



Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 18-Aug-2022 | Report No: PIDC34455

**BASIC INFORMATION****A. Basic Project Data**

Country Peru	Project ID P179037	Parent Project ID (if any)	Project Name Irrigation for Climate Resilient Agriculture (P179037)
Region LATIN AMERICA AND CARIBBEAN	Estimated Appraisal Date Nov 08, 2022	Estimated Board Date Feb 01, 2023	Practice Area (Lead) Water
Financing Instrument Investment Project Financing	Borrower(s) Republic of Peru	Implementing Agency Programa Subsectorial de Irrigaciones - PSI	

Proposed Development Objective(s)

The project development objectives (PDOs) are to (i) increase the efficiency, productivity, and resiliency of irrigation systems and (ii) improve the capacity of Water User Organizations (WUOs) and subnational governments to provide irrigation services appropriate to the needs of farmers.

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	125.00
Total Financing	125.00
of which IBRD/IDA	100.00
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Bank for Reconstruction and Development (IBRD)	100.00
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Non-World Bank Group Financing

Counterpart Funding	25.00
Borrower/Recipient	25.00



Environmental and Social Risk Classification

Substantial

Concept Review Decision

Track II-The review did authorize the preparation to continue

Other Decision (as needed)

B. Introduction and Context

Country Context

Peru is an upper middle-income country with just over 33 million inhabitants. The massive Andean Mountains divide the country into three natural zones: to the west, the Coast (*Costa*) with a narrow strip of desert along the Pacific Ocean; in the center, the Highlands (*Sierra*); and to the east, the Amazon Rainforest (*Selva*). The geographic diversity has created a country rich in economic, climatic, cultural, and social diversity but has also generated starkly different realities for Peru's population in terms of overall well-being, economic opportunities, and access to basic services.

During the first two decades of this century, Peru experienced exceptional economic growth. With annual average Gross Domestic Product (GDP) growth of 5.1 percent between 2002 and 2019, the Peruvian economy exhibited one of the highest growth rates in Latin America. The country's per capita income doubled during this period, and Peru achieved upper-middle-income country status. The poverty rate (US\$5-a-day-line) fell from 59 percent in 2004 to 21 percent in 2019. Inequality also declined significantly; the bottom 40 percent of the population experienced a rapid increase in income. Economic growth, however, has been centered in cities along the *Costa*; almost half of the rural population live in poverty and 14 percent live in extreme poverty.¹ The majority of Peru's extremely poor live in the rural areas of the *Sierra and Selva*.² Peru's Gini index of 43.8 reflects the country's high inequality in income and access to services.

The Coronavirus pandemic led to one of Peru's deepest recessions and exposed vulnerabilities in Peru's path to shared prosperity. In 2020, GDP contracted 11.1 percent, one of the highest drops among the major economies of Latin America. Peruvian families experienced some of the largest employment and income losses in the region as well as the highest virus-related death rates in the world. The poverty rate increased almost 12 percentage points, reaching 32.6 percent in 2020, and the middle class shrunk by almost 44 percent (from 14 million citizens in 2019 to 7.9 million in 2021). Although Peru's economy has rebounded, GDP growth is still below its pre-pandemic trend and is subject to significant uncertainty linked to political and social unrest, increasing global food and energy prices, declining commodity prices and more frequent and intense climate-related disasters. Persistent structural weaknesses, such as the state's low efficiency, territorial disparities, excessive regulation, and abundant informality, make the country even more vulnerable to these uncertainties and pose roadblocks to sustained growth and shared prosperity.

¹ INEI 2021

² INEI, 2019 based on ENAHO survey



Peru is especially vulnerable to climatic and non-climatic events. From 2003 to 2019, Peru was affected by 61,708 emergencies caused by natural phenomena (intense rains, floods, droughts, earthquakes, and landslides). Peru is one of the countries most affected by the climatic phenomenon known as El Niño Southern Oscillation (ENSO), which is associated with an increased incidence of drought and flood events. The 2017 Coastal ENSO resulted in economic losses estimated at US\$3.1 billion, equivalent to 1.6 percent of the national GDP. Under changing climate conditions, ENSO extreme weather events may increase in frequency from about one every 20 years to one every 10 years by the end of the 21st century. Climate change is also leading to increased glacial melt and changes in precipitation that will significantly impact the timing and availability of water for agriculture, drinking, and energy production.

Sectoral and Institutional Context

Irrigation is key for economic growth and rural development. The agricultural sector represents about 6 percent of the GDP and 16 percent of Peru's total exports. This sector alone employs almost a quarter of the total labor force and more than half of the labor force in rural areas. Irrigated land represents only 22 percent of agricultural land (2.6 million hectares), yet it produces about two-thirds of the country's agricultural outputs, demonstrating the effect irrigation has on productivity. While commercial irrigation is well established in the prosperous Costa region, in the Sierra and high-altitude areas of the Selva, where 50 percent of the rural population lives in poverty, only about 20 percent of the cultivated land is under irrigation, leaving agricultural production exposed to shifts in rainfall patterns linked to climate variability and climate change. Most precipitation occurs between November and March in these areas, resulting in an extensive dry period with water deficits that are exacerbated by the lack of adequate storage solutions. The lack of access to irrigation is significant given the role it can play in lowering poverty levels. The World Bank–financed Sierra Irrigation Subsector Project (P104760), which extended access to efficient irrigation systems to farmers in the Sierra, reported net household income per hectare increases of 25 to 500 percent because of water availability and irrigation technique improvements.

In addition to lack of access to irrigation, deteriorating irrigation and drainage systems, poor irrigation practices and limited use of efficient irrigation technologies are contributing to low productivity. The agriculture sector is Peru's biggest water consumer, accounting for 89 percent of water withdrawn in the country.³ The efficiency of agricultural water use (measured by crop water use divided by water withdrawals), however, is only 35 percent, significantly less than Mexico's 44 percent and Brazil's 48 percent. In addition to lack of irrigation, the low levels of water use efficiency can be attributed to the fact that: (i) approximately 57 percent of Peru's existing irrigation and drainage infrastructure is in poor condition; (ii) a large portion of the systems do not respond to farm irrigation demands; and (iii) only 12.8 percent of irrigated farm land (335,482 hectares) has efficient water application methods on-site (ability to apply water only where it is needed and in precise volumes). Efficient irrigation systems improve irrigation performance, boost agricultural productivity, and can increase agricultural water efficiency from 35 to 80 percent.⁴ In addition to problems with existing irrigation system infrastructure, low capacity to operate and maintain systems, insufficient coordination between various levels of government, and lack of strategic planning is limiting productivity and the optimization of potential benefits from irrigation.

The Sub-sectoral Irrigation Program (*Programa Subsectorial de Irrigaciones, PSI*), which is housed under the Ministry of Agriculture (*Ministerio de Desarrollo Agrario y Riego, MIDAGRI*), is the governing body of the irrigation subsector at the

³ INEI 2020

⁴ Programa Subsectorial de Irrigaciones (PSI) concept note 2021



national level. The PSI is responsible for improving agricultural productivity by: (i) promoting the efficient and sustainable use of water for irrigation; (ii) promoting the use of efficient irrigation technologies; and (iii) strengthening the management capacity of water users' organizations (WUOs). WUOs are responsible for distributing water and the operational management of irrigation systems. These organizations are groups of private water users, including irrigators, who pool their financial, technical, material, and human resources for the operation and maintenance (O&M) of a water system. There are 10,411 WUOs nationwide.⁵ Subnational (regional and local) governments are responsible for applying MIDAGRI's standards and policies to sector investments within their jurisdictions. Regional governments are also mandated by law to provide Technical Assistance (TA) to local governments and to service providers.

WUOs have struggled to achieve financial and technical autonomy. Despite covering more than 1.4 million hectares and serving almost three quarter of a million users, WUOs lack technical capacity, specialized equipment, and reliable information on the availability and use of water resources. The WUOs have also struggled to reach financial sustainability given low water tariffs and collection rates. These challenges make it difficult for WUOs to manage water resources sustainably and efficiently.

Subnational governments represent the driving force behind irrigation investment, representing about 80 percent of the total budget for irrigation.⁶ However, this investment has not translated to significant improvements in irrigation coverage or efficiency, given that only 60 percent of irrigation investments were executed and only about one percent was used for efficient irrigation systems. Little is known on the quality or impact of irrigation investments given that the sector does not have a monitoring and evaluation system.

In addition to the governance challenges mentioned above, irrigation investments are often made without considering the broader hydrological (basin or aquifer) context. Given the intensive competition for water, several basins are experiencing water deficits (a supply-demand imbalance). The PSI needs to adjust its approach and rigorously apply the concept of water accounting in all its interventions in collaboration with the National Water Authority (Autoridad Nacional del Agua, ANA).⁷

Through this Project, the Government of Peru (GoP) aims to integrate investment needs, water resources management, and institutional reforms to foster the development of sustainable and resilient irrigation systems.

Relationship to CPF

The Project is also aligned with the forthcoming Peru CPF (FY23-FY27) and Strategic Country Diagnostic (SCD) Update. The previous CPF covered until 2021 and the Completion and Learning Review (CLR) is underway to assess implementation of the CPF. The new CPF will cover the period of FY23-FY27 and is expected to be presented to the Board by January 2023. The SCD Update is expected to have a Decision Review Meeting in July 2022. The proposed operation is aligned with three High Level Objectives (HLO) that are presented in the forthcoming CPF and SCD: Increased quality economic opportunities (HLO1), Improved access to quality public services across the territory (HLO2), and Increased resilience to shocks (HLO3). The operation also supports the cross-cutting issues of delivering quality services and coping with shocks.

⁵ 128 are water associations, 1,692 are water commissions, and 8,591 are committees

⁶ 47 percent departmental/regional governments, 33 percent local governments and 20 percent at national level.

⁷ FAO defines water accounting as the systematic study of the current status and future trends in water supply, demand, accessibility and use within a specified spatial domain.



The Project is also closely aligned with the World Bank's strategic framework to move "From Crisis Response towards Green, Resilient and Inclusive Development" (GRID) and the World Bank Group 2021-2025 Climate Change Action Plan's goal of aligning climate and development goals while boosting growth. Moreover, it complements the Bank's ongoing and pipeline programs to support sustainable and inclusive growth in Peru and builds on the Bank's longstanding policy dialogues in these areas.

The Project is also aligned with the World Bank's twin goals of ending extreme poverty and promoting shared prosperity. Through promoting water efficiency and developing improved irrigation infrastructure, the operation will significantly enhance agriculture productivity and increase farmers' revenues.

Peru's updated 2020 Nationally Determined Contribution (NDC) and the 2021 National Adaptation Plan (NAP) identify the water sector as a priority for adaptation to climate change. The Project's emphasis on implementing efficient irrigation systems, increasing water storage, and strengthening water resources management is closely aligned with Peru's NDC and NAP priority actions. Both documents and Peru's Climate Country Diagnostic Report (CCDR) stress the importance of adaptation to water-related shocks given Peru's significant spatial and temporal rainfall imbalance and uneven development patterns across the territory. The Project is aligned with the CCDR's public investment recommendation to improve access to efficient irrigation and drainage systems to build resilience in the agriculture sector and boost economic growth while protecting vulnerable populations.

The Project is well positioned to contribute to Peru's General Government Policy (2021–26), which aims to develop a more sustainable and inclusive growth model. The Project is aligned with the following two policy actions: (i) promoting water security in agriculture through water storage solutions (infrastructure and nature-based), water-efficient irrigation systems, and sustainable water approaches that consider social, productive, and environmental uses; and (ii) strengthening environmental protection and disaster risk management and promoting climate change adaptation and mitigation.

C. Proposed Development Objective(s)

The project development objectives (PDOs) are to (i) increase the efficiency, productivity, and resiliency of irrigation systems and (ii) improve the capacity of Water User Organizations (WUOs) and subnational governments to provide irrigation services appropriate to the needs of farmers.

Key Results (From PCN)

A notional list of PDO indicators for the Irrigation for Climate Resilient Agriculture Project are listed below.

PDO 1: Increase the efficiency, productivity, and resiliency of irrigation systems

- Increase by TBD percentage of irrigated agriculture water use efficiency (%) – the ratio of the amount of water applied to the field to the amount of water diverted for irrigation (conveyance efficiency) times the ratio of the



amount of water consumed by the crops to the amount of water applied to the field for irrigation (application efficiency)⁸ - in the Project area under Component A. Indicator qualifies as a Climate Indicator for adaptation.

- Increase by TBD percentage of water-productivity (US\$/m³) for main crops – measured farm income per cubic meters of water consumed by the crops, and farm income per cubic meter of water applied to the field for irrigation for main crops - in the Project area under Component A. Indicator qualifies as Climate Indicator for adaptation.
- Increase resiliency to withstand droughts by increasing the amount of water available per hectare of farmed land by TBD% during dry periods in the Project area under Component 1. Indicator qualifies as Climate indicator for adaptation.

PDO 2: improve the capacity of WUOs and subnational governments to provide irrigation services appropriate to the needs of farmers.

- Cost recovery of irrigation service fee (%) for adequate operation and maintenance by WUOs
- TBD subnational governments implement at least xx percent of their total capital investment program for efficient irrigation systems
- Information system on irrigated agriculture and quantitative water budgets for targeted irrigation systems and respective watersheds established and operational.

D. Concept Description

The Project will cover Peru's three distinct geographic zones: the *Costa, Sierra, and Selva*.⁹ Sixty five percent of the Project's investment-related activities (Component A) are in the *Sierra*, 30 percent are in the *Costa* and 5 percent in the *Selva*. Most of the investments are in the *Sierra* given the potential to boost agricultural productivity coupled with the GoP's prioritization of rural development. Component B (capacity building) will target 21 of Peru's 24 departments. The Project will not intervene in three departments that are in the lower *Selva*, where rainfall allows for adequate rain-fed agriculture.

The Project will also ensure that a citizen engagement strategy, gender approaches, and climate change aspects are included in the design and implementation strategy. To that end, the PSI has identified farmer user groups and investment subprojects based on the PSI guidelines for efficient irrigation investments.¹⁰ These guidelines include socio-economic, technical, and institutional criteria following a demand-driven, participatory, and gender-sensitive approach. To reflect the growing threat of water scarcity in light of climate change, the Project will focus on watersheds with deficits

⁸ Definition based on Improving irrigation water use efficiency: A synthesis of options to support capacity development (author, Date)

⁹ Spanish translation of Coastal zone (*Costa*), mountain zone (*Sierra*) and rainforest zone (*Selva*). *Selva* for this project refers to the highlands located in the rainforest zone.

¹⁰ PSI regulation includes the following selection criteria for farmer user groups: legally established, land property title acquired, water rights from ANA acquired, water user organization established and operational, among others. In addition, socioeconomic factors and vulnerability to climate variability and water stress are considered.



and will ensure that efficient irrigation investments are integrated with Peru's national instruments and policies on water resources management.

The Project includes three specific components: (i) Component A: Efficient Irrigation Investments; (ii) Component B: Improving Water Governance and Promoting Investments in Irrigation and Drainage (I&D); and (iii) Component C: Project Management and Interagency Coordination.

Component A: Efficient Irrigation Investments (US\$108 million, of which US\$86 million IBRD). This component will improve irrigation services and agricultural productivity for 130 farmer user groups who are vulnerable to climate variability and climate change. The component is divided into two sub-components: (i) improving efficiency of water delivery systems, which includes modernizing infrastructure and management; and (ii) improving irrigation efficiency on-farm. Activities for the first sub-component consist of pre-investment studies, detailed engineering designs, and construction and supervision of off-farm irrigation infrastructure (also referred to as water control systems). Investments include water intake improvements, conveyance systems (canals and water mains), grit removal works, small water storage reservoirs, as well as TA to modernize the management of water delivery systems. The second sub-component includes pre-investment studies, detailed engineering designs, construction works, equipment installation, and construction supervision for on-farm irrigation systems. Investments include installation of pipes, meters, pressure regulators, sprinklers, drips systems, and land leveling, as well as TA to farmer user groups on operation and maintenance (O&M) of on-farm irrigation systems, climate-resilient agriculture, and the formulation and implementation of business plans to increase agriculture productivity and market access.¹¹

Component A would support work across 8,000 hectares of small and mid-sized farms in the *Costa, Sierra, and Selva*. The 8,000 hectares are divided into 130 subprojects; each farmer user group will be assigned to one subproject. Refer to Annex 1 for a map of the distribution of the subprojects. Out of the 130 subprojects, the PSI indicates that 18 have detailed engineering designs, 57 subprojects have advanced pre-feasibility studies, and 55 projects are at the concept stage. The PSI expects to reach 71 subprojects with advanced pre-feasibility studies by August 2022, meeting the level of readiness required by the Ministry of Economy and Finance (MEF) public investment regulation.

Component B: Improving Governance and Promoting Investments in Irrigation and Drainage (US\$12 million, of which US\$10 million IBRD). The main activities under this component include TA and capacity building to (i) improve capacity of WUOs to strive for financial sustainability and to manage irrigation and drainage services efficiently; (ii) support regional and local governments to prepare regional irrigation and drainage plans using water accounting assessments and implementation strategies to promote the scaling up of efficient irrigation investments (by approx. 1,000 hectares per Department) in a sustainable matter;¹² and (iii) promote policies and institutional reforms at the national level that will improve the sustainability and efficiency of irrigation and drainage services. This final activity tentatively includes: (i) the updating of the national irrigation strategy and plan; (ii) a national information system linked to quantitative water budgets for targeted irrigation systems and respective watershed to evaluate the impact of current interventions and improve planning for future investments; and (iii) a training and capacity building program for WUOs led by MIDAGRI.

¹¹ Business plans include crop management and market access strategies through key public and private partnerships.

¹² Utilize regional irrigation management plans that are informed by the project methodology.



To contribute to the achievement of a sustainable nexus between water resources management and agriculture productivity, this component may also support pilot projects that assist in: (i) the promotion of integrated water storage solutions and comprehensive water resources planning at the watershed level; (ii) the development of an irrigation subsidy program that focuses on small farmers and provides incentives for the adoption of efficient on-farm irrigation and water management related practices; (iii) the establishment of hydro-agro informatics, which combine field data with remote sensing data analytics, to improve resilience-based planning, O&M of assets, and impact evaluations of irrigation and agricultural systems in targeted sub-watersheds. The Project would implement these pilots in two to three basins with mature level of governance (i.e., river basin committees created and operational and associated river basins developed in coordination with ANA).

Component C: Project Management and Interagency Coordination (US\$5 million, of which US\$4 million IBRD). This component includes activities to support the administration of the Project and the strengthening of the PSI – the project implementation unit (PIU). The component will support capacity building on financial, environmental, social, and technical management, as well as monitoring and evaluation. In addition, this component would finance technical assistance to ANA to support the implementation of Components A and B, including (i) due diligence of existing water rights per subproject and needs of technical studies to update them if needed; (ii) implementation of potential dam safety measure to comply with Bank policy under Component A and (iii) collaboration with the design and implementation of policies and instruments related to water resources management under Component B.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	TBD
Projects in Disputed Areas OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

The overall environmental and social (E&S) risk classification is considered substantial at this stage. Project environmental risks and impacts will mainly stem from construction of conveyance systems (canals and water mains), rehabilitation and/or construction of small water reservoirs, installation of equipment, and land leveling in previously intervened areas. As such, the anticipated key environmental and safety risks are not likely to be significant. Additionally, due to the small-to-medium scale and location of the civil works anticipated for each subproject, such potential environmental and safety risks and impacts can be easily mitigated in a predictable manner. From the social perspective, the social risks generated by the proposed project could include exclusion of vulnerable populations, minor labor influx risks, and health challenges to workers and communities posed by the ongoing COVID-19 health context. A cross-cutting risk that might impact beneficiaries and stakeholders is related to weak/deficient levels of coordination among the multiple entities that need to be involved in the preparation and implementation of the project. Based on the above, and making use of the precautionary principle, the task team has assessed the E&S risk ratings as substantial at this stage. In order to adequately identify and manage the E&S risks and impacts, the Borrower will be required to prepare an ESMF, including mitigating measures according to the scale and nature of the activities. ESMPs, a Social and Gender Assessment, an Indigenous Peoples Planning Framework (IPPF), a Resettlement Framework (RF), and Labor Management Procedures (LMP) will also



be prepared according to the environmental and social standards of the ESF. The E&S risk ratings will be revisited prior to Appraisal depending on the findings of analytical work underlying the E&S instruments to be prepared, and feedback received from stakeholder engagement activities.

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