; (ii) a strategic framework report (within 1.5 months of fielding), including (a) an irrigated agriculture and fishery development strategy, (b) institutional assessments of irrigation service delivery and IWRM, (c) a social and environmental assessment framework (including a preliminary EARP, resettlement framework, and social development and poverty reduction strategy), and (d) preliminary project implementation strategy; (iii) enhanced DPRs and institutional actions reports (within 5.5 months of fielding), including sample schemes, safeguard assessments, action plans, institutional actions and a time frame; (iv) a draft final report (within 6.5 months of fielding), including (a) all the design elements and supporting materials for the proposed investment project, and (b) capacity strengthening programs including a list of training programs and issues, and training synthesis and consultant terms of reference for the preconstruction activities required immediately; and (v) a final report (within 7.5 months of fielding), after incorporating all comments received from the Government, OSG, and ADB.