

Technical Assistance

TAR: PAK 37231

Technical Assistance to the Islamic Republic of Pakistan for Preparing the Punjab Irrigated Agriculture Development Sector Project (Cofinanced by the Japan Special Fund, the Government of the Netherlands, and the Cooperation Fund for the Water Sector)

September 2005

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 25 July 2005)

Currency Unit	=	Pakistan rupee/s (PRe/PRs)
PRe1.00	=	\$.017
\$1.00	=	PRs59.60

TECHNICAL ASSISTANCE CLASSIFICATION

Targeting Classification	–	Targeted intervention
Sector	–	Agriculture and natural resources
Subsector	–	Irrigation and drainage
Themes	–	Sustainable economic growth, Governance, Environmental sustainability
Subthemes	–	Developing rural areas, Civil society participation, Natural resources conservation

ABBREVIATIONS

ADB	–	Asian Development Bank
AWB	–	area water boards
FO	–	farmer organization
ha	–	hectare
LBDC	–	Lower Bari Doab Canal
M&E	–	monitoring and evaluation
NDP	–	National Drainage Program
NWP	–	national water policy
O&M	–	operations and maintenance
OFWM	–	on-farm water management
PIDA	–	Provincial Irrigation and Drainage Authorities
PIPD	–	Punjab Irrigation and Power Department
TA	–	technical assistance
PC-I	–	Planning Commission Proforma No. I
TL	–	team leader
TOR	–	terms of reference

NOTE

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

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I. INTRODUCTION

1. The Government of Pakistan (the Government) has requested a project preparatory technical assistance (TA) grant from the Asian Development Bank (ADB) to support the improvement of irrigated agriculture in Punjab.¹ The TA was included in the Pakistan *Country Strategy and Program Update*² for 2004. An ADB fact-finding Mission in Punjab from 19 February to 8 March 2005 visited the Lower Bari Doab Canal (LBDC) system. The TA is based on extensive consultations with the governments of Pakistan and Punjab, farmer organizations (FOs), farmers, development partners, and other stakeholders, and the TA's contents have been confirmed by the government of Punjab. The TA design and monitoring framework is in Appendix 1.

II. ISSUES

2. **Irrigated Agriculture in Punjab.** In Punjab, as in all Pakistan, improving the productivity of irrigated agriculture is necessary to stimulate economic growth and reduce rural poverty since 80% of Punjab's poor live in rural areas. Agriculture directly employs 40% of the population and contributes 28% of the total economic output of Punjab. Punjab lies at the center of the Indus Basin link canal irrigation system (the world's largest), and has the greatest irrigated area and largest amount of irrigation assets in Pakistan. The Punjab Irrigation and Power Department (PIPD) manages vast infrastructure that supports an irrigated area of about 8.5 million hectares (ha), half the area in Pakistan, and uses 95% of the water resources in Punjab. While development of irrigation and water resources has been key factors to Punjab's growth, serious challenges of infrastructure development, water and environmental management, and irrigation governance must be overcome to help irrigated agriculture and water management achieve their full potential.

3. **Irrigation Challenges.** Much of the link canal system was constructed nearly a century ago. The infrastructure has deteriorated, which has been exacerbated by lack of investment and poor maintenance. Irrigation systems are inefficient in water distribution and pose a safety and security risk from failure of large structures. Management has been plagued by gaps in planning and operations, antiquated management methods and technology, lack of investment in irrigation and PIPD operational capacity, and insufficient monitoring and evaluation (M&E) to assess performance and direct improvements. A centralized and bureaucratic PIPD has contributed to limited responsiveness, deficient accountability, and inadequate operation and maintenance (O&M) and service delivery. Farmers have played a marginalized role in the management and O&M of irrigation, and their needs for more flexible water supply for high-value agriculture are not being met.

4. **Lower Bari Doab Canal.** The LBDC irrigation system in central Punjab exemplifies the challenges, complexities, and opportunities of irrigated agriculture within the link canal system. LBDC stretches for 200 kilometers, with a command area of about 700,000 ha that is supplied by the River Ravi and the link canal system. The main barrage was constructed in 1913. The headworks and main canal structures of LBDC require urgent rehabilitation, replacement, and upgrading. The distributary and minor canal network has degraded substantially due to inadequate O&M, which disproportionately affects downstream farmers. PIPD has not been able to effectively govern canal operations. As a result, livestock destroy the canals' shape; influential farmers tamper with the canal; there is patronage in water delivery; and unauthorized structures divert water. Over the last decades, water supply has become more inadequate and unreliable because agriculture within the command area has been intensifying. The original water allocations were not designed to support irrigation over the full command area.

5. **Environment and Groundwater.** Farmers have responded to the need for more reliable irrigation within LBDC through extensive development of private tubewells; however, the

¹ The TA first appeared in *ADB Business Opportunities* (internet edition) on 29 November 2004.

² ADB. 2004. *Country Strategy and Program Update (2004-2006): Pakistan*. Manila.

relationship between groundwater, canal water, and drainage is complex and poses management challenges and environmental risks. Groundwater serves as a flexible supply for irrigation during critical growth periods, and tubewell water may account from a third to over half the crop water requirements in some areas. If farmers do not own pumps, most of them purchase tubewell water. Groundwater depth, quality, and availability vary and are partly a result of canal seepage and traditional flood irrigation. Some areas have brackish or sodic water, which if used extensively, results in serious soil productivity decline and eventual ruin. This environmental damage has already occurred in some areas.³ Farmers are aware of the problem, yet some are forced to pump due to the overwhelming need for water. Groundwater management is also needed to prevent overdraft. Currently, no regulatory framework, monitoring, or enforcement is in place. Management of drainage, groundwater, surface water, and land resources requires an integrated approach from the farmers' fields to the aquifer.

6. **Agriculture in Punjab and LBDC.** Although agricultural production and cropping have intensified, yields have been declining and rural poverty has been increasing in Punjab.⁴ In addition to irrigation, water resources, and land management challenges, other factors contribute to low agricultural productivity: the need for improved seeds; sub-optimal use of fertilizer; inadequate plant protection; credit; and limited farmer exposure to improved agricultural practices, farm research, and alternative irrigation methods. Extension activities by the Punjab Department of Agriculture are often inappropriate for local conditions and market opportunities. In many cases, the private sector provides necessary inputs and markets, but linkages with farmers need strengthening. Crops in LBDC are still dominated by lower value cotton, wheat, maize, and fodder. LBDC, like much of Punjab, has excellent potential and some farmers are successfully engaged in higher value agriculture comprising fruits, vegetables, floriculture, livestock, and dairy. An important objective for irrigated agriculture in Punjab is to support a shift to higher value crops, which requires improved agricultural assistance to farmers.

7. **Institutional Reforms and Moving Forward.** An essential element to improve the performance of irrigated agriculture is to deepen the reforms started under the National Drainage Program (NDP).⁵ As part of NDP reforms, FOs are formed to manage minor and distributary canals. The FOs are the building blocks for area water boards (AWBs) and the Provincial Irrigation and Drainage Authority (PIDA), which represent farmers' interests at the system and provincial levels, respectively. To date, FOs' development has been weak, participation in system rehabilitation has been negligible, and their role should be expanded to include drainage and groundwater management. PIPD must also reassess its role and support a new approach to irrigated agriculture. PIPD has responded with the Water Sector Vision and Strategic Action Plan with the following framework: (i) implement structural measures for optimal utilization of surface water resources; (ii) increase public investments for modernization; (iii) develop holistic approaches to the use of surface water and groundwater to enhance productivity; (iv) reverse environmental degradation and groundwater mining; and (v) introduce institutional reforms aimed at transparency, efficiency, and autonomy to sustain the resource base and infrastructure. While Punjab has made a promising start and commitment to reform, assistance is needed to deepen and implement the reform process.

8. **Sector Activities and External Assistance.** ADB has a long history of investment in the water sector, with over \$1.5 billion in projects for irrigation, watershed management, and flood protection. ADB's investment in water resources and irrigated agriculture waned over the past

³ Drainage also plays an important role in managing salinity and needs to be addressed in some areas. Appropriate pesticide, herbicide, and fertilizer use is also critical to managing environmental sustainability of land resources.

⁴ Soil degradation and limited water supplies due to more intensive farming are the causes of declining yields.

⁵ The NDP was a joint irrigation and drainage program of ADB, World Bank, and Japan Bank for International Cooperation that originally totaled about \$750 million in combined funds from all financiers.

decade due to concerns with project performance and the pace of reforms. However, important changes have taken place following completion of the ADB-supported National Water Sector Strategy in 2003. The Government has shown strong support for water sector reform through introduction of a draft national water policy (NWP) that provides a strengthened institutional framework and is consistent with ADB's Water Policy. The Government has also requested ADB assistance for capacity development, institutional strengthening, and implementation of the draft NWP. ADB responded with advisory TA 4435 PAK: Irrigation Water Sector Development⁶ that will provide a road map for irrigation reform and prepare a substantial assistance program to strengthen water sector capacity and implement the new NWP. The Government plans to use at least \$4 million from the ADB Loan 2178-PAK: Technical Assistance Loan for Infrastructure Development to implement the TA program prepared under TA 4435 PAK. This strong Government support for reform along with Punjab's own commitment to irrigation reforms provide a solid basis for renewed ADB support to water resources and irrigation.⁷

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

9. The overall goal is to improve rural livelihoods and reduce rural poverty through improved irrigation service delivery, enhanced agricultural practices, and strengthened water resources and environmental management to increase the productivity of irrigated agriculture in Punjab. The TA and the ensuing project have the following interrelated objectives: (i) improve water resources management at all levels in LBDC, (ii) strengthen capacity and institutional frameworks to manage irrigated agriculture and water resources for improved productivity and enhanced environmental sustainability, (iii) rehabilitate and modernize irrigation and water resources infrastructure and stimulate sustainable O&M, and (iv) enhance the enabling environment for improved agricultural productivity. The TA will prepare a sector investment program that includes the following: studies and plans for civil works, institutional frameworks, implementation arrangements, capacity development programs, service delivery mechanisms, and M&E and safeguard procedures.

B. Methodology and Key Activities

10. The TA takes an integrated approach since all activities must work synergistically to optimize water resources management and maximize agricultural production and farm incomes. The following principles will guide TA and project development: (i) the entire irrigation system must be improved in unison to ensure that water entering the main canal provides benefits at the farm level; (ii) canal flows, groundwater, and drainage must be managed together to improve irrigation, productivity, and the environment; (iii) groundwater use must be sustainable and improved canal flows should be for existing, not new irrigation; (iv) agricultural support services, inputs, and markets must be strengthened to help farmers take advantage of improved irrigation; and (v) institutions must be reformed and strengthened in parallel with infrastructure rehabilitation to improve management and sustain O&M. The TA and ensuing project will provide a model of best practice for irrigation modernization and reformed management practices in the link canal system as well as for ADB's pipeline of forthcoming irrigation projects in Pakistan. The TA and the ensuing project will be based on the forthcoming components.

11. **Component 1: Balloki Barrage, Headworks, and the LBDC Main Canal.** The TA will prepare plans to rehabilitate and modernize Balloki Barrage and all headworks of LBDC to improve performance and reduce the risk of failure. For some of these activities, PIPD has prepared feasibility studies that will be confirmed under the TA. The TA will (i) prepare for the rehabilitation or

⁶ ADB. 2004. *Technical Assistance to the Islamic Republic of Pakistan for the Water Sector Irrigation Development*. Manila.

⁷ ADB is also supporting reform and innovation in the agriculture sector through the Agricultural Sector Program Loan, and the new Agribusiness Project that support improved agriculture research and new extension modalities.

replacement of all structures on the main canal, including bridges, drop structures and branch and distributary head structures; (ii) address rehabilitation of the pumping stations for lift canals and improvement of the emergency escape capacity of the main canal; and (iii) investigate the feasibility and financing options for a small hydropower generation facility along the main canal.

12. **Component 2: LBDC Branch, Distributary and Minor Canals, and Command Area Development.** The TA will evaluate technical options to rehabilitate and upgrade the distribution network and review existing flow capacities and needed modifications. It will evaluate alternative irrigation technologies to increase water use efficiency and delivery flexibility. A vital TA activity will be to define a process that involves FOs in every aspect of the minor and distributary canal rehabilitation including needs identification, design, and construction that can be replicated throughout the canal network under the project. The process will assist FOs to develop system ownership; increase understanding of O&M; and provide an opportunity to gain experience functioning as an organization. The TA will prepare two distributary canal commands as core-subprojects to identify technical requirements and options for rehabilitation and upgrading; define processes for FOs participation, and provide detailed costing. The TA will evaluate on-farm water management (OFWM) needs and options for coordinating and strengthening ongoing OFWM activities by the district, provincial, and federal governments.

13. **Component 3: Environment, Groundwater, and Drainage.** The TA will address LBDC as a conjunctive use system for infrastructure and management improvements.⁸ The TA will support development of models to assess safe yields as well as changes in soil and groundwater properties and environmental degradation under various scenarios. The TA will identify options for environmentally sustainable conjunctive use by farmers and provide strategies for conjunctive management that can be incorporated in FO development and training. Recommendations for an institutional framework to manage overall groundwater within LBDC and applicable to the wider Punjab will also be developed. This will also include specifying the necessary monitoring system for management and identification of additional data requirements. The TA will assess drainage needs, provide drainage recommendations and options to be implemented by FOs and PIPD. The TA and project seek to manage water resources more efficiently to reduce groundwater pumping and environmental degradation and to distributing existing surface water more effectively.

14. **Component 4: Agricultural Support Services.** The TA will evaluate farmers' needs and current delivery of agricultural support services to develop strategies to improve their delivery. The TA team will coordinate closely with the Department of Agriculture, the private sector, academic institutions, and other stakeholders to develop this component for the project. An important element of this component is the provision of options that help promote higher value agriculture in LBDC.

15. **Component 5: Institutional Strengthening and Capacity Development.** The TA will prepare a project that develops FO capacity for irrigation rehabilitation, management, and O&M including canal water, groundwater, drainage, and land resources. The TA will also identify improvements to refine the existing NDP model for FOs, AWB, and PIDA, and seek innovative approaches in the delivery of FO training and provision of ongoing FO technical support. The TA will develop a plan for restructured PIPD management of LBDC assuming full development of FOs and full modernization of PIPD with staff capacity development and technical upgrades (computers, enhanced and communication, among others). The TA will work with PIPD to develop an overall management study and long-term plan to strengthen and implement its water sector vision and strategic action plan. The TA will develop assurance mechanisms to ensure reforms are implemented through the project.

⁸ Conjunctive use is the deliberate and integrated use of both surface water and groundwater to optimize resource use and minimize adverse impacts from reliance on a single water source.

16. The TA will develop an M&E framework for all project activities and identify research needs and options to help achieve the project objectives and to support improved decision making. The TA will prepare social and poverty assessments and an initial environmental examination consistent with ADB's guidelines, and define procedures and a capacity development program for PIPD, FOs, and other stakeholders to continue these activities during project implementation (Appendix 2). A framework for resettlement consistent with ADB's guidelines will be prepared and used as needed in the ensuing project.

C. Cost and Financing

17. The total cost of the TA is estimated at \$1.55 million equivalent, comprising \$924,000 in foreign exchange and \$628,000 equivalent in local currency. The Government has requested that ADB finance the entire foreign exchange cost and \$318,000 equivalent of the local currency cost. The Government will contribute the remaining local currency cost of \$310,000 equivalent. The TA will be financed on grant basis by the Japan Special Fund, funded by the Government of Japan for \$595,000. The TA will be cofinanced by the Government of the Netherlands for \$557,000, and the Cooperation Fund for the Water Sector for \$90,000 administered by ADB. Details of the cost estimates and financing are in Appendix 3. The Government has been advised that approval of the TA does not commit ADB to financing an ensuing project.

D. Implementation Arrangements

18. PIPD will be the Executing and Implementing Agency for the TA and has agreed to the following: (i) to appoint a TA project director and counterpart staff; (ii) to create a project management unit to facilitate TA implementation; (iii) to provide data and information; (iv) to facilitate two consultative stakeholder workshops (in Lahore and in the command area) to discuss the TA; and (v) to provide logistical support, lodging in field guest houses, office space, phone lines as needed, and utilities. Two committees will be formed: (i) a secretary-level steering committee for policy guidance chaired by the Chairman of the Punjab Planning and Development Board; and (ii) a project technical advisory committee to assist implementation and interagency coordination chaired by the project director and comprising of technical officers.

19. The TA will be implemented over 7 months, from August 2005 to February 2006. Consultants will provide 34 international and 51 domestic person-months of consulting services in engineering, economics, agriculture, institutional development, social assessment, and environment. ADB will engage the consultants in accordance with its *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for engaging domestic consultants. A simplified technical proposal will be used and selection will be quality- and cost-based. The farming systems analysis/sustainable agriculture specialist will be recruited on an individual basis. Advance action will be taken to recruit the consultants on a noncommittal basis.

IV. THE PRESIDENT'S DECISION

20. The President, acting under the authority delegated by the Board, has approved (i) ADB administering a portion of technical assistance not exceeding the equivalent of \$90,000 to be financed on a grant basis by the Cooperation Fund for the Water Sector; (ii) ADB administering a portion of technical assistance not exceeding the equivalent of \$557,000 to be financed on a grant basis by the Government of the Netherlands; and (iii) ADB providing the balance not exceeding the equivalent of \$595,000 on a grant basis, to the Government of Pakistan for preparing the Punjab Irrigated Agriculture Development Sector Project, and hereby reports this action to the Board.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/ Reporting Mechanisms	Assumptions and Risks
<p>Impact Improve rural livelihoods and reduce rural poverty through improved irrigation service delivery, enhanced agricultural practices, and strengthened water resources and environmental management for improved agricultural productivity</p>	<p>Improved livelihood opportunities, increased incomes, and poverty reduced in Lower Bari Doab Canal (LBDC) command area by the end of the ensuing project</p>	<p>District data in Punjab for rural livelihoods and poverty</p> <p>Department of Agriculture statistics for agricultural production of both yields and cropping type</p> <p>Monitoring and evaluation (M&E) parameters set up for the project</p>	<p>Assumption 1. Government will continue to see project impacts as important national objectives.</p> <p>Risk 1. Significant changes to inter-provincial water allocations take place affecting LBDC irrigation supplies.</p>
<p>Outcome</p> <p>1. Rehabilitation plans and approach for Baloki Barrage, associated headworks, LBDC main canal structures, and distributary headworks</p> <p>2. Minor and distributary canal rehabilitation process that includes full participation of farmer organizations (FOs) and promotes improved irrigation flexibility and irrigation water management actions including on-farm water management options</p> <p>3. Strategy and options for conjunctive use of surface water, groundwater, and drainage in LBDC command area that promotes environmental sustainability and enhanced agricultural productivity. Groundwater regulatory framework options developed</p> <p>4. Strategy and options for enhanced agricultural support services that take advantage of improved water management to improve rural livelihoods and promote high-value agriculture</p>	<p>1. Rehabilitation plans for the Balloki Barrage, associated headworks, main canal, and distributary headworks completed and agreed to by Government and Asian Development Bank (ADB) at loan fact-finding</p> <p>2. Sector approach to comprehensive distributary and minor canal and farm-level rehabilitation under the Project with FO participation completed and agreed to by the Government and ADB at loan fact-finding</p> <p>3. Sector approach to conjunctive use and environmental soil management under the Project and a groundwater regulatory framework approach agreed to by the Government and ADB at loan fact-finding</p> <p>4. Sector approach to enhanced agricultural support services that promote high-value crops under the project agreed to by the Government and ADB at loan fact-finding</p>	<p>ADB technical assistance (TA) processing missions</p> <p>Inception, interim, and final reports from TA consultants</p> <p>Monthly reporting by TA consultants</p> <p>Formal reporting by Punjab Irrigation and Power Department (PIPD) and other Punjab government agencies</p> <p>Ongoing dialogue with PIPD</p> <p>Follow-up activities by ADB Pakistan Resident Mission</p>	<p>Assumptions</p> <p>1. Government will agree to approach to project components developed under the TA.</p> <p>2. Government will support strengthening the reform process and will support project deepening of the reforms.</p> <p>3. Counterpart agencies will have capacity and systems in place to easily initiate and implement recommended project activities.</p> <p>Risks</p> <p>1. Coordination of the Punjab Planning Department, PIPD, Department of Agriculture, and district government, which are implementing some command development activities will be difficult to finalize the project design.</p> <p>2. Farmers may not support a more participatory role in system management and operation and maintenance (O&M).</p>

Design Summary	Performance Targets/Indicators	Data Sources/ Reporting Mechanisms	Assumptions and Risks
<p>5. Strategies and assured implementation of institutional reforms that empower FOs, area water boards (AWBs), and the Provincial Irrigation and Drainage Authority (PIDA) for system management and O&M as well as a defined and strengthened vision and role of PIPD to support a more effective approach to water management and irrigation. Assured plan for implementation of needed institutional strengthening and needed reforms</p> <p>6. Capacity development assured for all aspects of the ensuing loan project</p> <p>7. M&E framework and safeguard procedures for all project activities</p>	<p>5. FO, AWB, PIDA, and PIPD capacity development and strategic planning program and a strengthened institutional framework, assurances, and needed reforms agreed to by the Government and ADB at loan fact-finding</p> <p>6. All capacity development and M&E and safeguard activities finalized at loan fact-finding</p>		
<p>Outputs</p> <p>1. Prefeasibility and feasibility level designs, implementation plans, terms of reference (TOR), and implementation arrangements for execution of works for Balloki Barrage, headworks, and main canal</p> <p>2. Implementation arrangements, manuals, TOR, and recommended technical options for rehabilitation of distributary and minor canals that describe a process with full involvement of FOs and include improved operational flexibility and on-farm water management</p>	<p>1. Draft of all pre-feasibility and feasibility-level designs, implementation plans, TOR, and implementation arrangements for the Balloki Barrage, associated headworks, main canal, and distributary headworks completed with the draft TA final report</p> <p>2. Draft of implementation arrangements, manuals, TOR, and recommended technical options for rehabilitation of distributary and minor canals rehabilitation plans completed with loan fact finding</p>	<p>ADB TA processing missions</p> <p>Inception, interim, and final reports from TA consultants</p> <p>Monthly reporting by TA consultants</p> <p>Formal reporting by PIPD and other Punjab government agencies</p> <p>Ongoing dialogue with PIPD</p> <p>Follow-up activities by ADB Pakistan Resident Mission (PRM)</p>	<p>Assumptions</p> <p>1. Existing feasibility and other PIPD studies are adequate to provide the basis for timely development of rehabilitation plans for major structures.</p> <p>2. Counterpart staff is adequate and competent to assist with preparation of TA activities.</p> <p>Risks</p> <p>1. Consultants may not be able to deal adequately with all policy issues during TA development.</p> <p>2. Consultants may not be able to complete all required tasks within the given time and resources.</p>

Design Summary	Performance Targets/Indicators	Data Sources/ Reporting Mechanisms	Assumptions and Risks
<p>3. Recommended practices and program, TOR, and implementation arrangements to abate environmental soil degradation that involve FOs and PIPD and institutional and technical groundwater regulatory framework options ready for implementation Design and initiation of a groundwater model for LBDC at loan fact-finding</p> <p>4. Recommended practices and program, TOR, and implementation arrangements for agricultural support services, especially those that support high-value agriculture in LBDC</p> <p>5. Strengthened institutional designs, TOR, and implementation arrangement and program to empower FOs, AWBs and PIDA to manage irrigation systems along with recommended institutional reforms, strategic planning, TOR, and capacity development for PIPD</p> <p>6. Options defined to assure institutional reforms tied to loan disbursement and other project activities</p> <p>7. Implementation arrangements, TOR, and capacity development plans for project activities</p> <p>8. M&E parameters and safeguard frameworks, implementation procedures, required capacity development for M&E and safeguards, and assurances</p> <p>9. Draft Planning Commission Proforma No. I (PC-I) for ensuing ADB Project.</p>	<p>3. Draft recommended practices and program, TOR, and implementation arrangements to abate environmental soil degradation and institutional and technical groundwater regulatory framework options completed with draft TA final report</p> <p>4. Recommended practices and program, TOR, and implementation arrangements for agricultural support services completed with draft TA final report</p> <p>5. All draft institutional outputs completed by the draft TA final report</p> <p>6. Draft finalized assurances completed by loan fact finding</p> <p>7. All capacity development outputs completed by draft TA final report</p> <p>8. Draft M&E and safeguard outputs completed by draft TA final report</p> <p>9. Draft PC-I for ensuing ADB project completed at fact-finding and final version by loan negotiations</p>		

Activities with Milestones	Inputs
<p>1.1 Review, critically analyze, and identify gaps in existing feasibility studies, designs, and other required plans for rehabilitating structures in LBDC. Develop detailed program for rehabilitation with some prefeasibility designs for the Balloki Barrage, LBDC, and Link Canal head regulators, and all structures for LBDC main canal.</p> <p>2.1 Develop inventory of structures, assessment of rehabilitation options, and finalize detailed plans with costing for two distributary including minor canal commands. Conduct focus groups and other structured interaction with FOs and farmers to ensure development of a participatory rehabilitation process. Analyze and recommend alternative irrigation and water supply options to increase system flexibility. Analyze ongoing on-farm water management activities and recommend options to improve practice and integrate into the canal rehabilitation process. Completed by the end of the TA</p> <p>3.1 Analyze existing groundwater data and develop the sampling protocol for monitoring and groundwater model development. Assess and develop technical needs and institutional options for groundwater regulatory framework. Conduct environmental assessment of soil degradation and develop options to optimize conjunctive use of water and strategies to abate environmental soil degradation. Develop strategies for conjunctive water use and environmental protection of soil resources at the farm level to be managed by FOs and at the aquifer level to be managed by PIPD. Completed by end of the TA</p> <p>4.1 Analyze ongoing agricultural practices within LBDC and options for higher value agriculture in LBDC and Punjab (from inputs to marketing). Identify farmer constraints to higher productivity and adopt high-value agriculture. Assess existing agricultural support services from all providers within LBDC and develop innovative strategies and a program to be implemented to assist farmers with support services and shift to higher value agriculture. Completed by the end of the TA</p> <p>5.1 Review and analyze the current status of institutional reforms started under the National Drainage Program in Punjab – FOs, AWBs, and PIDA. Assess current constraints on implementation as well as institutional structure of reforms and make recommendations to improve institutional arrangements as well as delivery mechanisms of reforms. Conduct focus groups with FOs, farmers, and PIPD and work with consultant team members to develop a comprehensive FO capacity development program that addresses management of irrigation from a conjunctive use perspective. Work with PIPD staff to develop a revised management plan for LBDC based on full implementation of institutional reforms. Develop overall agency strategic plan for PIPD with implementation arrangements for LBDC. Develop assurance mechanisms to ensure that reforms and institutional strengthening activities are implemented under the ensuing project. Completed by the end of the TA.</p> <p>6.1 Develop M&E parameters with implementation arrangements for all activities under the ensuing project along with relevant ADB safeguard frameworks and procedures with implementation arrangements and required capacity development activities. Completed by the end of the TA.</p> <p>7.1 Compose PC-I to support the ensuing project with draft completed by fact-finding and the final version completed by appraisal mission.</p>	<p>1. ADB inputs include 34 international and 51 domestic consulting person months; at least 5 processing missions; and follow-up support from PRM.</p> <p>2. PIDP will provide office space in Lahore and the field, counterpart staff, logistical support, data collection, design assistance, a groundwater study, and a rehabilitation study</p> <p>3. The Punjab Planning Department, Department of Agriculture, and district governments will provide support for institutional reforms and program activities.</p> <p>4. ADB financing through Japan Special Fund for \$595,000; support from the ADB Cooperation Fund for the Water Sector for \$90,000, and support from the Government of the Netherlands for \$557,000</p> <p>5. Farmers' participation in developing the FO program and other institutional reforms designed to improve sector performance</p>

INITIAL POVERTY AND SOCIAL ANALYSIS

A. Linkages to the Country Poverty Analysis

<p>Is the sector identified as a national priority in country poverty analysis?</p> <p style="text-align: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Due to the importance of irrigated agriculture to the rural economy and the economy as a whole, irrigation and water resources play a critical role in poverty reduction.</p>	<p>Is the sector identified as a national priority in country poverty partnership agreement?</p> <p style="text-align: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Pakistan's Poverty Reduction Strategy Paper (Dec./03), <i>Accelerating Economic Growth and Reducing Poverty: the Road Ahead</i>, states: "The most critical challenge facing the agricultural sector is the shortage of water as it is the key engine of agricultural growth." The strategy paper also recognizes the importance of improved water delivery and efficiency, water pricing and cost recovery, rehabilitation and modernization of infrastructure, and the need for improved governance and operation and maintenance of irrigation facilities. The paper specifically calls for decentralized and participatory irrigation management reforms that will be supported by the TA and ensuing project.</p>
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Contribution of the sector or subsector to reduce poverty in Pakistan:

Water resources are vital to Pakistan's economic well-being and their improved management is vital for poverty reduction. Agriculture contributes 26% to Pakistan's gross domestic product, employs 54% of the labor force, and directly or indirectly provides 60-70% of exports. Development of water resources in the Indus Basin for irrigated agriculture has been a key source of agricultural and economic growth, and irrigated land is responsible for about 80% of agricultural production in Pakistan. Irrigation uses 95% of all developed water supply to support agriculture on about 19 million hectares of land or about 82% of the irrigable area. In Punjab as in Pakistan, improving the productivity of irrigated agriculture is necessary to stimulate economic growth and reduce poverty. Agriculture directly employs 40% of the population and contributes 28% of the total economic output of Punjab. Punjab lies at the center of the Indus Basin link canal irrigation system and has the largest area of irrigated agriculture in Pakistan – about 8.5 million hectares, almost half the irrigated area in the country.

According to the Punjab Economic Report (Towards a Medium-Term Development Strategy, June 14, 2004, Government of Punjab, World Bank, Asian Development Bank (ADB), and Department for International Development), poverty in Punjab had increased to 34.1% by 2001/02. The incidence of poverty is much higher in rural Punjab, with almost 80% of the poorest 10% residing in rural areas. According to this report, the poorest 10% of Punjab consume just below PRs400 per capita per month. Vulnerability defined as proximity to the poverty line is at 77.7%. These people are vulnerable to even small shocks to their income, and all individuals in this group risk experiencing poverty if hit by a shock. Accordingly improved productivity, environmental sustainability, and livelihood opportunities from irrigated agriculture are essential to poverty reduction in Pakistan and Punjab.

B. Poverty Analysis

Proposed Targeting Classification: Targeted intervention

What type of poverty analysis is needed?

Social and stakeholder analyses are needed through focus group discussions as well as limited household survey work in Lower Bari Doab Canal (LBDC) with more extensive efforts in the command areas of the two distributary canals that will be prepared as core subprojects. Stratified procedures should be used to ensure desegregation of data between head, middle, and tail reaches of canal commands as well as among land tenure arrangements for farm families. Livelihoods impacts should also be assessed in areas where environmental soil degradation is more acute and in areas where irrigation canal conditions are particularly poor. The assessment would be in addition to other distributional assessment in standard ADB poverty assessment including gender. Baseline conditions should be established in all stratified areas to ensure that program monitoring and evaluation can reflect impacts to different groups.

C. Participation Process

Is there a stakeholder analysis? Yes No

Is there a participation strategy? Yes No

A stakeholder analysis and participation strategy will be undertaken for needs assessment and targeting of the poorest areas and groups, including women.

Since a vital objective of the TA and the ensuing project will be to empower farmers through development of farmer organizations (FOs), a formal strategy for farmers to strengthen and implement participation will be an important TA output.

D. Gender Development

Strategy to maximize impacts on women:

Women bear a disproportionately higher burden of poverty. District and village studies show that women constitute 42% of the economically active persons in agriculture, and are major contributors to the rural economy through crop production, livestock production, and cottage industry. A study of 42 villages of the Punjab showed that women play a vital role in agriculture production, manufacture of off-farm products, performing household tasks, caring for children, cooking and carrying fuel and water.

Gender discrimination in access to markets, institutions, and resources constrains women from overcoming poverty, and the prevailing gender norms within traditional households further exclude them from availing of the limited market opportunities. Poor women suffer from the double burden of poverty and the gender bias against them in social and economic life. Due to restrictions on mobility, they have poorer access to education, skills training, health facilities, and labor markets. A recent study showed that, while they contribute substantially (16–25%) to family income, their control over intrahousehold consumption decisions is relatively restricted. Another study of rural region of Punjab has shown that while women are predominantly employed in agriculture and livestock, their work is unpaid in a large proportion of cases. The percentage of unpaid farm labor for women is as high as 57% in areas where water is scarce, falls sharply to 17.3% in semi-irrigated areas, and further to 13% in the irrigated areas of Southern Punjab. This is attributed to the fact that given the low yield per acre in water-scarce areas, men traditionally seek employment outside, while women work on the family farm. In irrigated areas, women are traditionally hired for the more labor-intensive activities of cotton picking and vegetable weeding, and the return is far below the subsistence level. According to this study, paid employment outside the home, is mainly undertaken by women from low-income households, which for economic reasons cannot afford to observe seclusion norms.

Gender analysis will be undertaken and is specifically addressed in the TA terms of reference and development of a gender strategy will be an important part of the TA. This is especially important given the current status of women in Pakistan.

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	Since the project addresses rehabilitation in an irrigation system that is nearly 100 years old, it is anticipated that major resettlement activities such as household relocation will not be necessary. A resettlement specialist is included to prepare a resettlement framework consistent with ADB's guidelines for sector projects.	<input type="checkbox"/> Full
	<input checked="" type="checkbox"/> Not significant		<input checked="" type="checkbox"/> Short
	<input type="checkbox"/> None		<input type="checkbox"/> None
Affordability	<input type="checkbox"/> Significant	Based on the TA fact finding, affordability did not appear to be an issue under the TA and ensuing project. This will be validated during TA preparation.	<input type="checkbox"/> Yes
	<input checked="" type="checkbox"/> Not significant		<input checked="" type="checkbox"/> No
	<input type="checkbox"/> None		

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Labor	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	It is not anticipated that labor impacts will be experienced, and the increase of higher value agriculture should enhance labor opportunities for landless farm labor.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Indigenous Peoples	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	Based on the TA fact-finding mission, it did not appear that indigenous peoples posed an issue in the LBDC command area. The prevalence or significance of indigenous peoples will be validated by the social assessment specialist during the TA. If indigenous peoples issues are determined to be a concern, an indigenous peoples framework will be prepared in accordance with ADB's guidelines for sector projects.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Other Risks and/or Vulnerabilities	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Foreign Exchange	Local Currency	Total Cost
A. Asian Development Bank, Cooperation Fund for the Water Sector, and Government of the Netherlands Financing^a			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	779.0	0.0	779.0
ii. Domestic Consultants	0.0	204.0	204.0
b. International and Local Travel	48.0	0.0	48.0
c. Reports and Communications	0.0	6.0	6.0
2. Equipment	0.0	13.0	13.0
3. Workshops	0.0	3.0	3.0
4. Topographic Surveys	0.0	10.0	10.0
5. Social Assessment Surveys	0.0	12.0	12.0
6. Miscellaneous Administration and Support Costs	0.0	6.0	6.0
7. Transport/Vehicles	0.0	64.0	64.0
8. Representative for Contract Negotiations	4.0	0.0	4.0
9. Contingencies	66.0	0.0	66.0
10. Cofinancing Management Fee ^b	27.0		27.0
Subtotal (A)	924.0	318.0	1,242.0
B. Government of Pakistan Financing			
1. Office Accommodation and Transport	0.0	55.0	55.0
2. Remuneration and Per Diem of Counterpart Staff	0.0	75.0	75.0
3. Data Collection	0.0	35.0	35.0
4. Design Assistance	0.0	40.0	40.0
5. Logistical Support	0.0	25.0	25.0
6. Groundwater Survey	0.0	40.0	40.0
7. Rehabilitation Survey	0.0	40.0	40.0
Subtotal (B)	0.0	310.0	310.0
Total	924.0	628.0	1,552.0

^a Financed by the Japan Special Fund, funded by the Government of Japan (\$595,000); The Cooperation Fund for the Water Sector (\$90,000); and Government of the Netherlands (\$557,000). Note that final approval of cofinancing from the Government of the Netherlands is pending. The total budget includes \$80,000 for the farming systems analysis/sustainable agriculture specialist (\$66,000 for remuneration and per diem; \$8,000 for travel; and \$6,000 for transport).

^b This amount is for a 5% cofinancing management fee paid on the contribution by the Government of the Netherlands.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS¹

1. The consulting services from 11 international and 12 domestic experts will be required. The consultant's category and length of engagement (person-months) are in parenthesis.
2. **Project Economist/Team Leader** (international, 6). The team leader (TL) will (i) provide overall direction of the technical assistance (TA) team, coordinate inputs and manage individual specialists; (ii) manage the relationship with committees set up under the project, implementing agency, and associated agencies of the provincial and federal governments and other stakeholders; (iii) ensure timely preparation and quality control of all TA outputs and, in association with the provincial government, prepare a draft Planning Commission Proforma No. 1 on the final project proposal; (iv) oversee and coordinate monitoring and evaluation (M&E) recommendations of individual specialists; (v) work with the project team to develop innovative assurance mechanisms to ensure institutional reforms are implemented with the project and as project economist, (i) identify and calculate project costs and estimated benefits (including core subprojects) including estimation of the benefits in terms of reduced risk of infrastructure failure and interruption to water supplies, and estimation of the financial and economic benefits of the project; (ii) analyze relevant investment scenarios for the project; (iii) evaluate the financial situation in the Lower Bari Doab Canal (LBDC) regarding current levels of subsidy, cost recovery from water fees, financial flows, and expenditures under traditional management by the Punjab Irrigation and Power Department (PIPD) and under new institutional arrangements with farmer organizations (FOs) and make recommendations for reforms; (iv) confirm the sector policy framework, investment plan, and capacity and other requisite parameters to pursue a sector loan; and (v) develop project cost estimates and tables in COSTAB.
3. **Deputy Team Leader** (domestic, 7). The deputy TL will (i) act as TL in the TL's absence; (ii) be responsible for expedient mobilization of the project; (iii) manage the domestic consulting team under the guidance of the TL; and (iv) manage workshops in cooperation with the TA team, the Asian Development Bank (ADB), and PIPD.
4. **Hydraulic Structures Design and Construction Specialist** (international, 3). The specialist will provide a technical review of the feasibility-level design and construction proposals to rehabilitate (i) the Balloki Barrage and all associated works in the barrage's vicinity, (ii) the inlet structures of LBDC and the adjacent link canal, and (iii) structures and associated works on LBDC. The specialist will (i) identify shortcomings or additional work needed to ready project implementation of all hydraulic structures, (ii) prepare detailed descriptions and estimated costs of the works, (iii) make recommendations on construction aspects and sequencing, (iv) prepare a report on flood management and barrage safety following implementation of the recommended works, (v) recommend procurement packages for these works in line with ADB's guidelines, and (vi) advise, as required, the irrigation engineering specialist.
5. **Hydraulic Structures Design and Construction Specialist** (domestic, 5). The specialist will (i) support the tasks of the international consultant; and (ii) in association with PIPD, compile and synthesize the feasibility studies and other materials related to the design, construction, and operation and maintenance (O&M) of the hydraulic structures in LBDC or similar canal systems.
6. **Hydropower Development Specialist** (international, 1.5). The specialist will (i) review the feasibility-level proposals for construction of a hydroelectric facility on LBDC; (ii) identify the most promising implementation and operational arrangements for construction and commissioning; (iii) prepare capital and operating costs of promising proposals; (iv) help the project economist assess the

¹ All consultants will be responsible for the following: (i) developing monitoring and evaluation parameters for the project, (ii) identifying related research needs and options to achieve project objectives, and (iii) preparing terms of reference and capacity development activities as needed for the ensuing project.

economic merit of the proposals; (v) develop relevant M&E parameters for the project and identify related research needs and options to achieve project objectives; and (vi) in conjunction with the TL, investigate financing options including the private sector, to develop the hydropower project.

7. **Hydroelectric Engineering Specialist** (domestic, 3). The specialist will (i) assist the international specialist; (ii) prepare a preliminary report on similar hydropower schemes that evaluates the existing feasibility study from the technical, operational, and financial perspectives; and (iii) review similar projects in Pakistan and lessons they provide for the proposed feasibility study.

8. **Irrigation Engineering Specialist** (international, 5). The specialist will (i) review the technical design and estimated costs of rehabilitation proposals prepared for sample distribution canal commands by PIPD; (ii) recommend system innovations that will improve water use efficiency and delivery flexibility; (iii) develop technical proposals and estimated costs for rehabilitating all distribution canal commands, including construction works packaging and procurement in line with ADB's guidelines; (iv) in association with the hydraulic structures specialist, confirm the structural and functional distribution system structures; (v) review and recommend revisions to the arrangements to supply distribution canals and watercourses to improve irrigation efficiency and crop productivity, including measurement systems to help manage system performance; (vi) develop conjunctive use proposals for canal water and local groundwater resources; (vii) work with the on-farm water management (OFWM) specialist to fully integrate irrigation system rehabilitation activities with OFWM; (viii) work with the agriculturalist to develop strategies to accommodate water demand requirements for higher value crops; (ix) with the FO specialist, develop the FO training program and assist the irrigation agency management specialist in assessing LBDC and PIPD management; and (x) use focus groups and stakeholder consultation to develop a process that fully involves FOs in rehabilitation, which can be replicated under the project.

9. **Irrigation Engineering Specialist** (domestic, 6). The specialist will (i) support the tasks of the international consultant, (ii) work with PIPD to compile the results from the initial PIDP sample assessment of the distributary and minor rehabilitation, and (iii) work with PIPD to compile the results of the groundwater and agricultural activities survey conducted by PIPD.

10. **Groundwater, Environmental Land Degradation, and Drainage Specialist** (international, 2.5). The specialist will (i) review all relevant studies on groundwater, pumping and surface water drainage in LBDC and surrounding areas; (ii) review studies on salinization and sodification and environmental land degradation as they apply to LBDC; (iii) develop a model for groundwater in LBDC that can be used to investigate conjunctive water options; (iv) estimate long-term changes of environmental soil degradation and groundwater properties under various conjunctive use scenarios; (v) develop technical proposals and estimated costs for environmental management of land resources; groundwater development and management, surface drainage improvement works, and groundwater M&E systems; (vi) evaluate the impact of farm chemical use on groundwater and land resources and make recommendations for their sustainable use; (vii) recommend a groundwater regulatory framework for LBDC suitable for replication in other irrigation systems in Punjab; and (viii) provide input into an FO capacity development program to help farmers optimize conjunctive use of water, manage environmental land degradation, and address drainage concerns.

11. **Groundwater, Environment, and Drainage Specialist** (domestic, 2). The specialist will (i) support the tasks of the international consultant, and (ii) work with PIPD to collect and organize data from the inventory and assessment of groundwater activities.

12. **Groundwater Modeler** (domestic, 3). The specialist will (i) review current groundwater models in Pakistan and recommend a model to be developed under the project, (ii) compile existing data to support the development of a groundwater model for LBDC, (iii) identify data gaps and specify data needs and collection methodology, and (iv) initiate development of a groundwater model.

13. **On-Farm Water Management Specialist** (international, 2). The specialist will (i) identify problems and constraints faced by water users and FOs, which affect water availability (canal and groundwater) including water use and water productivity; (ii) review the current relationship between water availability, water use and management, and simulate a typical farmer's use of surface water deliveries in conjunction with the quality and quantity of a range of groundwater availabilities; (iii) analyze the options available for enhancing water productivity including innovative water conservation technologies; (iv) study alternative well technology and develop strategies for introducing it; (v) analyze the options for the use of alternative irrigation systems (sprinkler and drip) and innovative adaptations, which are cost effective; (vi) investigate innovative methods for improving the demand responsiveness of on-farm irrigation systems; (vii) review the ongoing program of watercourse improvement being carried out in LBDC and evaluate the capacity of OFWM agencies; (viii) identify appropriate coordination between OFWM activities and rehabilitation of the distribution system under the project; and (ix) identify relevant issues and recommend on-farm practices to combat environmental and soil degradation.

14. **On-Farm Water Management Specialist** (domestic, 5). The specialist will (i) provide support and follow-on to the tasks of the international consultant, and (ii) compile secondary information regarding OFWM activities in Punjab and develop a synthesis report on lessons learned from existing practices.

15. **Irrigated Agriculture Specialist/Agricultural Economist** (international, 4). The specialist/economist will (i) identify constraints that affect agricultural productivity including provision of inputs, postharvest processing, and marketing of the produce; (ii) assist the OFWM specialist reviewing the current relationship between water availability, water use, and crop production technology to develop practical strategies for improved productivity; (iii) assess farm budgets of the cropping pattern in the head, middle, and tail LBDC and suggest high-value, sustainable cropping patterns, and production technologies; (iv) evaluate available information regarding the agroclimatic zonation and cropping patterns and develop agro-climatic zonation for LBDC; (v) evaluate the existing institutional arrangements for extension services in the public and private sectors and develop options to provided inputs, services for crop production technology, and marketing including public-private partnerships; (vi) analyze the availability of information in production technology and the existing capacity of the agriculture extension and farmers training institutions; (vii) assist the project economist in estimating project benefits from agriculture; and (viii) use the analysis to develop extension interventions for irrigated agriculture, livestock, water use, and production technology in collaboration with the consultant team.

16. **Irrigated Agriculture Specialist/Agricultural Economist** (domestic, 5). The specialist will (i) provide support and follow-on to the tasks of the international consultant; and (ii) prepare a synthesis report or relevant secondary literature before the arrival of the international specialist.

17. **Farmer Organization and Irrigation Institutional Specialist** (international, 3). The specialist will (i) assess the PIDA Act and its implementation including functions, FO membership, equity, gender, FO geographic coverage, effectiveness, resource flows, and leadership; (ii) review the experience with FOs, area water boards (AWBs), and irrigation development authorities in Sindh and Punjab; (iii) analyze, develop options, and make recommendations as to appropriate roles, responsibilities, and authorities for FOs, PIPD, PIDA, and other stakeholders to develop, maintain, and manage LBDC including groundwater, drainage, and environmental management; (iv) recommend specific measures regarding policy/legislation changes, changes in institutional roles, and resource requirements; (v) develop recommendations for FO and farmer participation in physical works under the project; (vi) work with project team, PIPD, PIDA, FOs, and other stakeholders to determine the cost of system O&M and develop detailed FO operation and maintenance (O&M) procedures for the project; (vii) develop options and recommendations for the most effective delivery mechanism to develop FO capacity and provide ongoing support; and (viii) recommend policy changes and covenants for the proposed project to support irrigation institutional reforms.

18. **Farmer Organization Institutional Specialist** (domestic, 5). The specialist will (i) provide support and follow-on to the tasks of the international consultant; and (ii) compile secondary information on FO activities in Pakistan and develop a synthesis evaluation.

19. **Irrigation Agency Management Specialist** (international, 2). The specialist will (i) conduct a detailed review of the current status of the management, O&M, administration, and all other activities associated with operating LBDC; (ii) prepare a needs analysis of LBDC and its internal and external stakeholders, assuming full development of FOs and an AWB in the LBDC command area; (iii) from a zero base, identify options for the legal status, organizational characteristics, staffing, operational and administrative functions, governance and management needs, and resources requirements for each option, along with strengths and weaknesses in meeting stakeholder needs; (iv) based on review of the options and discussion with the government of Punjab, prepare terms of reference for a strategic planning process including capacity development needs and resources requirements for a revised management structure at LBDC to be implemented under the project; (v) develop initial options to be refined under the project for strategic objectives of the government of Punjab for an agency/corporation (including PIPD and PIDA) to operate, manage, and develop the provincial irrigation assets; and define the outcomes desired after consultation with government of Punjab and other stakeholders; (vi) develop initial zero-based options for reform of existing institutions for managing and developing provincial irrigation assets and prepare estimates of the financial requirements to deliver strategic objectives and the funding sources; (vii) establish accountability and transparency mechanisms for each of the options that meet expectations of responsiveness to water user and other stakeholder needs, as well as appropriate representation for governance and management; (viii) prepare an issues and options report for government comment and hold a workshop to report the comments to the stakeholder community; and (ix) finalize recommendations on the preferred irrigation agency model and sketch out a change management road map to achieve the recommended changes.

20. **Social Assessment Specialist** (international, 2). The specialist will (i) evaluate secondary sources on the socioeconomic status of people in the subproject area; (ii) coordinate with the project economist to conduct the poverty impact assessment and develop a stakeholder analysis; (iii) carry out an initial social assessment in accordance with ADB guidelines; (iv) develop a study methodology and instruments, recruit a field team, and manage field studies, including a social and poverty analysis and institutional analysis of the core subprojects; (v) work with the project team to assess the effectiveness of current FOs and make recommendations to strengthen them; (vi) carry out gender analysis guided by ADB's gender checklist on agriculture and develop a profile of women cultivators in irrigation systems including their participation in agriculture activities, decision making, roles of women members and constraints to their effective participation in FOs; (vii) identify strategies for women's participation in FOs and access to agriculture support services and capacity-building opportunities offered by the project; (viii) identify ways to ensure that women benefit equally and that interests of women farmers and laborers are protected and enhanced through the project; (ix) assess the need and make recommendations for gender sensitization training for stakeholders; (x) identify indigenous persons and likely project impacts on them, and prepare an appropriate plan and/or strategies for their participation if needed; (xi) develop strategies to ensure maximum information dissemination and transparency of project activities; (xii) coordinate with the resettlement specialist to help produce the resettlement framework; and (xiii) develop social assessment procedures, institutional arrangements, and a capacity development plan for use under the ensuing project.

21. **Social Assessment Specialist** (domestic, 4). The specialist will (i) provide support and follow-on to the tasks of the international consultant; (ii) identify, compile, and do an initial review of secondary sources to support the social component of the project; and (iii) provide oversight for enumeration and all field activities.

22. **Environment Specialist** (domestic, 4). The specialist will (i) assess and compare PIDP's, Punjab's, and Pakistan's environmental legislation and policies with those of best practices (ADB included) to identify gaps, differences, or conflicts; and recommend modifications and/or mechanisms for compatibility; (ii) prepare initial environmental examination and summary initial environmental examination reports for the project as a whole, each project component, and each core subproject in accordance with ADB's environmental assessment guidelines for sector loans;² (iii) propose any environmental management and monitoring plans needed to mitigate environmental impacts and their corresponding costs; (iv) assess the capacity of Punjab and Pakistan government agencies involved in approving the environmental assessment, and develop environmental assessment and review procedures with detailed implementation arrangements for use during the project; (v) assess PIPD and PIDA's capacity for environmental assessment and implementation of environmental management plans and develop training requirements for capacity building; (vi) work with the project team to give special emphasis to issues of environmental management of water and soil salinity and sodicity; and (vii) identify environmental issues related to the sector and/or subprojects requiring loan covenants to ensure appropriate resource management.

23. **Resettlement Specialist** (domestic, 2). The specialist will (i) assess all potential resettlement impacts from the range of possible interventions under the TA and project within the purview of ADB's resettlement policy; (ii) prepare a resettlement framework consistent with ADB guidelines for sector projects; (iii) at an early stage of TA implementation, apply ADB's resettlement checklists to identify resettlement issues and ascertain the nature and degree of the project impacts on affected households and prepare any resettlement plans required for the ensuing project; (iv) review PIPD, PIDA, and Punjab and Pakistan's relevant policies and practices in resettlement; identify any gaps between such policies and ADB's involuntary resettlement policy³ and recommend measures to bridge that gap; and (v) develop detailed implementation arrangements to carry out resettlement activities under the project and assess the capacity of PIPD and PIDA and other relevant agencies, and prepare a capacity development program for resettlement to be implemented under the project.

24. **Farming Systems Analysis/Sustainable Agriculture Specialist** (international, 3). The specialist will (i) in a participatory way identify, describe, and assess the major types of farming systems in the project area; (ii) for each farming system, identify agricultural practices that undermine sustainable agricultural production; (iii) collect and evaluate information on current status and trends in applying of fertilizers, pesticides, other farm inputs, as well as practices that threaten sustainable production; (iv) identify and assess short–medium– and long-term environmental impacts at farmer's, provincial, and interprovincial levels, arising from current agricultural practices; (v) identify and assess all factors that influence the sustainability of agricultural production in the project area such as issues relating to farm inputs, land ownership, availability of infrastructure, marketing options, social structure, cultural aspects, institutional setting; (vi) identify and assess potentially beneficial agricultural practices or other measures that may enhance sustainable agricultural production and increase opportunities for livelihood for the poorest farmers; (vii) liaise with other specialists and stakeholders to identify factors that influence decision making at farmer's, provincial, and national levels, with respect to the adoption of environmentally (un)sustainable farming practices; (viii) propose any intervention to promote the adoption of sustainable farming practices in the project area; (ix) assess the potential contribution of the proposed interventions with respect to the Millennium Development Goals, the PRSP, and the objectives of the Netherlands Development Cooperation Policy; and (x) liaise with the Royal Netherlands Embassy in Islamabad on the observations and conclusions of the project preparatory technical assistance.

² http://adb.org/documents/Guidelines/Environmental_Assessment/eaguidelines002.asp

³ ADB. 1995. *Involuntary Resettlement*. Manila.