1. Country and Sector Background

1. Between 2001 and 2006, Peru enjoyed a strong economic growth and sound macroeconomic policy, with GDP increasing on average by more than five percent per year. However, over the last decades poverty has not been significantly reduced in the Sierra and Amazon regions, which have the highest poverty incidence in the country. The 2002 Household Survey indicates that the incidence of poverty in the rural Sierra is about 75 per cent (4.2 million), nearly 25 points above the national average, with more than 40 per cent (2.3 million) of the population being extremely poor. In the Sierra, most households obtain the majority of their incomes from the agriculture sector. Eighty per cent of the households depending on agriculture for their livelihood are poor.

2. Deprivation in the Sierra poses a risk to political stability and integration. Poverty reduction in the Sierra is one of the top priorities of the Government of Peru (GOP). In 2006, GOP launched “Sierra Exportadora”, a program setting ambitious goals for agricultural production and exports, job creation, income generation and poverty alleviation throughout the Sierra. This ambitious initiative emphasizes the expansion of the agricultural production of small farmers, by helping them identify and exploit commercial opportunities and developing products that can compete in national and international markets. Because of its importance for the production of higher value crops for exports and urban markets, the irrigation schemes, viewed as potential economic growth poles, are key in this development policy and their modernization is the purpose of the proposed Project.

3. Today, the Sierra accounts for 400,000 ha of irrigated land, about 30 per cent of its cultivated area and a quarter of the total irrigated area in the country. It includes 37 large-scale irrigation schemes, each managed by a Water Users Association (Juntas de Usuarios – WUA) ranging from 1,700 to 47,000 ha irrigable land, with an average of about 10,000 ha. Irrigation systems are supplied mostly from surface water and consist of a network of open canals, generally unlined, with rudimentary water intakes and distribution systems. Irrigation systems generally do not include water regulation (i.e. small reservoirs, dams) which, combined to the
seasonality of rainfall, limits agricultural production at a few months per year. Less than 5 per cent of irrigated land is equipped with improved on-farm irrigation systems, such as drip or sprinklers.

4. Management of irrigation infrastructure is weak. Following the economic crisis of the late 1980s water users, organized in water commissions (Comisiones de Regantes-CR) and water users associations (Juntas de Usuarios-WUA), were transferred the full responsibility of operating and maintaining the irrigation schemes. WUAs in the Sierra are financially and technically weak, with low water tariffs and collection rates --insufficient for adequate operation and maintenance (O&M)--and limited number of professional water managers, water guards and other paid staff. As a result of WUA’s limited capacities, there is very little, if any, planning or daily management of the water distribution and irrigation services. Poor maintenance contributes to the gradual degradation of the infrastructure and the performance of the water delivery service limiting water quantity, frequency and reliability at the field level.

5. For all these reasons, the problems of low quantity, uniformity, frequency and reliability of water supply to the crops often persist even in irrigated areas, although to a much lower extent than in rainfed conditions. Hence, in many areas of the Sierra, irrigation infrastructure and management need to be improved in order to increase the value of agricultural production and to allow the production of high-value crops for internal urban markets and exports. The proposed Project aims at improving the irrigation performance in selected irrigation districts of the Sierra, while taking into account local practices about land and water, and the aspirations of the people.

2. Objectives

6. The Project development objective (PDO) is to strengthen the technical, financial and management capacity of farmers and Water users organizations1 (WUO) in targeted irrigated areas of the Sierra through improved collective and on-farm irrigation infrastructure, irrigation management practices, water users’ organizations, a better coordination between the irrigation scheme and the agricultural supply chains linked to it and the formalization of water rights.

3. Rationale for Bank Involvement

7. Over the past ten years, the Bank has had a long, successful involvement with Peru’s irrigation sector. Through the World Bank supported Irrigation Subsector Projects I and II (Proyecto Subsectoral de Irrigación-PSI), it has developed and implemented a successful approach to improve irrigation performance in the coastal area, including an exemplary program of agricultural water rights registration. With its global irrigation experience and deep level of involvement in the sector dialogue in Peru, the Bank can play a unique role, through the Project, in supporting irrigation improvement in the Sierra, particularly in:

- tailoring to the Sierra environment, the successful approach to irrigation improvement it supported in the coastal area under PSI I and II;
- supporting the extension of the water rights formalization program to the Sierra and other water uses;

1 WUOs is understood here as both the Juntas de Usuarios or water users’ associations – WUAs and the Comisiones de Regantes - CRs that compose them.
• advising PSI on ways to strengthen linkages between farmers, processing and marketing agents.

4. Description

8. While a limited number of the Project activities will cover the entire Sierra area, in other words the jurisdiction of the 37 WUAs (410,000 ha of irrigated land, 440,000 water users), the majority of them will only concern 14 WUAs selected for their relative level of performance and their potential for the production and commercialization of high value crops. These 14 WUAs are: Abancay, Alto Piura-Huancabamba, Andahuaylas, Callejón de Huaylas, Cachi, Chonta, Colca, Condebamba, Cusco, Huancavelica, Lagunillas, Mantaro, Mashcon, and Tarma (see map 1). They cover an area of about 200,000 ha of irrigated land and include about 200,000 water users.

9. The proposed Project includes 5 major components:

Component A. Modernization and Rehabilitation of Collective Irrigation and Drainage Systems

10. This component would support eligible Water Users Organizations to improve their water supply service to farmers. More specifically, it would finance the feasibility studies, execution and supervision of infrastructure subprojects in the collective irrigation and drainage systems. Such subprojects could include, for example, canal improvements (i.e. canal lining) and small water regulation reservoirs (see annex 4 for details on the types of subprojects). It would benefit about 15,000 ha of irrigated area and 16,000 families.

11. In order to encourage improvements in collective irrigation management, including cost recovery, and increase the likelihood of Project sustainability, only WUOs, within the 14 prioritized WUAs, reaching a minimum performance level would be eligible for Project financing under this component. Component C1 will provide capacity building to all 14 prioritized WUAs to reach this eligibility level.

12. Only subprojects meeting a set of criteria would be eligible for Project financing. Those criteria are detailed in Annex 4 and aim, among other things, at ensuring that subprojects will: (a) contribute to improving water delivery services to farmers in a cost-effective manner; (b) be selected following a participatory process involving the water users and the regions; (c) have acceptable design standards, and (d) comply with environmental and social safeguards.

13. Subprojects will require a financial contribution from WUOs and regional governments. Financial contribution from WUOs is detailed below.

(a) Feasibility studies: WUOs will finance at least 5 per cent in cash of feasibility and technical design studies, the balance being financed by the Project.

(b) Construction and supervision of works: WUOs will contribute a minimum of 15 per cent of the total cost of which a minimum of 5 per cent in cash, the balance being financed by the Project and regional Governments.
14. Financial contribution from the regions will vary from region to region depending on its financial capacity. It is expected to average 40 per cent of subproject construction costs. PSI is currently discussing with each of the 10 regional governments involved in the Project the level of their financial contribution. Those agreements will be signed before negotiations, at which date, the exact contribution of regional governments will be known.

15. This component would also finance the feasibility studies, works/installation and supervision of works of some 150 measuring devices to be installed at the head of the hydraulic sectors defined in relation with the water user rights that will be formalized under component D1. These activities would be entirely financed by the Project.

Component B. On-farm Irrigation Infrastructure Improvement (US$12.96 million)

16. This component would support farmers, located in the 14 prioritized WUAs, in increasing irrigation performance at farm level through the installation of improved on-farm irrigation systems in areas cultivated with, or to be dedicated to, the production of high value agricultural commodities. More specifically, it would finance the feasibility studies, execution and supervision of subprojects including: (a) collective works and equipment at the tertiary level up to the farm intake and (b) works and equipments on the irrigation plots.

17. Only subprojects meeting a set of criteria would be eligible for Project financing. Those criteria are detailed in annex 4 and aim, among other things, at ensuring that subprojects will: (a) contribute to improving on-farm irrigation management in a cost effective manner, (b) have an adequate supply of irrigation water; (c) have acceptable design standards; (d) consider environmental and social safeguards and (e) benefit the production of high-value crops with an identified market (viable business plan).

18. Individual farmers as well as farmers groups will be able to participate in this component (see lessons learned). Farmers’ financial contribution to subproject implementation will depend on the size of the group: the bigger the group, the smaller the financial contribution required from each beneficiary. This is to favor the formation of groups for the later marketing and processing of agricultural production. The region will also participate in subproject financing.

19. This component would improve about 4,000 ha or 1 per cent of the irrigated area in the Sierra and benefit about 4,000 farmers, as the average family property is 0.94 ha.

Component C. Institutional Strengthening and Support to Production and Marketing (US$11.21 million)

Sub-component C.1. Awareness Raising and Capacity building of Water Users Organizations (US$5.71 million)

20. This subcomponent would support three broad types of activities: (a) sensitization of water users in the territory of the 37 WUAs on some key aspects of water management; (b) a comprehensive capacity building program for the 14 prioritized WUAs and (c) the promotion of component A in the 14 prioritized WUAs.
21. The comprehensive capacity building program has three objectives: (a) to help each WUA identify the strategic water management issues in the system and formulate action plans (including investment and training) to address them; (b) to help them achieve eligibility level for Component A; and (c) to help the WUAs and CRs improve water delivery service to farmers and, more generally, to increase their sustainability and the quality of their management through a adequate operation and maintenance plan. This comprehensive program will be tailored to the specific context of each WUA.

22. This subcomponent will be entirely financed by the Project and would be undertaken by PSI, with locally contracted partners.

Sub-component C.2. Awareness Raising and Capacity Building of Agricultural Producers and Business Groups (US$5.49 million)

23. This subcomponent will include three broad types of activities, all in the territory of the 14 prioritized WUAs: (a) activities aimed at promoting the adoption of improved on-farm technologies; (b) technical assistance to farmers who adopt those technologies and (c) activities aimed at supporting the production and marketing of high value crops.

24. The Project will facilitate the transition of interested farmers and groups to higher value crops and improved on-farm irrigation technologies. More generally, it will attempt to increase the value of the agricultural production by better coordinating farmers with the agricultural supply chains linked to the irrigation scheme, especially around issues such as productivity, reliability of deliveries and quality. This will entail for each irrigation scheme: (a) a diagnosis of the main high value agricultural supply chains; (b) the provision of technical assistance to help farmers and groups to formulate and implement business plans around viable agricultural supply chains; and (c) the promotion of interactions between farmers groups and key stakeholders.

25. This activity will be implemented by PSI with locally contracted agro-business consultants and partners. It will be closely coordinated with other projects/programs in the Sierra, such as Sierra Exportadora/PROSIERRA, Aliados/MARENAS, INIA, INCAGRO and the Dirección de la Promoción Agraria of MINAG (see section C.1. on partnerships arrangements for more details).

Component D. Formalization of Water Rights and Extension to the National Water Registry (US$ 7.07 million)

26. This component would finance the formalization of about 200,000 agricultural water rights in the Sierra and their integration into the existing national water rights registry (RADA) in 20 valleys of the Sierra.

Component E. Project Implementation Support (total cost US$ 2.80 million)

27. This component would finance the administration, monitoring and evaluation (including baseline and impact assessment studies) and auditing of the Project and “strategic sector studies” such as feasibility studies for follow-up projects or in-depth analysis of key topics.
28. It would also support the capacity building of PSI national and regional teams and other key stakeholders in the implementation of the Project, such as regional Governments, in conducting, supporting and monitoring field operations financed by the Project.

5. Financing

Source: ($m.)
Central, Regional and Local Governments, Water Users’ organizations and farmers 29.00
IBRD 20.00
Total 49.00

6. Implementation

6. The Programa Subsectorial de Irrigacion (PSI) under the Ministry of agriculture (MINAG) will be responsible for overall Project implementation and coordination, as well as the direct implementation of components A, B, C and E. The Intendencia de Recursos Hídricos (IRH), under the Ministry of Agriculture, will be responsible for the implementation of component D (formalization of water rights). Both PSI and IRH are experienced executive agencies for Bank and other donors’ projects. They are currently working under PSI II in an institutional arrangements similar to the one proposed for the present Project.

7. The Regional Governments would be responsible for approving subproject feasibility studies, after technical clearance from PSI. Regional governments will also participate in subproject financing. Participation of Regional Governments in subproject financing will vary depending on their financial capacity, but is expected to average 40% of subproject construction costs for both components A and B. The exact level of the participation from the regions will only be known once the specific agreements between PSI and each of the 10 regions benefiting from the Project will be signed. This will take place before Project’s appraisal.

8. Water Users Organizations (WUOs), including the Juntas de Usuarios (WUAs) and Comisiones de Regantes (CRs), representatives of users at the irrigation district and district subsectors levels, will be directly involved with component A and C1. More specifically, they will: (a) participate in collective irrigation and drainage subprojects identification, selection and design; (b) collect farmers’ contributions to feasibility studies, detailed design, construction and supervision costs of subprojects and (c) participate in the definition and monitoring of appropriate result indicators. WUOs are also responsible for collecting water fees and operate and maintain the collective irrigation and drainage system.

9. Individual farmers and farmers groups will directly be involved with component B and C2. More specifically, they will participate in on-farm irrigation subprojects identification, design, financing and will be responsible for infrastructure’s operation and maintenance. They will also be responsible for the formulation and implementation of business plans.
7. Sustainability

• **Sustainability of water sources and adequate design and quality construction of irrigation infrastructure.**
  
  o In the irrigation schemes of the Sierra, the sources of water are rivers fed by rainfall and, in some cases, the melting of snow. Some irrigation schemes have small reservoirs. Water availability for irrigation may vary from year to year and season to season depending on the precipitation. In many river basins, irrigation faces rising water shortages due to over-design, infrastructure deterioration, lack of regulation and increasing demand from competing water uses. Over the long run, water availability for irrigation may further decrease due to increasing competing demand (i.e. mining, municipalities and hydropower) and climate change. The formalization of water rights and the installation of measurement devices, both financed by the Project, allocates water rights based on long-term water availability and helps farmers secure entitlement to water, thereby reducing the risks of shortages in over-exploited rivers. In addition, the Project will increase water availability and reliability by reducing irrigation water losses and building and/or improving small reservoirs.

  o Considering PSI’s substantial experience in irrigation rehabilitation and modernization, the quality of design and construction should not be an issue. PSI will review subproject design and ensure supervision of the works.

• **Adequate O&M of irrigation infrastructure (off-farm and on-farm) by:**
  
  o Ensuring strong ownership by users. This is essential to guarantee long-term sustainability and effective use of irrigation schemes. The Project will follow a demand-responsive and participatory approach to irrigation improvement focusing on the strategic issues identified by water users. A critical element of this approach is farmers and WUOs cash contribution to subprojects. The Project will support the adoption of irrigation water tariffs that, together with the labor contribution from farmers, should ensure an efficient O&M of collective/off-farm irrigation investments.

  o Ensuring adequate capacity/knowledge to operate and maintain irrigation systems. Experience has shown that WUOs and farmers need support until they are proficient in operating and maintaining their systems. Thus, as a complement of structural improvements, the Project will offer training and prolonged support to WUOs and groups of farmers in the O&M of collective and on-farm irrigation systems.

  o Ensuring sufficient farms revenues to cover the cash component of the costs of operating and maintaining off-farm and on-farm irrigation infrastructure. The Project will undertake off-farm irrigation improvements in 14 WUAs (out of the 37 located in the Sierra) that are already producing higher value crops for internal markets and exports, so that farmers can generate enough incomes to cover the cash component of O&M costs of the irrigation systems. In addition, an eligibility criterion for WUOs to benefit from irrigation infrastructure improvement is a minimum level of cost recovery (see Annex 4). Finally, the Project will adopt an integrated approach to irrigation improvement, combining not only infrastructure development and rehabilitation, but also supporting improvement in agricultural practices and the commercialization of...
agricultural produce. This is essential to increase farmers’ revenues and thus facilitate payments for the O&M of irrigation infrastructure.

8. Lessons Learned from Past Operations in the Country/Sector

10. Past experience in Peru (PSI I&II, PRONAMACHCS) and elsewhere shows that irrigation projects can have significant positive impacts on farmers’ incomes, job creation and resource conservation.

11. It has also revealed that adopting a demand-driven and participatory approach to irrigation improvement, both at off-farm and on-farm levels, increases the sustainability and effective use of irrigation infrastructure provided that local organizations responsible for their management receive sufficient training and support. Accordingly, the Project will (a) utilize a demand-driven, participatory approach to irrigation improvement in which WUOs/Farmers Groups will participate in irrigation subproject selection, design, execution and financing; and (b) the Project will offer training and prolonged support to WUOs and farmers groups to ensure that they are capable of managing irrigation systems both technically and financially, while taking into account local practices of water distribution.

12. Past experience in Peru and elsewhere indicates as well that, in an environment with very little culture of cost recovery in irrigation and limited financing capacity, government support for a significant portion of the irrigation infrastructure investment is crucial to stimulate demand. Adapting to the Sierra environment the approach introduced in the coast under PSI I&II, the proposed Project will share the costs of off-farm and on-farm irrigation investments with WUOs and Farmers.

13. Past experience under PSI I and II reveals that financial support to WUAs for irrigation infrastructure improvements can be used as an incentive for them to improve their management capacity and sustainability by setting-up eligibility criteria for WUA related to these aspects (such as cost recovery).

14. Under PSI II, only groups of at least six farmers could benefit from on-farm irrigation improvements to encourage farmers’ organization. This has tremendously slowed-down the implementation of the component because of the difficulty to find neighboring farmers interested at the same time in equipping their land with improved on-farm irrigation systems. This situation is expected to be even more difficult in the Sierra, where ability to pay for on-farm irrigation improvement is lower. In addition, this condition could exclude medium farmers with good potential for cash crop production and marketing that could have a strong demonstrative effect among their neighbors. The Project will therefore allow individual farmers to benefit from on-farm irrigation improvements while providing higher financial incentives to farmers groups.

15. Past experience in the Sierra reveals that projects supporting increases in agricultural production without ensuring a market for such production have very often resulted in a depression of agricultural prices in the local markets. Under PSI II, agricultural producers with a potential and an interest for improved on-farm irrigation technologies had to form small farmers groups with a collective production and marketing strategy, defined in a business plan elaborated with the help of agro-business consultants. This plan is a requirement of the national guidelines for public investment in irrigation projects, and includes the marketing arrangements for the
produce (e.g. with a trader or an agro-processing firm). These business plans have increased the integration of producers in agricultural supply chains and their connection to markets (foreign and domestic). The Proposed Project will follow the same approach strengthening implementation monitoring of the plans and assisting producers in adapting them to the rapidly evolving production and marketing context, and related constraints and opportunities.

9. **Safeguard Policies (including public consultation)**

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<th>Safeguard Policies Triggered by the Project</th>
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<tr>
<td>Environmental Assessment <em>(OP/BP 4.01)</em></td>
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<td>Piloting the Use of Borrower Systems to Address Environmental and Social Safeguard Issues in Bank-Supported Projects <em>(OP/BP 4.00)</em></td>
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10. **List of Factual Technical Documents**

- Programa Subsectorial de Irrigación Sierra, Estudio de Preinversión a nivel de pre-factibilidad, Ministerio de Agricultura, 2008.
- Environmental Assessment
- Environmental Management Plan, including Pest Management Plan
- Social Assessment
- Indigenous People Planning Framework

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