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Report No: PAD3369

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF US\$70 MILLION

TO THE

REPUBLIC OF HONDURAS

FOR A

WATER SECURITY IN THE DRY CORRIDOR OF HONDURAS PROJECT

May 21, 2020

Water Global Practice
Latin America and the Caribbean Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective March 20, 2020)

Currency Unit = Honduran Lempira (HNL)

HNL 24.8 = US\$1.00

HNL1.00 = US\$0.04

FISCAL YEAR

January 1 - December 31

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ABBREVIATIONS AND ACRONYMS

ADA	National Water Authority (<i>Autoridad del Agua</i>)
CABEI	Central American Bank for Economic Integration
CBA	Cost Benefit Analysis
CE	Citizen Engagement
CENAOS	National Center for Atmospheric, Oceanographic, and Seismic Studies (<i>Centro Nacional de Estudios Atmosféricos, Oceanográficos y Sísmicos</i>)
CER	Contingency Emergency Response
CIAT	International Center for Tropical Agriculture (<i>Centro Internacional para Agricultura Tropical</i>)
COMRURAL II	Integrating Innovation for Rural Competitiveness in Honduras Project - P168385
COPECO	Ministry of Disaster Risk Management and National Contingencies (<i>Secretaría de Gestión del Riesgo y Contingencias Nacionales</i>)
COSUDE	Swiss Agency for Development and Cooperation (<i>Agencia Suiza para el Desarrollo y la Cooperación</i>)
COVID-19	Coronavirus Disease 2019
CWTP	Central Water Treatment Plant
DGRH	General Directorate of Water Resources (<i>Dirección General de Recursos Hídricos</i>)
EAP	Emergency Action Plan
EFA	Economic and Financial Analysis
EIRR	Economic Internal Rate of Return
ENEE	National Electric Energy Company (<i>Empresa Nacional de Energía Eléctrica</i>)
EPP	Emergency Preparedness Plan
E&S	Environmental and Social
ESF	Environmental and Social Framework
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization (of the United Nations)
FIRR	Financial Internal Rate of Return
FM	Financial Management
FMA	Financial Management Assessment
FSL	Full Supply Level
GBV	Gender Based Violence
GDP	Gross Domestic Product
GHG	Green House Gases
GIIP	Good International Industry Practice.
GoH	Government of Honduras
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
GWh	Gigawatt hours
ICF	National Institute of Forest Conservation and Development, Protected Areas and Wildlife (<i>Instituto de Conservación Forestal</i>)

IDA	International Development Association
IFR	Interim Financial Report
IRR	Internal Rate of Return
INSEP	Ministry of Infrastructure and Public Services (<i>Secretaría de Infraestructura y Servicios Públicos</i>)
INVEST-H	Honduran Strategic Investment Office (<i>Inversiones Estratégicas de Honduras</i>)
IPF	Investment Project Financing
IPPF	Indigenous Peoples Planning Framework
IT	Information Technology
IWRM	Integrated Water Resources Management
JCV	José Cecilio del Valle Dam
LAC	Latin America and the Caribbean
MIAMBIENTE	Ministry of Natural Resources and Environment (<i>Secretaría de Recursos Naturales y Medio Ambiente</i>)
M&E	Monitoring and Evaluation
MFD	Maximizing Finance for Development
NPV	Net Present Value
MIS	Management Information System
OAS	Organization of American States
O&M	Operations and Maintenance
PDO	Project Development Objective
PMU	Project Management Unit
POM	Project Operational Manual
PPCR	Pilot Program for Climate Resilience
PPSD	Project Procurement Strategy for Development
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SAG	Ministry of Agriculture and Livestock (<i>Secretaría de Agricultura y Ganadería</i>)
SEFIN	Ministry of Finance (<i>Secretaría de Finanzas</i>)
SEP	Stakeholder Engagement Plan
SIAS	Integrated System for Water Security (<i>Sistema Integrado de Agua Segura</i>)
SIASAR	Water Supply and Sanitation Rural Information System (<i>Sistema de Información de Agua Potable y Saneamiento Rural</i>)
SMAGE	Operations and Management System (<i>Sistema de Manejo y Gestión de Equipos</i>)
SPC	Shadow Price of Carbon
STEP	Systematic Tracking and Exchanges in Procurement
TA	Technical Assistance
tco2 - eq	Carbon dioxide equivalent measured metric tons
TOR	Terms of Reference
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WB	World Bank
WOP	Without Project
WP	With Project

WRI	Water Resources Information
WRIS	Water Resources Information System
WRM	Water Resources Management
WSS	Water Supply and Sanitation
WUAs	Water User Associations

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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Honduras	Water Security in the Dry Corridor of Honduras	
Project ID	Financing Instrument	Environmental and Social Risk Classification
P169901	Investment Project Financing	High

Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input checked="" type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
12-Jun-2020	30-Dec-2025

Bank/IFC Collaboration

No

Proposed Development Objective(s)

To improve water service delivery and strengthen water governance in selected areas of the Dry Corridor of Honduras.

Components

Component Name	Cost (US\$, millions)



Component 1: Strengthening institutional capacity for water resources governance and management	6.00
Component 2: Scaling up resilient hydraulic infrastructure for water security in the Dry Corridor	70.00
Component 3: Project management and capacity building	9.00
Component 4: Contingency Emergency Response Component	0.00

Organizations

Borrower:	Republic of Honduras
Implementing Agency:	Honduran Strategic Investment Office (Inversiones Estratégicas de Honduras – INVEST-H)

PROJECT FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	85.00
Total Financing	85.00
of which IBRD/IDA	70.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	70.00
IDA Credit	70.00

Non-World Bank Group Financing

Counterpart Funding	15.00
Borrower/Recipient	15.00

IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
Honduras	70.00	0.00	0.00	70.00



National PBA	70.00	0.00	0.00	70.00
Total	70.00	0.00	0.00	70.00

Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2020	2021	2022	2023	2024	2025	2026
Annual	0.00	3.56	7.33	12.65	18.33	17.89	10.23
Cumulative	0.00	3.56	10.90	23.55	41.88	59.77	70.00

INSTITUTIONAL DATA**Practice Area (Lead)**

Water

Contributing Practice Areas

Agriculture and Food, Energy & Extractives, Environment, Natural Resources & the Blue Economy

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	● Substantial
2. Macroeconomic	● Substantial
3. Sector Strategies and Policies	● Substantial
4. Technical Design of Project or Program	● Moderate
5. Institutional Capacity for Implementation and Sustainability	● Substantial
6. Fiduciary	● Substantial
7. Environment and Social	● High
8. Stakeholders	● Substantial
9. Other	● Substantial
10. Overall	● High



COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[] Yes [√] No

Does the project require any waivers of Bank policies?

[] Yes [√] No

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Relevant
Cultural Heritage	Relevant
Financial Intermediaries	Not Currently Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

Legal Covenants

Sections and Description



Schedule 2. Section I. A. 1C. Implementation Arrangement. For purposes of the implementation of Parts 1, 2 and 3 of the Project, the Recipient shall without limitation of the provisions of (b) above, no later than thirty (30) days after the Effective Date, hire the following additional staff for the PMU: (i) one procurement specialist and a procurement officer, (ii) a labor and occupational health specialist, (iii) a gender and social inclusion specialist, (iv) a legal specialist, and (v) a resettlement of population specialist.

Sections and Description

Schedule 2. Section I. A. 2. Implementation Arrangement. To facilitate the implementation of Part 1 (a) of the Project, the Recipient, through INVEST-H, shall no later than thirty (30) days after the Effective Date, enter into a tripartite agreement (the Inter-institutional Agreement) with MIAMBIENTE and COPECO; all under terms and conditions acceptable to the Association, including the provisions set forth in Section I.C. of this Schedule 2.

Sections and Description

Schedule 2. Section I. A. 3. Implementation Arrangement. Without limitations to the provisions of paragraph 2 above, the Recipient, through INVEST-H, shall ensure that no works shall be carried out under Part 1 (a) of the Project unless the agreement referred to in said paragraph has been signed.

Sections and Description

Schedule 2. Section I. A. 4. Implementation Arrangement. To facilitate the implementation of Part 1. (b) 1. of the Project, the Recipient, through INVEST-H, shall no later than thirty (30) days after the Effective Date, enter into an agreement (the Inter-institutional Agreement) with ICF; under terms and conditions acceptable to the Association, including the provisions set forth in Section I.C. of this Schedule 2.

Sections and Description

Schedule 2. Section I. A. 5. Implementation Arrangement. To facilitate the implementation of Parts 1. (b) 2., 1. (b) 3., and 2. (b) of the Project, the Recipient, through INVEST-H, shall no later than thirty (30) days after the Effective Date, enter into an agreement (the Inter-institutional Agreement) with MIAMBIENTE, under terms and conditions acceptable to the Association, including the provisions set forth in Section I.C. of this Schedule 2.

Sections and Description

Schedule 2. Section I. A. 6. Implementation Arrangement. To facilitate the implementation of Part 2. (a) of the Project with respect to each selected SIAS, the Recipient, through INVEST-H, shall no later than sixty (60) days after the Effective Date enter into an agreement (the Inter-institutional Agreement) with the corresponding Selected Municipality (which has territorial jurisdiction over said selected SIAS) and the pertinent Water Board and/or Irrigation Board (as the case may be); all under terms and conditions acceptable to the Association including the provisions set forth in Section I.C. of this Schedule 2.

Sections and Description

Schedule 2. Section I. A. 7. Implementation Arrangement. Without limitations to the provisions of paragraph 6 above, the Recipient, through INVEST-H, shall ensure that no works shall be carried out under Part 2 (a) of the Project unless the agreement referred to in said paragraph has been signed.

Sections and Description

Schedule 2. Section I. A. 8. Implementation Arrangement. Without limitations to the provisions of paragraph 5



above, the Recipient shall ensure that: (i) no works shall be carried out under Part 2 (b) of the Project unless the comprehensive dam safety assessment of the JCV Dam referred to in Part 2 (b) (iv) (1) of the Project has been completed in a manner acceptable to the Association, and the recommendations set forth therein have been implemented in accordance with the pertinent provisions set forth in Section I.C of this Schedule and in a manner acceptable to the Association, and the agreement referred to in paragraph 5 above has been signed; and (ii) no goods shall be procured, unless the agreement referred to in paragraph 5 above has been signed.

Conditions

Type	Description
Effectiveness	<p>Article IV. Effectiveness.</p> <p>4.01. (a) the Project Operational Manual has been adopted by the Recipient in a manner and with contents acceptable to the Association.</p>
Type Effectiveness	<p>Article IV. Effectiveness</p> <p>4.01. (b) the PMU has been established as set forth in Section I.A.1(b) of Schedule 2.</p>
Type Disbursement	<p>Schedule 2. Section III. B.1. Withdrawal Conditions.</p> <p>No withdrawal shall be made:</p> <p>(a) for expenditures under Category (2), unless at least two (2) of the Inter-Institutional Agreements referred to in Section I.A.6. have been entered into on terms and conditions acceptable to the Association.</p>
Type Disbursement	<p>Schedule 2. Section III. B.1. Withdrawal Conditions.</p> <p>No withdrawal shall be made:</p> <p>(b) for expenditures under Category (3), unless the Inter-Institutional Agreement referred to in Section I.A.5 has been entered into on terms and conditions acceptable to the Association.</p>
Type Disbursement	<p>Schedule 2. Section III. B.1. Withdrawal Conditions.</p> <p>No withdrawal shall be made:</p> <p>(c) for Emergency Expenditures under Category (4), unless and until the Association is satisfied, and notified the Recipient of its satisfaction, that all of the following conditions have been met in respect of said expenditures: (i) the Recipient has determined that an Eligible Crisis or Emergency has occurred, has furnished to the Association a request to include the proposed activities in the Emergency Response Part in order to respond to said crisis or emergency, and the Association has agreed with such determination, accepted said request and notified the Recipient thereof; (ii) the Recipient has ensured that all environmental and social instruments required for said activities have been prepared and disclosed, and the Recipient has ensured that any actions which are required to be taken under said</p>

instruments have been implemented, all in accordance with the provisions of Section I.D. of this Schedule; (iii) the entities in charge of coordinating and implementing the Emergency Response Part have adequate staff and resources, in accordance with the provisions of Section I.D of this Schedule, for the purposes of said activities; and (iv) the Recipient has adopted the CER Manual, in form and substance acceptable to the Association, and the provisions of the CER Manual remain - or have been updated in accordance with the provisions of Section I.D of this Schedule so as to be - appropriate for the inclusion and implementation of the Emergency Response Part.



I. STRATEGIC CONTEXT

A. Country Context

1. **Over the past 30 years, Honduras has experienced broadly modest, volatile economic growth, with a large share of its vulnerable population exposed to shocks that have stymied years of progress in poverty reduction.** Honduras' real Gross Domestic Product (GDP) grew at an average annual rate of 3.8 percent over the past three decades, exceeding the Latin American and Caribbean (LAC) regional average of 2.6 percent and on par with the Central American average of 3.9 percent.¹ Real GDP growth slowed to 3.7 percent in 2018 from 4.8 percent in 2017 and to 2.7 in 2019 due to lower agricultural exports and unfavorable domestic and external factors.² Output in most sectors (except services) decelerated, most notably in agriculture, where lower coffee and palm oil prices, in conjunction with severe droughts and weaker terms of trade, significantly affected production.³ The country's sensitivity to external shocks, exposure to natural hazards, fiscal instability, limited investment, crime, migration and other challenges to competitiveness, combined with political instability, weak institutions and the thin economic base for generating more and better jobs, have inhibited economic diversification, undermined productivity growth, and slowed progress in raising incomes and reducing poverty and inequality.
2. **Poverty rates and income inequality in Honduras continue to be among the highest in LAC.** With 9.6 million inhabitants and a per capita annual income of US\$2,541, Honduras is the third poorest country in the Western Hemisphere. According to official poverty estimates, an estimated 48.3 percent of Hondurans (around 4.3 million people) lived below the national poverty line in 2018, and an estimated 22.9 percent of Hondurans (around 2 million people) lived below the national extreme poverty line. International headcount estimates for 2018 show that 16.5 percent of the Honduran population lived on less than US\$1.90 per day (the international poverty line), the second highest rate in the LAC region. In addition, a third of the population lives just above the poverty line and is vulnerable to falling back into poverty.⁴ Inequality is also on the rise, with a Gini of 51.1 in 2016, Honduras has one of the most inequitable income distributions in LAC, with inequality increasing from 50.5 in 2017 to 52.1 in 2019.⁵
3. **Indigenous Peoples and Afro-descendants are most severely affected by poverty and social exclusion in Honduras.** While these groups account for an estimated 8.6 percent of the national population, rough estimates from indigenous organizations indicate that more than 70 percent live in poverty and more than half are unemployed.⁶ A lack of information from household surveys has translated into a lack of official estimates of poverty rates among these groups.
4. **Honduras' high exposure to extreme climate events and disease outbreaks further threatens its economic stability and the safety and well-being of its population.** It is one of the most vulnerable countries in the world to increasingly frequent droughts and other extreme weather events, and to the effects of climate change. Honduras was the second most severely affected country between 1997 and 2016.⁷ During this period, the country suffered 66 climatic events, including Hurricane Mitch in 1998,

¹ Central Bank of Honduras; World Development Index, and World Bank staff calculations, March 2020.

² On March 19th, the Central Bank of Honduras stated that the real GDP growth was 2.7 percent in 2019

³ Strong dependence on agriculture has been identified as one of the core structural challenges hindering medium-term growth in Honduras. IMF Debt Sustainability Analysis, Article IV, July 2019.

⁴ Honduras Poverty and Equity Brief, World Bank, April 2020.

⁵ Data from World Bank, Development Research Group.

⁶ Germanwatch 2017.

⁷ 2019 Global Climate Risk Index (Germanwatch)



which resulted in a massive loss of life and assets. During the 1997-2016 period, Honduras lost 1.8 percent of GDP per year, on average, due to climatic events.⁸

5. In addition to extreme climate vulnerabilities, disease outbreaks impact economic growth, health and welfare of the Honduran population. In the midst of a national health emergency resulting from an uncontrolled Dengue fever epidemic,⁹ in March 2020 Honduras also joined the ranks of countries with confirmed and increasing cases of the Coronavirus Disease 2019 (COVID-19) pandemic. This outbreak poses an even greater threat to the health and welfare of the Honduran population, particularly given the ongoing difficulties in addressing recurrent infectious diseases. The global COVID-19 pandemic is expected to impact the growth of the country's gross domestic product (GDP), and increase poverty rates.

6. Honduras' Dry Corridor, located in the southwest along the Pacific coast and covering 20,000 km², encompasses five water basins (Sampile, Choluteca, Nacaome, Lempa and Goascorán), all of which are increasingly vulnerable to severe weather instability and climate shocks. This region is part of Central America's Dry Corridor, known for its variable precipitation patterns and increasingly unstable weather regime.¹⁰ During El Niño years, precipitation in the Dry Corridor can drop by 30 to 40 percent, with rising temperatures and longer and more frequent rainless periods. Such dry periods are often followed by tropical storms that take a devastating toll on human life, food security, infrastructure and national economies. The Dry Corridor is home to approximately 2.2 million people, where 76.7 percent live in poverty and 64.5 percent in extreme poverty; most are subsistence farmers growing basic grains; others are landless farmers and day laborers. An estimated 25 percent of these households are headed by women.¹¹

B. Sectoral and Institutional Context

7. Agriculture accounts for about 36 percent of total employment and 61 percent of the bottom two quintiles in Honduras. Subsistence agriculture is the primary source of income and food security for rural communities in Honduras, with an estimated 72 percent of agricultural families dependent on farming on small plots of land. This type of farming is typically characterized by low revenue generation and high vulnerability to shocks, particularly droughts. The deceleration of the labor-intensive agriculture sector, including coffee production, due to water shortages, along with rising consumer prices, have adversely affected rural household incomes. In 2018, 60 percent of the rural population (around 2.5 million people) lived below the official rural poverty line¹². Chronic child malnutrition is roughly twice as high in rural areas (29 percent) as in urban centers (15 percent¹³), and rural households are far more likely to lack access to clean water, which is crucial not only to meet human consumption and ensure food security and nutrition needs, but also to prevent the spread of disease.

8. Of the five water basins in the Dry Corridor, the Nacaome has the most potential for agro-industry, aquaculture and hydropower, sectors considered key to economic development in the Dry

⁸ The Central America Urbanization Review: Making Cities Work for Central America, World Bank 2017.

⁹ Honduras is facing a severe and uncontrolled outbreak of Dengue fever that so far has affected more than 110,000 people and caused 180 suspected deaths since its inception in 2019. *Epidemiological Bulletin EW52*. Ministry of Health 2020 (January).

¹⁰ The Central American Dry Corridor spans the Pacific coast from Southern Mexico to Panama. The region's variable precipitation patterns make it highly susceptible to an increasingly unstable weather regime. Source: *Chronology of the Dry Corridor: The Impetus for Resilience in Central America*. Food and Agriculture Organization (FAO) 2017.

¹¹ Based on Fourth Population and Housing Census - 2013.

¹² Idem

¹³ International Food Policy Research Institute. 2016.



Corridor and Honduras as a whole. With a population of about 278,000¹⁴ people distributed over 25 municipalities and 3,478 km², Nacaome is the most populated basin of the Dry Corridor. Although largely inhabited by subsistence farmers, it also has export-oriented economic activities based on higher-value crops and industrial shrimp aquaculture. In 2013-2014, aquaculture alone generated US\$219.5 million in GDP and 35,000 jobs.¹⁵ The basin is also home to the José Cecilio del Valle (JCV) Dam, a large multipurpose structure originally designed to supply water for human consumption, irrigation and power generation, but currently being used only for power generation—although the failure to install spillway gates during construction has limited the dam's storage capacity to about 29 million m³, reducing its hydropower potential of 35 Gigawatt hours (GWh) by 40 percent.¹⁶ At its current storage level and without the spillway gates, the dam is unable to provide the low-cost, low-carbon power generation that is critical for the region's economic development.

9. **Although Honduras has made substantial progress in closing the water supply gap over the last decades, there are persistent inequities in access and service quality is generally low.** Two-thirds of urban residents receive water only three hours a day, and only one-third have access to safely managed sanitation. As of 2017, nearly one-fifth of Hondurans living in extreme poverty did not have access to adequate water and sanitation services.¹⁷ Severe water restriction programs are imposed during most summers. The lack of safely managed water supply, sanitation and hygiene services also significantly increases the risk of transmission of diseases. The importance of ensuring access to safely managed water supply, along with adequate handwashing, which is crucial for breaking the cycle of contagion, has been made even more apparent following the global COVID-19 pandemic.

10. **Water quantity, quality and availability are increasingly at risk due to inadequate water resources management (WRM).** Honduras lacks a national water resources master plan and has only limited river regulation, resulting in unprotected watersheds, high deforestation rates and contamination of water sources. The National Water Law approved in 2009 is yet to be put into effect through the implementation of regulations.¹⁸ The Water Law envisaged the creation of a National Water Authority (*Autoridad del Agua – ADA*) for the overall management of water resources, the establishment of water rights, and the participation of water users in WRM. The Ministry of Natural Resources and Environment (*Secretaría de Recursos Naturales y Medio Ambiente - MIAMBIENTE*) is responsible for the formulation of environmental policies, as well as for setting minimum water quality standards. However, there is no water policy in effect. Responsibility for water policy, financing, regulation, and monitoring is dispersed across various ministries and agencies, with no established central body to effectively coordinate efforts. Legislation governing the protection of watershed areas¹⁹ was approved more than a decade ago, but widespread lack of compliance represents an additional weakness in the WRM framework. The Government has recently committed to the establishment of ADA for the overall management of water resources, including setting of coordination mechanisms and issuing of water rights.

¹⁴ Dry Corridor's Water Security Strategy (Ministry of General Coordination, 2019).

¹⁵ Honduras aquaculture data, Cargill Animal Nutrition 2015.

¹⁶ The JCV dam was put in operation in 1998. At present, the dam is being operated by Ministry of Natural Resources and Environment (MIAMBIENTE). Downstream JCV Dam, the Government of Honduras (GoH) through the Ministry of Infrastructure and Public Services (*Secretaría de Infraestructura y Servicios Públicos - INSEP*) has granted a concession for the hydropower production which feed from the water supplied by MIAMBIENTE through the JCV dam. Hydropower is the only service currently being provided by the dam.

¹⁷ According to the 2017 Joint Monitoring Program (JMP) Report.

¹⁸ Water Law approved through Legislative Decree No. 181-2009.

¹⁹ The Law of Forests, Protected Areas and Wildlife was approved in 2007.



11. **The lack of adequate water resource information and basin management tools hampers the Government's ability to respond to the country's growing water demands and climate risks.** The Government's limited capacity to generate clear and usable water and hydrometeorological data undermines all aspects of river basin management, including planning, monitoring, and coordination among responsible basin management agencies. Further, the lack of groundwater information and management of water abstraction have resulted in a proliferation of illegal wells, increasing the risk of overexploitation of aquifers. There is a pressing need to improve the quality and availability of water and hydrometeorological information and develop relevant information products for all stakeholders.

12. **Water scarcity in the Nacaome Basin is the result of unchecked agricultural expansion, unregulated water abstraction and high levels of pollution.** Deteriorating water quality has not only adversely affected irrigation and agro-exports, but also the quality of drinking water and water treatment costs. The shortage of hydraulic infrastructure to store water and regulate volumes has led to intensive groundwater use, particularly in the lower parts of the Choluteca and Nacaome Basins, threatening important water supply sources for the productive regions of the Pacific.

13. **Although the Dry Corridor has ample groundwater resources, these are insufficient due to frequent droughts.** Based on recent estimates, the combined available resources of the five basins total roughly 7.3 billion m³/year, significantly surpassing demand, estimated at 0.6 billion m³/year. However, significant and worrisome drawdowns in the aquifers have been identified. Projections under climate change scenarios for 2030, coupled with estimates of rising water demand, indicate that water deficits will worsen in the coming decade, particularly during the dry season (February-April).²⁰ These deficits, combined with severe weather instability and climate shocks, will threaten the provision of basic water supply services, leading to declining agricultural production and the risk of food security.

14. **To address these issues and as a direct response to the recurring droughts, in mid-2014 the Government of Honduras put in place the Alliance for the Dry Corridor** in collaboration with development partners.²¹ The Alliance aims to improve and coordinate water resource management (WRM) initiatives within Honduras' Dry Corridor. One of these initiatives is the Pilot Program for Climate Resilience, under which the Honduras Water Security Strategy for the Dry Corridor was elaborated in 2019. The objectives of this Strategy are: (a) reducing the country's vulnerability to droughts and floods; (b) strengthening the institutional and governance framework for water resources; (c) increasing water availability by addressing deficiencies in water infrastructure, including through the expansion of local water harvesting reservoir systems (*Sistemas Integrados de Agua Segura – SIAS*²²); and (d) developing tools for water financing.

15. **The aim of the proposed Water Security in the Dry Corridor Project is to support implementation of the Water Security Strategy and contribute to its objectives.** The Project would carry out pilot interventions in the Nacaome River Basin, which has one of the highest levels of water resource

²⁰ Intergovernmental Panel on Climate Change (IPCC) 2019 Report: AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability.

²¹ Partners in the Alliance include the World Bank, European Union, United States Agency for International Development (USAID), Canadian International Development Agency (CIDA), Swiss Agency for Development and Cooperation (COSUDE), Spanish Agency for International Development Cooperation (AECID), Central American Bank for Economic Integration (CABEI), and the Global Agriculture and Food Security Program (GAFSP).

²² SIAS are local water harvesting reservoir systems, managed by local water users, which components include: a) protection and legalization of micro catchment area; b) the hydraulic storage infrastructure or reservoir; c) the water distribution system for irrigation and / or water supply purposes and d) technical assistance (TA) to water users to enhance water practices for humans consumption and/or irrigation. See footnote 30 for more information.



degradation in the Dry Corridor. Priority structural and non-structural interventions at the national and local levels identified in the Strategy²³ would be supported by the proposed Project to put in motion the key building blocks to address the key challenges in the Dry Corridor. This would be done through the development and testing of a scalable model in the Nacaome Basin for sustaining water resources, delivering basic water services and building resilience to droughts, floods and climate change. Several basin management models will be developed and put in place for the upstream and downstream parts of the basin.

16. **For the upper basin, the proposed Project will scale up the WRM approach initiated in 2015 by the Honduran Strategic Investment Office (*Inversiones Estratégicas de Honduras - INVEST-H*), which has been building small-scale systems for community water harvesting and storage,** with proven benefits for the population. Farmers living in the targeted areas have reported better livelihood conditions as a result of increased water availability, which has prevented crop losses and enabled crop intensification and diversification into higher-value crops, with broad implications for health, employment and migration patterns.²⁴ For the lower basin, the proposed Project will support revamping of the multipurpose dam infrastructure, with the aim of reducing water conflicts among the various users (downstream inhabitants for water supply, the Ministry of Infrastructure and Public Services (*Secretaría de Infraestructura y Servicio Público - INSEP*) as owner of the hydroelectric plant, upstream and downstream farmers and industrial consumers). The aim is for the water security model set up in the Nacaome Basin to eventually be replicated by the Government in other basins in the Dry Corridor with the support from other development partners.

Relevance to Higher Level Objectives

17. **The proposed Project is fully aligned with the World Bank Group's FY16–FY20 Country Partnership Framework (CPF) for Honduras,²⁵ discussed by the Board of Executive Directors on December 15, 2015 and supports two of its three pillars.** It supports *Pillar 2: Bolstering Conditions for Growth*, by directly contributing to Objective 1 (*Improve Reliability of Key Infrastructure*) and Objective 2 (*Strengthen the Regulatory Framework and Institutional Capacity*). It also supports *Pillar 3: Reducing Vulnerability* by contributing to Objective 3 (*Boost Resilience to Disasters and Climate Change*). The Project contributes to these objectives by (a) improving the enabling conditions for sustainable agricultural growth; and (b) strengthening the institutions responsible for WRM and adaptation to climate change-related threats, mainly droughts and floods, in the Dry Corridor.

18. **The Project would also contribute to the World Bank Group's twin goals of ending extreme poverty and boosting shared prosperity** by increasing access to water supply and improving WRM, thereby benefitting small farmers and rural communities. The Honduras Systematic Country Diagnostic (SCD)²⁶ recognized that Honduras' capacity to grow in a sustainable manner depends on how well the country manages its natural resources and called for improved WRM to meet current and future water demands. The proposed Project is aligned with its recommendation for the improvement of WRM, which will require smart investments in water storage infrastructure and aqueducts, coupled with effective

²³ The priority interventions laid out in the strategy aim at: (i) reducing the risk to climate change vulnerabilities, mainly droughts and floods; (ii) strengthening the institutional framework and governance around water resources by promoting user participation, among others; (iii) increasing water availability by addressing deficiencies in water infrastructure; and (iv) developing tools for water financing.

²⁴ Based on consultations carried out with INVEST-H as part of Project preparation.

²⁵ Report No. 98367-HN

²⁶ October 2015, report number 100441-HN.



water management, institutional strengthening, and capacity building at the local, basin, and national levels.

19. **The Project is closely aligned with other World Bank-funded projects.** It was designed in alignment with the Pilot Program for Climate Resilience – PPCR (P157795), which prioritizes water security in the Dry Corridor. Similarly, it complements the Integrating Innovation for Rural Competitiveness in Honduras - COMRURAL II Project (P168385) by supporting the development of WRM plans at the local level.

20. **The Project is also aligned with the overarching theme of IDA18, “Towards 2030: Investing in Growth, Resilience and Opportunity,” as well as with the Sustainable Development Goals (SDGs).** It contributes to several IDA18 priorities, including: (a) maximizing finance for development; (b) climate change adaptation; (c) gender equality; (d) jobs and economic transformation; and (e) improved governance and institutions, all of which present specific development challenges for Honduras. Further, the Project advances the country’s progress toward meeting the Sustainable Development Goals on poverty, food security, gender equality, clean water and sanitation, affordable and clean energy, improved infrastructure, responsible production and climate action.

21. **Finally, the Project is aligned with the Government’s priorities** of improving water governance, climate resilience and water resource management, including: (a) the National Plan and Country Vision Law 2010-2038 (specifically, with Objective 3, aimed at increasing the country’s water storage capacity); (b) the Water, Forest and Land Master Plan (2017-2030); and (c) the Country’s National Adaptation Strategy (2010) including its Plan for Climate Resilience 2018-2022. In addition, the Project would contribute to the Government’s efforts to mitigate the economic impact of COVID-19 in the Dry Corridor by providing water directly to households (thereby reducing the use of common wells) and increasing the availability of water for irrigation to enhance food security. To mitigate the spread of this and future disease epidemics, the Project would also support handwashing and community outreach and communications campaigns.

II. PROJECT DESCRIPTION

A. Project Development Objective

22. The Project Development Objective (PDO) is to improve water service delivery and strengthen water governance in selected areas of the Dry Corridor of Honduras.

23. Achievement of the PDO will be measured through the following indicators:

- Beneficiaries with access to improved water supply, disaggregated by gender (number)
- Beneficiaries with access to new/improved irrigation, disaggregated by gender (number)
- Local organizations with enhanced capacity for using WRM principles for better monitoring/decision-making (number)

B. Project Components

24. **The overall cost of the proposed Project is US\$85 million, financed by an IDA credit in the amount of US\$70 million and US\$15 million in counterpart funding from the Government of Honduras for infrastructure works.** The Project is to be implemented over a five- and half-year period. It consists of four components:

25. **Component 1: Strengthening Institutional Capacity for Water Resources Governance and Management (US\$6.0 million IDA).** This component aims to: (a) strengthen the hydrometeorological



network, water resources information system (WRIS), and capacity development targeting the Nacaome Basin; and (b) develop approaches and mechanisms for more transparent WRM and water governance. Better management and governance of water resources will increase the availability and quality of water and thus contribute to reducing water insecurity and risks in the Nacaome Basin. The expectation is that results from the Nacaome Basin pilot will be scalable to other parts of the Dry Corridor and the rest of the country.

26. *Sub-component 1.1: Strengthening Water Resources Information Systems in the Nacaome Water Basin (US\$3 million).* This sub-component will support WRM in the Nacaome Basin by strengthening the use of evidence from improved hydroclimatic monitoring, integrated information platforms, tools and assessments²⁷ to support, plan and manage water services. Specifically, it will support the development of: (a) an optimization plan for the modernization of hydrological and climate services, an operations and maintenance plan for the hydromet network, and an upgraded hydroclimatic monitoring network; (b) an automated hydroclimatic data integration system and associated information technology equipment; (c) a water resources demand analysis and groundwater assessment²⁸; (d) a system to monitor water availability and support planning of water resources allocation; as well as (e) capacity building for technical staff and key local actors.

27. *Sub-component 1.2: Promoting Water Governance and Capacity Building (US\$3 million).* This sub-component will contribute to institutional strengthening and coordination of water institutions at the local, basin and national levels. Activities will follow a bottom-up approach, building on various actors' experiences at the micro-watershed level to scale up at the sub-basin, basin and national levels. The sub-component will:

- i. *At the municipal (micro-watershed) level*, support: (a) issuance of the legal declarations of water source zones; (b) elaboration of watershed management and protection plans according to applicable regulations for each micro-watershed; and (c) design of financial compensation mechanisms to ensure protection of the catchment area, if needed. The long-term sustainability of this approach to micro-watershed management will be achieved by strengthening coordination among municipalities, water/irrigation organizations (*juntas de agua and riego*) and upstream stakeholders, aimed at protecting and sustaining local water resources.
- ii. *At the basin (Nacaome Basin) level*: (a) support and articulate new mechanisms for managing the benefits of JCV Dam; and (b) strengthen the Nacaome Water Basin Board, in collaboration with other partners, including the development of integrated WRM tools such as watershed management plans for ensuring the long-term protection of water resources.
- iii. *At the national level*, support: (a) establishment and strengthening of the ADA through capacity building (training and equipment); (b) inclusion of specific proposals related to gender equity in WRM policies or bylaws; and (c) the piloting of an interconnection between the ADA and Nacaome Water Basin information systems.

28. *Component 2: Scaling up Resilient Hydraulic Infrastructure for Water Security in the Dry Corridor (US\$55 million IDA, US\$15 million counterpart funds).* This component aims to finance implementation of prioritized infrastructure interventions for resilient water management in accordance with Good

²⁷ All assessment reports will include, when applicable, information disaggregated by gender groups (percentages of male and female), and all hydroclimatic and hydrometeorological information will be disseminated in a form equally accessible to men and women.

²⁸ To this end, WRM tools such as water cadasters and water balances may be explored.



International Industry Practice (GIIP).²⁹ These investments will make the targeted areas more resilient to drought by supporting water harvesting reservoirs and integrated watershed management.

29. Sub-component 2.1: Promoting an Integrated and Multipurpose Micro-watershed Management Approach in the Dry Corridor (US\$15 million IDA). This sub-component will support: (a) the design, construction, establishment and supervision of local water harvesting reservoir systems known as *Sistemas Integrados de Agua Segura - SIAS*³⁰, including formulation of environmental and social assessments for each; (b) training and capacity building of project beneficiaries on operation and maintenance of each SIAS, including crop management, for a minimum of two years after construction is completed, to ensure financial and environmental sustainability; (c) the provision of basic sanitation units³¹ combined with the implementation of social outreach plans to promote behaviour change and raise awareness on water, sanitation and hygiene (WASH), including the rational use of water and hygiene practices to mitigate disease contagion; and (e) the development of upstream catchment protection and management plans, with community participation.

30. This sub-component will follow a community-based integrated micro watershed management approach, aimed at: (a) improving water retention and storage through the SIAS, thereby increasing resilience to drought in the targeted areas; (b) strengthening community-driven water governance institutions through capacity building and TA; and (c) improving livelihoods through climate-smart agriculture and better value chain practices, while securing local and global environmental benefits (such as reduced sedimentation of waterways, improved interconnectedness, integrity of ecosystems, and higher rates of carbon storage through forest conservation and reduced Green House Gases (GHG) from increased use of hydropower. Beneficiary training will include modules to promote women's participation in water user associations (WUAs) and empower them to take an active part in decision-making.

31. Sub-component 2.2: Maximizing the Benefits of the Multipurpose José Cecilio del Valle (JCV) Dam in the Nacaome Basin (US\$40 million IDA, US\$15 million counterpart funds). This sub-component seeks to support infrastructure modernization in the middle Nacaome Basin—the JCV Dam together with the water supply system downstream—to give the dam the multipurpose functionality for which it was originally designed. Specific investments³² will include: (a) installation of gates on the spillway to increase storage, improve reservoir operation, and increase the usable capacity of the hydropower plant;³³ (b)

²⁹ Defined as the exercise of professional skill, diligence, prudence that would be reasonably expected from experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally in areas/circumstances such as, but not limited to: varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility. For World Bank, such assessment is carried out consistent with Environmental and Social framework (ESF) standards.

³⁰ The SIAS will include: (a) for all systems, regardless of their purpose, water storage and protection plans and legal declaration of each system's upstream catchment area; (b) for rural water supply systems, a treatment and distribution system and basic household sanitation units (co-financed by the communities); (c) for irrigation systems, a distribution system, a drip irrigation system and other relevant equipment; and (d) for urban water supply systems, the expansion and/or rehabilitation of bulk water systems. Four SIAS to be supported under this sub-component already have well-advanced designs—La Venta SIAS (rural water supply), Curarén SIAS (rural water supply and irrigation), La Paz SIAS (improving urban water supply), and Manazapa- Intibuca SIAS (irrigation).

³¹ The units will be comprised of a basic latrine, a septic tank, and a handwashing sink, prioritizing families living upstream of the local water reservoirs.

³² US\$15 million in counterpart funding will be used to finance some of the infrastructure works, corresponding to the spillway gates and centralized water treatment plant, respectively.

³³ The installation of gates on the JVC Dam spillway is expected to raise the reservoir water level by 8 meters and storage capacity from 29 to 43 million m³ and an increase in the load factor of the hydropower plant which will be determined during implementation. The current average load factor is estimated in 16% per year (73% in winter Jun-Nov and 7% in summer Dec-



construction of a centralized water treatment plant (CWTP) and dedicated pipeline to increase water quality and supply³⁴ for four municipalities downstream³⁵; (c) dam safety interventions, including establishment of a panel of safety experts, technology upgrades and minor works; and (d) technical assistance (TA) to promote an agreement between Ministry of Natural Resources and Environment (MIAMBIENTE) and downstream users to ensure safe and efficient dam operation and management. In addition, this sub-component will finance feasibility studies, technical designs, preparation of bidding documents, supervision for all the structural interventions, as well as an environmental and social impact assessment (ESIA) and implementation of associated environmental and social mitigation and management plans in accordance with the ESIA. All contractors will be required to adhere to equal opportunity recruitment practices³⁶ and provide training on gender equality in the workplace and on gender-based violence.

32. The full feasibility and detailed design studies for the dam will include institutional aspects of the dam's operations, water supply system (including possible weirs³⁷ in the lower part of the basin), and water management. The new institutional arrangements will ensure the system's financial and environmental sustainability and will involve: (a) MIAMBIENTE as owner of the dam and agency responsible for its operation, maintenance, management and safety; (b) municipal water utilities responsible for providing treated water; (c) the Ministry of Infrastructure and Public Services (*Secretaría de Infraestructura y Servicio Público – INSEP*) as owner of the hydroelectric plant; and (d) irrigation water users downstream of the dam. The institutional arrangements will also include payment mechanisms for ring-fencing and long-term operational maintenance of the dam, as well as specified responsibilities for protection of the upstream catchment area.

33. As indicated above, this sub-component will finance improvements in the JCV Dam safety plan. During preparation, a preliminary dam safety assessment found general conditions to be satisfactory, with no red flags. However, the assessment identified some gaps and recommended that a comprehensive dam safety assessment be carried out during the implementation of the Project. The comprehensive assessment will comprise the following actions: (a) a review and update of the dam safety conditions for present and future configurations prior to the onset of works; and (b) improvements in the dam safety plan, including preparation of: (i) specific operations and maintenance (O&M) manuals and monitoring plans for the different dam components, (ii) a publicly approved emergency preparedness plan (EPP); and (iii) an emergency action plan (EAP) for high spillway discharge and dam break contingencies, to warn the population and implement partial or full evacuation, as necessary. The EPP may include a dam break analysis and related inundation maps, as well as the definition of security areas around the reservoir, the dam itself and individual structures.

34. Component 3: Project Management and Capacity Building (US\$9 million IDA). This component will support: (a) project coordination and management through a Project Management Unit (PMU), as described in Annex 1; (b) monitoring, evaluation and impact assessment of project activities; (c) project fiduciary administration, internal controls, and audits; (d) systems created by the Honduran Strategic

May). Preliminary estimates indicate that once the dam's storage capacity is increased, the load factor could increase from 16 to 25 percent per year on average (to be determined).

³⁴ The volume flow of water is anticipated to increase from 117 to 310 liters per second (l/s) as a result of the new CWTP and dedicated pipeline.

³⁵ Municipalities of San Antonio de Flores, Pespire, San Lorenzo and Nacaome.

³⁶ The risk of having few or no female applicants for these positions will be mitigated by requiring contractors to conduct outreach campaigns targeting women and provide training to women who apply for technical positions.

³⁷ The construction of the weirs will not be financed under this Project



Investment Office (INVEST-H) for environmental and social risk management³⁸; (e) stakeholder outreach, a citizen engagement mechanism and a grievance management system; (f) design and implementation of the project's gender strategy³⁹; (g) other project-related strategic studies as well as prefeasibility and basin-wide environmental and social assessments to contribute to preparation of future interventions within the Dry Corridor, including its transboundary basins; and (h) training of PMU staff. This component will also finance consultancy services, training, vehicles, office equipment and project operating costs.

35. Component 4: Contingency Emergency Response (CER) Component (US\$0 million). Reflecting the strategic approach taken in Honduras across the World Bank's portfolio, this component will provide immediate response to eligible emergencies. If an eligible emergency (as defined in the Contingency Emergency Response Operational Manual to be prepared and adopted by the GoH) arises, this component would finance emergency activities and expenditures through the reallocation of project funds.

C. Project Beneficiaries

36. It is expected that about 167,100 people will directly benefit from the Project. For people affected by recurrent droughts, the Project will: (a) provide access to secure water for irrigation to increase agricultural production in the rural areas of Manazapa and Curarén; (b) improve access to reliable sources of drinking water for rural and small-town residents in La Venta, Curarén, La Paz, San Antonio, Perspire, Nacaome and San Lorenzo; and (c) improve sanitation in all of these areas. In addition, the interventions at the JCV Dam and municipalities downstream will: (a) increase the volume of irrigation water available for about 1,350 hectares (ha) in the lower river basin; (b) improve the generation capacity of the hydropower plant; (c) facilitate flood management by increasing the dam's storage capacity; (d) improve water quality by reducing the overexploitation of aquifers that result in salinization of groundwater; and (e) reduce the risk of dam failure. The Project will also provide temporary employment opportunities to an estimated 570 people during the construction of the physical activities. In addition, rural water supply and irrigation boards, municipal water and sanitation providers will also benefit from strengthened capacity through technical assistance activities. Lastly, the Project will support the active involvement of women in all project activities, including those carried out by contractors, thereby contributing to improving equal employment opportunities for males and females.

37. Indirect beneficiaries. It is estimated that the proposed project will provide indirect benefits to a broad range of stakeholders. In the Dry Corridor, indirect beneficiaries include those employed in the off-farm input, marketing, and commercialization of the value chain segments of farming activities—an estimated 2,800 households.⁴⁰ Downstream of the dam, roughly 3,510 families are also expected to benefit from farming and commercialization activities, including those family members providing technical assistance to commercial farmers. In addition, about 1,350 temporary laborers and their respective families will benefit from commercial farming opportunities generated by the Project in the Nacaome delta during the dry seasons. Altogether, 7,660 families are expected to benefit indirectly from the Project.

³⁸ The Project will contribute to strengthening INVEST-H's implementation and monitoring capacity for environmental and social aspects of projects under their responsibility, through a comprehensive environment and social risk management framework aligned to the World Bank's ESF.

³⁹ INVEST-H will ensure the inclusion of the gender approach in the terms of reference for service provision contracts, consultancies, and works contracts.

⁴⁰ According to the National Statistical Institute (INE) a household in Honduras is composed, on average, by five people.



D. Results Chain

38. A detailed illustration of the Theory of Change and critical assumptions is available in Annex 3.

Figure 1: Results Chain

Component	Activities	Outputs	Intermediate outcomes	PDO/Outcomes	Long-term outcomes
C1: Strengthening institutional capacity for water governance and management					
1.1: Strengthening water resources information (WRI) in Nacaome Basin	<ul style="list-style-type: none"> Financing of equipment and TA for: <ul style="list-style-type: none"> Optimization Plan for the Modernization of Hydrological and Climate Services. Automated hydroclimatic data integration system Water resources allocation system; water demand analysis and assessment Staff and communities trained on IWRM 	<ul style="list-style-type: none"> Rehabilitated/ new stations installed and data feeding into the system O&M plan established WRI systems designed and developed Assessment ready to complement water balances Water use rights monitoring supported IWRM capacity of staff & communities increased 	<ul style="list-style-type: none"> WRI system in Nacaome Basin operational 	WRM enhancement in the Nacaome Basin and local level	<ul style="list-style-type: none"> Increased resilience to climate variability and change Enhanced capacity of government institutions to manage WR WRM Approach replicated throughout the Dry Corridor Avoided crops losses, stabilized and increased yield, intensification and crops diversification Improved access to markets, value chains boosted (ancillary industries)
1.2: Water governance and capacity building	<ul style="list-style-type: none"> Financing of TA for: <ul style="list-style-type: none"> Issuance of Legal declaration of water source Elaboration of watershed plans Coordination of municipalities and local water/irrigation organizations Support for the establishment of a water basin board (Nacaome) New mechanisms for managing benefits of JCV Dam Roadmap for ADA's operationalization 	<ul style="list-style-type: none"> Legal declaration of water source zones Watershed plans prepared Local organizations & municipalities strengthened with WRM plans prepared and approved Nacaome Basin boards established with water balance ready Committee for multipurpose issues supported Roadmap for operationalization of ADA prepared 	<ul style="list-style-type: none"> Area (ha) protected/ restored Local organizations and Municipalities strengthened Basin board established Sub Committee(s) established that rules on and resolves multipurpose issues ADA's roadmap approved 		
C2: Scaling up resilient hydraulic infrastructure for water security in the Dry Corridor					
2.1: Promoting an integrated multipurpose micro-watershed management approach in the Dry Corridor	<ul style="list-style-type: none"> Studies, designs, construction works and supervision for SIAS Development of catchment protection plans and activities Provision of sanitation units Training on O&M and crop management Promotion of female participation in WUAs Communication campaigns on WASH 	<ul style="list-style-type: none"> SIAS established Catchment protection plans and activities implemented Sanitation units in use Beneficiaries trained on O&M and agriculture aspects Female participation, decision-making and leadership roles in WUAs 	<ul style="list-style-type: none"> Catchment protected Increased water storage upstream Improved sanitation Female participants with improved decision-making and leadership roles 	Improved water service delivery	<ul style="list-style-type: none"> Improved livelihoods and incomes for farmers Reduced migration Lower rates of malnutrition and incidence of water-borne diseases
2.2: Maximizing benefits of the multipurpose JCV Dam in Nacaome	<ul style="list-style-type: none"> Studies and assessments for JCV/ Basin Installation of gates and CWTP for JCV / Nacaome Basin Hiring of experts for Dam Panel Recruitment practices targeting women 	<ul style="list-style-type: none"> Gates installed CWTP and pipeline built Dam safety action plan developed Increased targeting of female participation in JCV / Nacaome Basin related jobs 	<ul style="list-style-type: none"> Increased water storage downstream Increased energy generation Increased water production capacity Females with improved sources of income resulting from subcomponent activities Dams operating satisfactorily 		



E. Rationale for Bank Involvement and Role of Partners

39. The World Bank has been actively involved in the Honduran water sector by supporting implementation of the Framework Law, institutional reforms, and infrastructure investments through the World Bank-financed Water and Sanitation Sector Modernization Project (WSSMP, P103881), Pilot Program for Climate Resilience – PPCR (P157795), Honduras Rural Competitiveness Project (P101209), and the Integrating Innovation for Rural Competitiveness in Honduras - COMRURAL II Project (COMRURAL II, P168385), as well as broad-based TA and knowledge sharing. The World Bank will, likewise, bring to bear extensive global experience and specialized staff, as necessary, to support the institutional process to improve water governance at the central and basin levels, to enhance the quality and efficiency of water service provision and the design of water resources management tools.

40. The Project was designed with the understanding that effective WRM can only be achieved through close coordination with other projects led by other partners. The proposed Project will collaborate closely with key partners through the *Water Donor Roundtable (Mesa de Donantes de Agua)* to ensure coordination with relevant initiatives in the Dry Corridor, such as:

- The Alliance for the Dry Corridor. A multi donor effort with a major focus on food production and income generation—seeking to increase families' incomes and access to nutritious foods. The program also includes WASH interventions, in addition to investments in rural infrastructure.
- The United States Agency for International Development (USAID) is financing the *Adaptation of Agriculture to Climate Change Project* and the *Water Harvesting Project*. These projects aim to increase the capacity of families to adapt to climate change by restoring watersheds, promoting climate-smart agriculture, and increasing productivity and food security.
- The Swiss Agency for Development Cooperation (COSUDE) is financing a *Water Governance Program in the Fonseca Gulf area*. The program aims at contributing to the development of a more effective management system for three river basins (Nacaome, Choluteca and Samíle) in the southern region of Honduras. It has already shown promising results (e.g., extension of the Water Balance Platform—Agua de Honduras—to the southern region).
- The Central American Bank for Economic Integration (CABEI) is supporting several initiatives in the Dry Corridor. Of greatest relevance for the proposed Project are the technical studies for the Morolica Dam in the Choluteca Basin to be designed as a multipurpose water storage structure. In addition, CABEI is working with support from the Food and Agriculture Organization of the United Nations (FAO) on a proposal for a *Climate Resilient Corridor Initiative*, to be submitted for funding to the Green Climate Fund by mid-2020. This initiative would include activities complementary to the proposed Bank project, including watershed management and scaling up of the SIAS initiative.
- The Organization of American States (OAS) is promoting a joint WRM approach in the Trifinio region, encompassing the transboundary basins of Guatemala, Honduras and El Salvador. The program includes a cross-border diagnostic analysis and a Water Resources and Sub-basins Strategic Action Plan for the region.

Private sector partners

41. The Maximining Finance for Development (MFD) approach initiated under IDA18 aims to crowd in private sector resources for projects where possible. However, the MFD approach recognizes that private participation is not optimal in projects such as this one that are characterized by a high degree of public good and have no scope for profit. Therefore, fees collected from water users will only cover the



O&M costs of the dam and the small water reservoirs; private sector capital investment in the dam and the small reservoirs is not possible at this stage. However, the Project will lay the foundation for the future participation of the small farmers who benefit from increased irrigation, the urban and rural water service providers, and the hydropower concessionaire.

F. Lessons Learned and Reflected in the Project Design

42. **Global experience suggests that a participatory approach based on the direct involvement of stakeholders in decision-making is vital for sustainable water resources management and planning.** It also suggests that the river basin is the appropriate spatial unit for planning and guiding water management functions. A participatory approach to river basin management ensures that interventions are appropriate and tailored to local needs and increases stakeholders' commitment to implementing water management agreements.

43. **Experience also suggests that a mechanism such as an Inter-institutional Agreement** signed by the agencies responsible for water governance is an effective means of clarifying responsibilities and ensuring their cooperation in maintaining major water infrastructure. In keeping with this lesson, an Inter-institutional Agreement will be signed by the main actors prior to the launch of any bid document.

44. **The interventions addressing water harvesting build on the water storage infrastructure pilots implemented by INVEST-H and incorporate lessons and results from ongoing Bank projects.⁴¹** Relevant lessons include the following: (a) capacity building and training of targeted communities are key to ensuring the sustainability of interventions; (b) support for establishing value chains is essential to strengthen market linkages for producers; (c) assessment of gender needs ensures effective targeted support for women in rural and urban households, given their different needs, roles and responsibilities; and (d) support for citizen engagement mechanisms allows beneficiaries to actively engage with the project. Further, (e) evidence shows that complementing infrastructure works with capacity building and training will strengthen the capacity of users to perform O&M and increase their sense of ownership, thereby improving the long-term sustainability of the system.

45. **Establishing mechanisms to ensure close coordination among the agencies responsible for the catchment area** will be critical to the Project's success. The Project will promote collaboration between INVEST-H and the Forest Conservation Institute (ICF)⁴² to ensure that ICF guidelines are followed in issuing legal declarations of water producing areas and the subsequent elaboration of watershed management plans for those areas.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

46. **The Project will be implemented under the overall coordination of the Honduras Strategic Investment Office (INVEST-H).** INVEST-H is a government agency that supports implementation of strategic projects for the country's socioeconomic development. INVEST-H will house the Project Management Unit (PMU), which will coordinate with the Ministry of Natural Resources and Environment (*Secretaría de Recursos Naturales y Medio Ambiente, MIAMBIENTE*), the Ministry of Disaster Risk Management and National Contingencies (*Secretaría de Gestión del Riesgo y Contingencias Nacionales*,

⁴¹ Corredor Seco Food Security Project (P148737) and the Honduras Rural Competitiveness Project (P101209).

⁴² Full name - National Institute of Forest Conservation and Development, Protected Areas and Wildlife (*Instituto Nacional de Conservación y Desarrollo Forestal*).



COPECO), ICF, and other government institutions. The PMU will oversee all technical, administrative, and fiduciary aspects of the Project. It will ensure compliance with the World Bank's environmental and social standards and be responsible for monitoring and evaluation (M&E) of the Project. The proposed institutional arrangements build on the successful experience with INVEST-H in the implementation of World Bank projects - the Integrating Innovation for Rural Competitiveness in Honduras – COMRURAL II Project (P168385), Honduras Rural Competitiveness Project (P101209), the Corredor Seco Food Security Project (P143787), and the Honduras Pilot Program for Climate Resilience (PPCR) Phase 1 Grant (P157795).

47. The PMU will be headed by a Project Coordinator, who will have responsibility for day-to-day management of the Project. In addition to the Coordinator, the PMU will comprise the following key staff: (a) a procurement specialist, (b) a financial management specialist, (c) an environmental specialist, (d) a social specialist, and (f) a communications and grievance management specialist. Administrative and fiduciary support personnel will complete the PMU. In addition, INVEST-H will hire technical support through short-term consultancies with various skills such as: (a) additional procurement specialist and a procurement officer, (b) an institutional liaison officer; c) a labor and occupational health specialist, (d) a gender and social inclusion specialist, (e) a legal specialist, and (f) a resettlement of population specialist, among others, which will be hired on demand to support implementation of the Project's components. Establishment of the PMU is an effectiveness condition of the Project.

48. Implementation arrangements are designed to ensure long-term sustainability of the water infrastructure. INVEST-H will sign Inter-institutional Agreements with the main actors, ensuring their commitment to maintain the infrastructure that will be transferred to them under each sub-component: (a) INVEST-H with MIAMBIENTE and COPECO for sub-component 1.1; (b) INVEST-H with ICF for sub-component 1.2; (c) INVEST-H with the municipalities and the water/irrigation organizations for each SIAS established under sub-component 2.1; and (d) INVEST-H with MIAMBIENTE for sub-component 2.2, to ensure proper coordination of the activities related to upgrading of the JCV Dam. Before works are initiated, INVEST-H will provide technical assistance to support the dialogue between MIAMBIENTE and the downstream users⁴³ to conceptualize and establish an agreement defining users' contributions to O&M of the JCV Dam and protection of the catchment area.

B. Results Monitoring and Evaluation Arrangements

49. INVEST-H will be responsible for overall M&E of the Project. M&E responsibilities include planning, managing, and entering data into the Project's management information system (MIS), in coordination with the other participating institutions. The MIS will include: (a) a financial management module able to provide financial information by component, disbursement category, and source of financing—this system is already in operation at INVEST-H; (b) a beneficiary monitoring module with geo-referencing; and (c) a control panel for monitoring the results framework indicators as well as the implementation of project operational plans. The MIS will also report on (a) semi-annual and annual progress, (b) lessons learned, (c) baseline and target data (including surveys), (d) midterm review, and (e) final evaluation. The semi-annual reports will include implementation progress against the performance indicators listed in the results framework and the Project Operational Manual (POM).

⁴³ INVEST-H will support MIAMBIENTE in establishing O&M arrangements with downstream users (municipalities of San Lorenzo, Pespire, Nacaome and San Antonio de Flores, INSEP and Irrigation Boards) to ensure sustainability of the JCV Dam and protection of the catchment area.



C. Sustainability

50. **The Project articulates and supports the Government's vision and goals for improving water resources development and management in the Dry Corridor.** The promotion of water for productive use responds to the Government's strong agenda on climate change adaptation by building the resilience of producers in the Dry Corridor to the impacts of drought and flood events. This increased resilience, in turn, contributes to the reduction of extreme poverty and food insecurity in rural areas, and related consequences such as climate-driven migrations.

51. **The Project is well aligned with the Government's sector policies and strategies, such as the National Climate Change Strategy of 2010 and the Water, Forest and Land Master Plan for 2017-2030.** The Project also supports the Country's Program for Climate Resilience 2018-2022, which includes strategies to build the capacity of local governments to manage water resources and conserve water for human consumption, among other goals.

52. **The sustainability of the interventions will be measured mainly by the success of the approach in the Nacaome Basin and its replicability in the other basins of the Dry Corridor.** The following design elements contribute to its sustainability: (a) a participatory approach throughout the Project cycle, with community involvement in decision-making; (b) establishment of strict financing policies, linking the level of service to the community's financial and operational capacity; and (c) infrastructure tailored to the local context with low cost O&M needs, ensuring their sustainability. Through capacity building activities, water organizations at the various levels are expected to become capable of providing O&M for the new infrastructure to ensure sustainability. The Inter-institutional Agreements to be signed between INVEST-H and the main actors for each of the interventions will provide clear operational guidelines, including payment schemes to finance O&M.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis (if applicable)

53. **Technical analysis.** Project interventions are multifocal; they include establishment of community water harvesting and storage reservoir systems (SIAS) for water supply and irrigation in rural areas; expansion of the storage capacity of the JCV Dam; and construction of a central water treatment plant along with conveyance infrastructure to deliver bulk water to the Nacaome Basin's main urban centers. Piloting of these approaches in each target area has shown that some technical aspects may require attention during implementation. These include: (a) the location and sizing of SIAS to optimize investment costs per cubic meter of water stored and serve the largest possible number of residents; and (b) assessment of structural conditions of the JCV Dam in both its current and rehabilitated configurations. The Government has commissioned feasibility studies for the four existing SIAS (of the six to be built) and is preparing bidding documents that will ensure delivery of outputs and outcomes for all the SIAS in line with project objectives. The Government has also commissioned a prefeasibility study for improvements to the JCV Dam and development of the downstream infrastructure and has prepared the TORs for final design and the corresponding bidding documents for the construction. Although the preliminary JCV Dam safety assessment did not find any red flags with its general condition, a comprehensive JCV Dam safety assessment will be carried out during implementation, using Good International Industry Practice (GIIP) criteria, to ensure that the new configuration meets safety standards. Both the dam and SIAS project construction will be reviewed by the independent panel of experts.



54. **Economic analysis.** A standard cost benefit analysis (CBA) was carried out. The economic costs and benefits of project interventions have been assessed based on the following public good impacts: (a) increased access to potable water for people dwelling in the Dry Corridor's rural areas and small towns; (b) increased availability of water for irrigation in the water harvesting and storage systems for small farmers affected by drought in the Dry Corridor; (c) increased storage capacity of the JCV Dam; and (d) a strengthened water resources information system (WRIS). The increased storage capacity of the JCV Dam reservoir will provide the following benefits: (a) a larger supply of potable water for major population centers downstream of the JCV Dam, including Nacaome and San Lorenzo; (b) larger cultivation areas and increased yields in the Nacaome Delta, particularly for those added hectares with access to water for irrigation; and (c) increased capacity for energy production in the existing hydropower plant at the foot of the JCV Dam, which will also contribute to the reduction of greenhouse gas (GHG) emissions. Other indirect economic effects of the Project will be derived from strengthening the WRIS, which will improve decision-making and overall management of water resources in many areas of the Dry Corridor.

55. **The rate of discount used for the CBA is 6 percent, which represents the opportunity cost of investment projects with activities dealing with the mitigation/adaptation to the effects of climate change.** The rate of exchange used is Lempiras 24.5 per US\$1, and the time horizon for the CBA is 20 years, while the life of investment infrastructure is assumed to be 50 years.

56. **The Project is viable according to its own economic merits, and it also contributes to mitigating GHG emissions.** The economic internal rate of return (EIRR) and net present value (NPV) were estimated using the incremental CBA method. The EIRR of the Project as a whole for the base case scenario is 13.3 percent and the economic NPV for the base case scenario is US\$68.6 million.⁴⁴ When the Project's contributions to the reduction of carbon emissions are taken into account, the EIRR rises from 13.3 percent to between 13.9 and 14.6 percent, and the economic NPV goes from US\$68.6 million to between US\$74.7 million and US\$80.8 million (depending on the minimum and maximum shadow price of carbon used in the calculations).

57. **A sensitivity analysis was carried out for the base case scenario to assess the impact on the Project's economic viability of changes in key parameters.** Taking all components together, a 10 percent investment cost overrun results in the EIRR falling from 13.3 to 12.3 percent. The base case scenario includes farming with two harvests per year and crop diversification; a failure to achieve two harvests per year reduces the EIRR of the Project by 1.0 percent. However, this reduction makes investments in small water reservoirs for irrigation not economically viable, with an EIRR of only 1.7 percent, well below the 6 percent discount rate. Similarly, a failure to diversify crop production to include higher-value crops also reduces the EIRR by 3.0 percentage points; this makes investments in small water reservoirs for irrigation economically not viable, with an EIRR of 5.1 percent. On the optimistic side, providing sufficient water to enable farmers to have three harvest per year would increase the EIRR to 12.7 percent.

58. **Financial analysis.** Based on the cash flow model used for this assessment, small farmers' incomes will substantially improve provided they achieve a minimum of two harvests per year and plant high-value crops in 60 percent of their production plots; the small water reservoirs for irrigation's financial internal rate of return (FIRR) under this scenario is estimated at 9.1 percent and the NPV at US\$3.1 million. In the case of small water supply systems administered by local water boards, based on cash flows estimated using a water utility model, they can achieve an FIRR of 10.7 percent and become financially viable. In the

⁴⁴ The EIRR for the investments in small irrigation systems is 8.1 percent, for small water supply and sanitation (WSS) systems is 11.8 percent, and for the JCV Dam and downstream infrastructure is 14.2 percent. The economic NPV for small irrigation systems is US\$2.0 million, for small WSS systems is US\$5.5 million, and for the dam and downstream infrastructure is US\$61.1 million.



case of investment related to the JCV Dam, based on a utility-type model with central administration of all hydraulic infrastructure, the FIRR is estimated at 11.6 percent and the NPV at US\$41 million and will therefore be financially viable.

59. **The analysis shows that small farmers in the Dry Corridor would have limited financial viability if both user fees and capital investment were to be included in their cash flows.** However, they could increase their likelihood of financial viability by incorporating high-value crops in their production menu and by increasing the number of harvests per year (e.g., FIRR 14.0 percent if three crops per year); both will depend on the technical assistance expected to be provided by the Project. In terms of water supply systems built for the rural areas and small towns in the Dry Corridor, they will be financially viable (more than 11 percent FIRR) if small farmers cover only O&M costs. However, if investment costs are included in the cash flows, all small water supply systems will have limited financial viability. The overhaul of the water supply production system downstream of the JCV Dam will be financially viable (12 percent FIRR) if tariffs are set at the user's willingness-to-pay level (US\$1/m³)⁴⁵ and if water utilities achieve a non-revenue (unpaid) water usage of no more than 25 percent.

60. **Rationale for public sector financing.** Public sector financing is justified by the high degree of public good of both the multipurpose dam and of the local irrigation and WSS (water supply and sanitation) infrastructure. In addition, as the JCV Dam is a state-owned asset, public sector financing is justified by the current Honduran institutional and regulatory realities; high regulatory risks and the high capital cost of entry would mean higher costs of private financing, resulting in high cost-recovery tariffs and enhanced risks for private investors.

B. Implementing Agency Assessment

61. **INVEST-H will host the Project Management Unit, which will be responsible for project management (including fiduciary aspects) and M&E.** The PMU will coordinate project implementation with MIAMBIENTE, COPECO, ICF, the Ministry of Agriculture and Livestock (SAG – *Secretaría de Agricultura y Ganadería*), and other government institutions and private stakeholders. The Project's institutional arrangements build on the successful experience of INVEST-H with other Bank projects.

62. **INVEST-H will staff the PMU with qualified experts** in the areas of procurement, financial management, environment and social safeguards, communications and grievance management, among others, according to the complexity of the activities. Specific roles and responsibilities of all parties involved in implementation will be described in the POM, the adoption of which will be a condition of project effectiveness.

63. **Implementation arrangements will include separate Inter-institutional Agreements between INVEST-H and each of the central and local institutions** engaged in sub-component activities. The agreements will detail the requirements and responsibilities of all signatories.

C. Fiduciary

Financial Management

64. **The Bank conducted a financial management assessment (FMA) of the proposed arrangements for the Project.** The FMA was carried out in accordance with *Bank Policy: Investment Project Financing* and *Bank Directive: Investment Project Financing* and the *Financial Management Manual for World Bank-*

⁴⁵ This assumption is based in information reported in Ana Carolina Gonzalez, "Study to Analyze Viability of Rainwater Projects in Tegucigalpa" Colorado State University, 2012.



Financed Investment Operations (effective March 1, 2010 and revised February 10, 2017).

65. **The scope of the FMA included:** (a) evaluation of existing financial management (FM) systems within INVEST-H to be used for project monitoring, accounting, and reporting; (b) review of staffing arrangements; (c) review of the flow of funds arrangements and disbursement methods to be used; (d) review of internal control mechanisms in place, including internal audit; (e) discussion of reporting requirements, including the format and content of unaudited interim financial reports (IFRs); and (f) review of the external audit arrangements.

66. **The preliminary conclusion of the FMA is that INVEST-H's capacity and the proposed fiduciary arrangements meet the WB's requirements.** INVEST-H is a well-established entity with significant experience implementing donor-funded operations and is satisfactorily implementing three other Bank projects.

Procurement

67. **The Bank has conducted a capacity assessment of the adequacy of procurement arrangements of INVEST-H.** The assessment focused on how INVEST-H will be organized to procure works, good and services using the credit funds, in terms of staffing structure, procurement record system, internal controls and roles and responsibilities. INVEST-H has experience with Bank projects and is expected to staff its PMU with qualified procurement experts according to the complexity of procurement activities. The technical aspects of the envisaged procurement activities will require appropriate coordination among the technical and procurement units, including clearly defining the roles and responsibilities of all parties involved.

68. **Procurement will be carried out in accordance with the World Bank Procurement Regulations for IPF Borrowers** (July 2016, revised November 2017 and August 2018) ("Procurement Regulations"). A Project Procurement Strategy for Development ("PPSD") has been prepared by the Recipient, which describes how procurement will support the attainment of the PDOs and deliver value for money under a risk-based approach. The PPSD will provide adequate supporting market analysis for the selection methods detailed in the Procurement Plan. Mandatory Procurement Prior Review Thresholds detailed in Annex I of the Bank's Procurement Regulations will be observed. All procurement procedures, including the roles and responsibilities of different units, will be defined in the POM. Considering the complexity of inter-institutional coordination, and since such coordination is key to the success of the Project, the POM and the Inter-institutional Agreements will define the specific steps, roles, and responsibilities of INVEST-H (including enhancements based on lessons learned from previous and current projects) related to the implementation of procurement processes.

69. The key issues and risks concerning procurement for the Project include: (a) the possibility that bottlenecks in decision-making may occur during implementation due to INVEST-H's rapidly growing portfolio of projects and its small management team; (b) INVEST-H's ability to manage additional staff and resources; (c) the need for close coordination between technical units and procurement; and (d) the complexity of inter-institutional arrangements. Corrective measures that have been agreed upon include: (a) ensuring that the PMU has sufficient numbers of qualified staff; (b) ensuring that the POM specifies sufficient delegation of decision-making authority to the PMU coordinator, to limit the need for approvals by senior INVEST-H management; (c) detailing in the Inter-institutional Agreements the roles and responsibilities of the different entities involved.



D. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	Yes
Projects in Disputed Areas OP 7.60	No

70. All SIAS envisaged under the Project, which already have advanced designs and environment and social studies, are located in the Nacaome and Ulúa river basins, both of which are national basins. However, the Project leaves a window for potential future SIAS as well as strategic studies, some of which may be implemented in the Choluteca river basin which is shared between Honduras and Nicaragua and considered an international waterway. Accordingly, WB's Operational Policy - Projects on International Waterways (OP 7.50) is triggered and a notification letter presenting an indicative map of the intervention areas (see Annex 5) was submitted to the Government of Nicaragua. The WB assessed that the proposed Project will cause no harm to the Republic of Nicaragua or any other riparian and that activities will have no adverse effects on the water quantity or quality of any of the international waterway's possible water use.

71. On March 23, 2020, the Bank received a letter from the Government of Nicaragua (GoN) confirming the No Objection to Project activities envisaged in the Choluteca River transboundary basin in alignment with OP 7.50. The GoN proposes to carry out a set of activities jointly with Honduras to enhance collaboration in the Choluteca and Coco river basins. The Project may support cooperation between the two countries in the future, if they so request.

E. Environmental and Social

72. **The Project's social and environmental risks are considered High.** The main social risks and impacts under the Project include: (a) the potential to exacerbate existing social tensions and conflicts around access to and use of water resources (for example, between municipalities or low-income populations in the lower Nacaome Basin if private sector-led development leads to increased water use in some areas); (b) potential adverse impacts on Indigenous Peoples (IP) or other vulnerable groups, or their exclusion from project activities and benefits; and (c) impacts resulting from the temporary or permanent acquisition of land, and restrictions on land use, as a result of civil works. Mitigation measures have been developed and integrated into environmental and social instruments for the activities planned for JCV Dam and the four existing SIAS at La Paz, Curarén, La Venta and Manazapa. For the two new planned SIAS, specific risks and mitigation measures will be determined once their locations are identified during implementation. Additional social challenges may arise in the time between the preparation and beginning of works, and adequate management of those unforeseen challenges will depend critically on continued communication and dialogue with the target communities.

73. **The principal environmental risks are expected to include:**

- i. permanent flooding of approximately 40 ha of secondary forest land in connection with raising the reservoir level of the JCV Dam, and flooding of smaller areas—ranging from about 1.7 ha to 4.2 ha—for the establishment of the two new SIAS water harvesting reservoirs;
- ii. potential safety risks associated with both the JCV Dam and the SIAS water harvesting structures;



- iii. potential positive and/or negative impacts on fish populations and associated livelihoods resulting from changes to downstream flows from the JCV Dam;
- iv. potential indirect impacts to land use downstream of the dam due to additional water available for irrigation;
- v. diverse localized construction-stage impacts related to both JCV Dam works and SIAS subprojects, including from excavation of water harvesting reservoir areas; building of SIAS embankments and JCV Dam spillway gates; laying of pipelines, construction of a central water treatment plant; building or upgrading access roads; and risks related to the potential labor influx to rural communities, including community health and safety risks, GBV risks, occupational health and safety risks, as well as traffic safety risks to both workers and communities at all construction sites; and
- vi. potential risks associated with future water-related investments in the lower Nacaome, for which a feasibility study may be undertaken under the Project.

74. Both environmental and social (E&S) risks related to SIAS investments are considered lower overall than those related to JCV Dam improvements, due to their small size and the requirements that they not be in environmentally or socially sensitive areas and have strong community support. To address these potential risks, several E&S management instruments have been developed.

75. **For the investments under sub-component 2.1**, an Environmental and Social Impact Assessment (ESIA) was prepared and disclosed, including preliminary Environmental and Social Management Plans (ESMPs) for expansion of the four existing SIAS.⁴⁶ In the initial stage of implementation, detailed designs, bidding documents and ESMPs will be finalized, and Indigenous Peoples Plans (IPPs), and Resettlement Action Plans (RAPs) will be developed as needed. For future SIAS subproject locations not yet identified, an Environmental and Social Management Framework (ESMF) as well as an Indigenous Peoples Planning Framework (IPPF) and Resettlement Policy Framework (RPF) have been developed and disclosed in accordance with the World Bank's Environmental and Social Framework (ESF) and national requirements⁴⁷. Environmental and Social Impact Assessments (ESIAs) will be completed prior to bidding of works to ensure that all required mitigation and management measures to be undertaken by contractors are appropriately included in bidding and contract documents. The potential for cumulative impacts across multiple SIAS, or between the SIAS and the JCV Dam, is expected to be negligible, as the proposed investments are not in proximity and will not affect each other hydrologically. For any future SIAS, this finding will be re-evaluated as part of the subproject-level ESIA.

76. **For JCV Dam-related investments (sub-component 2.2)**, a preliminary ESIA⁴⁸ was conducted. During **implementation**, a full ESIA study will be carried out to address all potential direct, indirect, induced and cumulative impacts, and site-specific RAPs will be developed, as needed, in parallel with the full feasibility and design studies to be contracted. The resulting construction-stage ESMP will be reflected in bidding documents. The Project will also fund (a) compensation programs for the loss of forest cover and livelihood impacts; (b) a broader watershed management and restoration program; and (c) a

⁴⁶ The Recipient disclosed E&S instruments by January 31st , 2020 prior to appraisal and relevant documents were redisclosed thereafter as needed: the ESIAs May 12, 2020; the RPF on Feb 2, 2020, the ESRS and SEP on March 24, 2020; ESCP on April 3, 2020 and ESMF on April 17, 2020; and IPPF on May 2, 2020 (<https://projects.worldbank.org/en/projects-operations/document-detail/P169901>).

⁴⁷ Idem

⁴⁸ Idem.



proactive mangrove conservation program to address any indirect impacts on the mangrove forest at the mouth of the Nacaome River which might result from induced agricultural expansion or intensification.

77. **For small-scale works under Component 1** (supply, installation, and commissioning of hydro-meteorological stations and data centers), impacts are expected to be minor, and limited to the construction phase. E&S screening and assessment will be carried out as part of the technical assessment and design study to be commissioned in year one of implementation. Required mitigation and management measures related to land acquisition, site access, easements and other construction impacts will be incorporated into bidding documents. Additionally, draft Labor Management Procedures have been completed; these will be updated in the initial phase of project implementation and be in place throughout the life of the Project in accordance with Environmental and Social Standard 2, Labor and Working Conditions.

78. **Given the sensitive water context in the Dry Corridor**, strong stakeholder analysis and engagement have been and will continue to be critical aspects of the Project, in order to mitigate risk of potential social conflicts and/or misperceptions about project impacts and benefits and solicit stakeholder feedback on the Project. The Project has been prepared with extensive stakeholder engagement, in accordance with Environmental and Social Standard 10, Stakeholder Engagement and Information Disclosure. The subproject selection and design process for the SIAS has taken existing social conflict issues into account to minimize risks and impacts wherever possible, including by selecting locations with strong local ownership and broad community support in areas that are not characterized by high levels of social tension around water or with high environmental sensitivity. The first four SIAS have all been subjected to multiple rounds of engagement with local stakeholders as part of the ESIA study. For JCV Dam works, the preliminary ESIA included targeted consultations with key stakeholders; more comprehensive and in-depth engagement will be a major component of the full ESIA during implementation. Consultations with five groups of stakeholders were also undertaken between September and October 2019 with key stakeholders at the national and regional levels, including representatives of relevant indigenous organizations. Participants were consulted on the scope, objectives and planned activities of the Project, as well as on potential benefits, opportunities, E&S risks, and related mitigation measures. To guide these processes, as well as future engagement and grievance management, a Stakeholder Engagement Plan (SEP) was developed and disclosed, including a description of project-level grievance redress mechanisms (GRMs), and will be implemented throughout the life of the Project.

79. **All required construction-phase mitigation, management and monitoring measures** identified in detailed ESIA studies will be reflected in bidding and contract documents. Contractors will be required to maintain Environmental, Social, Health and Safety (ESHS) officers who will ensure that all ESHS contract requirements are implemented, and lead training of workers. For the SIAS, each subproject will have a multidisciplinary supervision team on site to ensure compliance with E&S requirements. The JCV Dam works will similarly have a separate full-time multidisciplinary supervision team.

80. **INVEST-H has previous experience working on similar projects with multilateral lenders, including the World Bank** Rural Competitiveness Project in Honduras Project (COMRURAL), P101209; Corredor Seco Food Security Project, P143787; Honduras PPCR Phase 1 Grant, P157795. Nonetheless, its capacity to effectively manage E&S risks will require further strengthening, considering the complexity of E&S issues, the new areas covered under the ESF and the challenges of implementing simultaneous subprojects and projects. INVEST-H's PMU will include full-time environmental, health and safety (EHS) and social specialists, as well as labor, resettlement and gender specialists, who will oversee the quality of the E&S supervision by the firms, periodically visit works sites and handle grievance management



systems, and report to the Bank and relevant national authorities. INVEST-H will submit quarterly implementation reports to the Bank, including a dedicated section on compliance with E&S requirements set forth in an Environmental and Social Commitment Plan (ESCP) and specified in each of the E&S instruments prepared for this Project.

81. Project design has taken into consideration climate change considerations. A climate and disaster risk screening was conducted to determine the most relevant risks associated with the Project. The screening concluded that Honduras is moderately exposed to several geophysical hazards and is highly vulnerable to climate shocks, which could cause severe long-term damage to human and physical assets. Moreover, inadequate management of land, forests and water resources has contributed to increased flood and drought risks and aggravated the impact of climate variability over the last decades. Projects by the Intergovernmental Panel on Climate Change (IPCC) for southern Honduras suggest that by 2050, there could be a loss of almost 50 percent of the current ecological “climate envelope,” resulting in major ecological shifts that would put significant pressure on upland forest ecosystems, significantly degrading their ability to regulate runoff and recharge aquifers—a critical ecosystem service to the region.⁴⁹ To address these risks, the proposed Project will finance activities aimed at strengthening institutional capacity and developing tools to improve WRM. The Project will also take an integrated, ecosystem-based approach to water infrastructure investments and water governance, with a view to effectively managing the interconnectedness between upstream catchment land uses and downstream water availability. This approach will contribute to reducing the country’s vulnerability to droughts and floods. In addition, the carbon emissions assessment of the Project show that Project activities will have negative net contributions to carbon emissions. Improved watershed management planning under Sub-component 2.1 will help protect soil and vegetation, which sequester CO₂ and yield climate co-benefits from estimated net emissions of -40,330 tCO₂-eq through reforestation, increased water flows and reduced sedimentation, and sustainable landscape management and erosion prevention. Sub-component 2.2 is expected to yield net emissions of -216,973 tCO₂-eq due to expanded hydroelectric generation, downstream energy efficiency gains from pumping, and increased carbon sequestration from greater access to irrigation, including some switching to perennial crops.

82. Gender strategy. The Project’s gender strategy and action plan will aim at promoting the involvement of women at all phases and levels of project implementation. In addition, the Project Operational Manual (POM) will include a section outlining gender-sensitive approaches. The Project will address gender equity gaps in the target area by (a) enhancing livelihoods and improving economic opportunities for women, and (b) fostering women’s participation in decision-making in watershed management. These are measured by specific indicators in the results framework.

83. During Project preparation, a gender assessment was undertaken to identify equity gaps and constraints in three main areas: (a) work, (b) participation in water-related decision-making, and (c) social and cultural expectations. The assessment found that only 20 percent of members in community-based decision-making and management structures are female, and that women are rarely represented in leadership positions.⁵⁰ During implementation, a gender strategy will be prepared to ensure that the

⁴⁹ USAID. “Vulnerability and Resilience to Climate Change in Southern Honduras: African and Latin American Resilience to Climate Change (ARCC).”, 2013

⁵⁰ The preliminary “Gender Assessment for Water services in the Dry Corridor” undertaken by World Bank in 2020, revealed that when it comes to women in leadership positions for WUAs or any other local instance, the participation is so low that there is not a meaningful percentage. This situation was also confirmed during consultations and field visits carried out during Project preparation. Likewise, according to Kammerbauer, et al., 2009. “most of the positions currently held in WUAs correspond to vocals, followed by secretary”. There are multiple reasons reported by women, why they have not held a managerial position



specific needs, concerns, and aspirations of women who participate in the Project are addressed. Special attention will be given to promoting female voice, participation, and leadership in the water user associations established under the Project. To this end, the Project will finance stakeholder consultations and communications campaigns, aimed at publicizing the benefits of greater female participation in the water associations and at promoting water conservation and hygiene practices to prevent water borne and spreading of diseases.⁵¹ The Project will also finance training in managerial, organizational and financial skills to enable female farmers to take on leadership roles. To further ensure female leadership and participation, the Project will advocate (a) delinking the requirement of land ownership from membership in farmers' associations; (b) minimum quotas for female meeting attendance; and (c) minimum quotas for female participation in water/irrigation boards, both as members and in management positions. The Project will also foster adequate timing (e.g., when children are in school) and locations (safe spaces) of meetings to facilitate the participation of women. Workshops with women who hold leadership positions in other bodies will also be organized.

84. On the other hand, female labor participation is also highly unequal limiting economic and employment opportunities. A recent World Bank report⁵² reveals 46 percent of female force participation, compared to 85 percent for men, globally, tend to be underrepresented in the infrastructure sector (e.g. on average in a water utility, they make up less than 18 percent of the utility workforce). Although a high proportion of rural women are occupied in agriculture, most often are unpaid family workers which do not receive an economic reward for their activities. There are also significant gaps in land and assets ownership,⁵³ hampering women's access to financing, which is one of the major constraints for women economic opportunities and employment. Furthermore, women also face other challenges, as they tend to have less access to training, capital, inputs and markets for their goods.⁵⁴ Informal producer groups, which are providers of these inputs, are dominated by men and are not responsive to the needs of female community members. In addition, shortages in water add additional time to domestic workload, leaving less time to attend school for girls or better paid jobs for adult women. In order to address the limited economic and employment opportunities from a gender perspective, and besides the improvement of water supply services foreseen through the Project, construction and consulting firms will be required to hire women and train them in the necessary technical skills (e.g. water supply fitters, plumbers). Additionally, female beneficiaries of training on irrigation-related activities would likewise be provided with soft skills to better negotiate and commercialize agriculture products or initiate their own small-businesses to ensure that their incomes are increased from the Project.

85. Gender-based violence (GBV). Preliminary screening has determined that GBV risks for the Project are low. Screening of institutions in charge of GBV prevention and response around the Project's intervention sites will be undertaken during implementation. GBV risks are reflected in the ESMF and will be discussed with stakeholders in the context of the Stakeholder Engagement Plan. The Project will also require GBV training and consultations for both local communities and contractors, given the expected

such as: a) perception of not being summoned; b) not invited; c) not considered; d) a preference towards the appointment of men, among others.

⁵¹ Poor water quality is linked to water-borne diseases and women are more prone to contagion due to continuous contact with contaminated water during domestic chores. Such diseases are linked to lower educational attainment and losses in employment income.

⁵² Women in Water Utilities: Breaking Barriers (2019). World Bank.

⁵³ The FAO Gender and Land Rights Database shows that the percentage of women agricultural landowners in Honduras is around 14 percent, far from other countries in LAC. Nearly 80 percent of men reported that they owned agricultural assets compared to 42 percent of women.

⁵⁴ Women's empowerment in rural Honduras, Hanns R. Neumann Foundation (HRNS) and the University of Münster's, 2016.



labor influx in construction areas. Contracts to be signed with firms for civil works will include a code of conduct with specific mention of GBV. Contractors will be required to monitor compliance with the code of conduct and to organize gender training and harassment prevention workshops for their employees. In addition, the PMU will be trained on GBV risk identification and management.

86. **Citizen engagement (CE).** Strong stakeholder engagement has been a critical aspect of project preparation and will continue throughout project implementation, in order to mitigate the risk of social conflicts and misperceptions about project impacts and benefits, and to solicit stakeholder feedback on the Project. During preparation, focused consultations with key stakeholders were undertaken on project objectives, activities, potential risks and impacts, mitigation measures, stakeholder engagement and grievance redress mechanisms. Targeted consultations were also undertaken with stakeholders of each of the confirmed SIAS as well as with national and local indigenous organizations and indigenous community members. The results are documented in the SEP, IPPF and ESIA. The SEP identifies affected and other interested parties, disaggregated by project activities at the national, SIAS and JCV Dam level. It also identifies vulnerable groups that will require special measures to facilitate their participation in project implementation and consultations, such as female-headed households and uneducated individuals. The SEP includes a schedule of activities and a budget for stakeholder participation that will be included in the Project Operational Manual.

87. **As specified in the SEP, citizen engagement mechanisms will include:** (a) traditional consultation and feedback mechanisms, such as satisfaction surveys and focus group meetings; (b) participatory mechanisms, such as participatory planning; and (c) citizen-led mechanisms, such as community or user management committees. Community involvement through water basin committees, water supply boards and associations of irrigators, among other citizen platforms, are reflected in CE indicators in the results framework which provide the feedback loop by incorporating beneficiary input into the implementation of Project activities. INVEST-H will be responsible for the implementation, monitoring and reporting of CE activities under the Project, based on the SEP and other project environmental and social instruments.

V. GRIEVANCE REDRESS SERVICES

88. **Communities and individuals who believe that they are adversely affected by a World Bank-supported project** may submit complaints through existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project-affected communities and individuals may submit their complaint to the WB's Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VI. KEY RISKS

89. **The overall project risk is rated High.**



90. **Political and Governance risks are rated Substantial.** Political polarization may delay approval of the Project, as is common in internationally financed development projects, and political changes at both the federal and municipal levels may result in deviations away from Project objectives, thereby limiting achievement of the PDO. These risks will be mitigated by strong engagement with stakeholders on the Government's national development plans, allowing them to express their perspectives on public policies. Project preparation involved multiple consultations with key agencies and stakeholders, and these consultations will continue to ensure their ongoing buy-in and commitment. In particular, the Project design calls for: (a) ongoing high-level political dialogue on the importance of WRM in the Dry Corridor, between INVEST-H and the ministries and agencies responsible for WRM; (b) establishment of a management structure involving several actors, including water users in targeted areas; (c) training of all actors on participatory decision-making, GBV, and the technical aspects of the Project; and (d) implementation of robust communications campaigns by INVEST-H to disseminate information on project objectives and benefits.

91. **Macroeconomic and Fiscal risks rated are Substantial.** Externally, adverse weather conditions and lower international prices for key agriculture products (especially coffee) could create large agricultural losses and lower exports. Domestically, increasing political polarization in the country may pose a risk to macroeconomic stability by delaying water reforms, which are crucial to the sustainability of the country's economy, and energy sector reforms, which are needed to free up counterpart resources for the Project's infrastructure investments. The impacts of COVID-19 pandemic is also expected to weaken growth and external and fiscal accounts. To mitigate these risks, the Government aims to strengthen fiscal sustainability by: (a) increasing revenue mobilization through reform of the Tax Code; and (b) enhancing transparency and governance of the electric utility, with support from the precautionary International Monetary Fund (IMF) program. The country's large stock of foreign exchange reserves (20 percent of GDP) remains available to mitigate the impact of shocks such as the COVID-19 pandemic. The authorities are mitigating the impacts of the pandemic by enacting strong containment measures and implementing the first phase of the Economic Rescue Plan.

92. **Sector Strategies and Policies risk is rated Substantial.** Continued delays in implementing the 2009 Water Law could limit the Government's capacity to effectively plan, manage and protect water resources. The proposed Project has a strong focus on supporting information-based policy and strategic planning to promote effective water resources management, conservation and enhanced water storage practices. INVEST-H will provide TA to the Government to support ministerial endorsement of the by-law underlying the establishment of the National Water Authority (ADA), as called for in the 2009 Water Law. Operationalization of the ADA constitutes a priority action under the recently approved, Honduras DRM Development Policy Credit with a Catastrophe Deferred Drawdown Option CAT-DDO (P172567).⁵⁵

93. **Institutional Capacity for Implementation and Sustainability risk is rated Substantial.** The multisectoral nature of project activities will require strong leadership and technical capacity for planning and implementation. Although INVEST-H has experience in managing WB-financed projects, the Project requires effective inter-institutional coordination. To mitigate this risk, the Project will require Inter-institutional Agreements between INVEST-H and the main actors and beneficiaries, with clear delineation of roles and responsibilities. The Project will also promote the establishment of citizen engagement mechanisms; facilitate the involvement of experts in areas where there is limited experience in Honduras;

⁵⁵ Approved in March 2020.



and ensure the sustainability of interventions through the provision of O&M training for beneficiaries for two years beyond the life of the Project, among other measures.

94. **Fiduciary risk is rated Substantial.** While INVEST-H is a well-established entity that has considerable experience with externally financed projects, its current structure and workload, as well as the additional workload for this Project, may present a challenge. To mitigate this risk, additional experienced fiduciary staff will be located within the PMU to supplement existing staffing and ensure adequate implementation capacity and clear implementation agreements for all parties delineated in the POM.

95. **Environmental and Social risk is rated High.** The high degree of environmental risk is due to the scope of civil works envisioned under Component 2. To mitigate this risk, the procurement process will be structured to attract high-quality consulting firms to carry out the technical, environmental and social assessments for the water harvesting and storage systems and for the JCV Dam and its associated infrastructure. The high social risk is due to potential water user conflicts in the target areas. To manage potential social risks, the Recipient has prepared a Social Assessment (SA) and an ESMF satisfactory to the Bank. The ESMF includes a Stakeholder Engagement Plan, an Indigenous Peoples and Afro-Descendants Planning Framework (IPPF), a Resettlement Policy Framework (RPF), and guidelines for the development of labor management procedures and community health and safety plans. To manage water user conflicts, the designs for the SIAS envisage the separation of water for drinking purposes and for irrigation, as well as the incorporation of micro-measurement to verify the rational consumption and use of water. INVEST-H would also manage risks through the citizen engagement activities, with special emphasis on the participation of users in water basin, water supply and irrigation boards, as well as through the participation of municipalities and their Municipal Water Units.

96. **Stakeholder risk is rated Substantial.** There could be potential resistance from users to the monitoring and control of water (surface and groundwater) abstraction and discharges. Likewise, there could be problems related to land tenure in areas where the Project is planning to intervene. Water usage may be another potential source of social conflict if the water sharing measures are not properly implemented. Honduras has experienced challenges with water allocation and distribution among the local population, farmers and hydropower producers. To mitigate these risks, INVEST-H will provide training on adequate integrated WRM (IWRM) to beneficiaries. The Project will also address risks through the citizen engagement activities and a strong participatory process in the design of infrastructure, institutions, plans and tariffs (water tariffs, environmental fees, user fees). To ensure the long-term sustainability of SIAS investments to avoid future conflicts, the Project will provide a minimum of two years of TA to water users after construction, in particular related to O&M and the collection of user fees.

97. **Climate change risk is rated Substantial.** Honduras has substantial vulnerability to extreme climate events, as current overall adaptive capacity remains low. The Project design includes resilient and climate-smart practices and technologies to mitigate such vulnerabilities.

**VII. RESULTS FRAMEWORK AND MONITORING****Results Framework**

COUNTRY: Honduras

Water Security in the Dry Corridor of Honduras

Project Development Objectives(s)

To improve water service delivery and strengthen water governance in selected areas of the Dry Corridor of Honduras.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	Intermediate Targets					End Target
			1	2	3	4	5	
To improve water service delivery								
Beneficiaries with access to improved water supply, disaggregated by gender (number) (Number)		0.00	0.00	0.00	0.00	37,000.00	129,450.00	166,450.00
Beneficiaries with access to new/improved irrigation, disaggregated by gender (number) (Number)		0.00	0.00	0.00	0.00	650.00	650.00	650.00
To strengthen water governance								
Local organizations with enhanced capacity for using WRM principles for better monitoring/decisionmaking (number) (Number)		0.00	0.00	0.00	6.00	8.00	12.00	12.00



Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets					End Target
			1	2	3	4	5	
Component 1: Strengthening institutional capacity for water resources governance and management								
Water Resources Information System in Nacaome basin operational (Yes/No)		No	No	No	No	No	Yes	Yes
Area with watershed protection plans (Hectare(Ha))		0.00	0.00	0.00	0.00	9,150.00	9,150.00	9,150.00
Roadmap for implementing the National Water Authority approved (Yes/No)		No	No	No	No	Yes	Yes	Yes
Number of local organizations strengthened (Number)		0.00	0.00	0.00	0.00	6.00	7.00	13.00
Number of Rural Water Supply/ Irrigation Boards, Municipal Water and Sanitation Providers (Number)		0.00	0.00	0.00	0.00	2.00	3.00	5.00
Number of Municipalities (Number)		0.00	0.00	0.00	0.00	4.00	4.00	8.00
Nacaome Water Basin Board strengthened (Yes/No)		No	No	No	No	Yes	Yes	Yes
Water balance ready for Nacaome (Yes/No)		No	No	No	No	No	Yes	Yes



Indicator Name	PBC	Baseline	Intermediate Targets					End Target
			1	2	3	4	5	
Component 2: Scaling up resilient hydraulic infrastructure for water security in the Dry Corridor								
Increased water storage due to the SIAS (Cubic Meter(m3))		0.00	0.00	0.00	0.00	668,000.00	668,000.00	668,000.00
Increased water storage in JCV dam (Cubic Meter(m3))		29,000,000.00	0.00	0.00	0.00	0.00	43,000,000.00	43,000,000.00
Increased load factor (Text)		The average load factor is 16% per year; 73% in winter (Jun-Nov) and 7% in summer (Dec-May).	TBD	TBD	TBD	TBD	TBD	TBD
Improved water production capacity (Text)		117 l/s	117 l/s	117 l/s	117 l/s	117 l/s	310 l/s	310 l/s
JCV dam with dam safety assessments completed and monitoring instruments installed (Yes/No)		No	No	No	Yes	Yes	Yes	Yes
Number of people with access to improved sanitation services (Number)		0.00	0.00	0.00	0.00	0.00	7,000.00	7,000.00
Component 3: Project management and capacity building								
Number of staff trained in the PMU (Number)		0.00	0.00	0.00	6.00	6.00	6.00	6.00
Citizen engagement								
% Beneficiaries satisfied with the participatory process to prepare and implement the Project (disaggregated by vulnerable groups)		0.00	0.00	80.00	80.00	80.00	80.00	80.00



Indicator Name	PBC	Baseline	Intermediate Targets					End Target
			1	2	3	4	5	
(Percentage)								
% Beneficiaries that feels the Project reflected their needs (Percentage)	0.00	0.00	0.00	0.00	80.00	80.00	80.00	
Grievances and claims registered and addressed (GRM) (Yes/No)	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Gender								
% females members in community-based decisionmaking and management structures (Percentage)	20.00	20.00	20.00	25.00	30.00	35.00	35.00	
of which % in leadership roles (Percentage)	0.00	0.00	0.00	0.00	5.00	10.00	10.00	
% female participants in irrigation related activities who have improved sources of income (compared with men) (Percentage)	0.00	0.00	0.00	0.00	0.00	65.00	65.00	

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Beneficiaries with access to improved water supply, disaggregated by gender	This indicator measures how the project provides	Assessment after works	Reports provided by	Data will be collected by the PMU	M&E Project team



(number)	increased access to treated water (water supply purposes) in rural areas (SIAS in La Venta, Curaren and La Paz; and semi-urban areas (works in JCV that will benefit San Antonio, Pespire, Nacaome and San Lorenzo.)	completion (intermediat targets date) and end of Project	the contractor and supervision firm		
Beneficiaries with access to new/improved irrigation, disaggregated by gender (number)	This indicator measures how the project improves access to raw water for irrigation (SIAS in Curaren and Manazapa)	After completion of works in year 4 and at the end of the Project	Reports provided by the contractor and supervision firm	Data will be collected by the PMU	M&E Project team
Local organizations with enhanced capacity for using WRM principles for better monitoring/decisionmaking (number)	This indicator measures local water organizations supported by the Project (Water/Irrigation organizations; Municipalities and particularly their Water and Environmental Units; "UMAS"; Nacaome Drought Committee; unit of the Ministry of Environment managing the JCV dam; Nacaome Water Basin Board) and have enhanced capacity for using WRM principles for better	Annual	Consultancy firm providing the TA and local organizations	Progress report elaborated by the PMU, which will be responsible of collecting evidence of compliance. WB team will supervise and monitor the results.	M&E Project team



	monitoring/decisionmaking through the capacity building provided. It will be fully defined in the project operation manual.				
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Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Water Resources Information System in Nacaome basin operational	Water Resources Information System in Nacaome basin fully operational (including the databases, structure, platform), providing validated online data and information products to decision makers	After full implementation (expected in year 3) and end of the Project	MIAMBIENTE (DGRH)	Progress reports verified by WB team	M&E Project team
Area with watershed protection plans	This indicator reports on the hectares in targeted basins/micro-catchment covered by watershed management plan (with actions to enhance WRM; reforestation; sustainable landscape)	Annual starting year 2	Draft/Final watershed plans. Global Positioning System/Geographic Information System. Water resource information systems	Intermediate draft reports and final watershed plans elaborated by PMU and verified by the WB team	M&E Project team (PMU), ICF



Roadmap for implementing the National Water Authority approved	A roadmap for implementing the ADA prepared and approved, including the definition of governance structure, duties, responsibilities; policies, manuals, and systems; and estimation of staff, training and equipment needs.	Semi-annual	MIAMBIENTE and progress reports provided by the consultancy firm providing TA	Information verified by the PMU and WB team	M&E Project team (PMU) and MIAMBIENTE
Number of local organizations strengthened	Organizations are considered strengthened when one of the following criteria are met: through i. updating/improving the structure, functions and responsibilities; ii. capacity building such as training and workshops aiming at socializing the role of WRM and sharing lessons learned; and/or iii. supporting the development of participatory WRM plans	Bi-annual	Progress reports provided by the PMU	Reports and evidence verified by PMU and WB	M&E Project team (PMU)
Number of Rural Water Supply/ Irrigation Boards, Municipal Water and Sanitation Providers	Same as main indicator	Same as main indicator	Same as main indicator	Same as main indicator	Same as main indicator
Number of Municipalities	Same as main indicator	Same as main	Same as main	Same as main indicator	Same as main indicator



		indicator	indicator		
Nacaome Water Basin Board strengthened	Strengthening and operationalization of Water Basin Board by, inter alia, updating structure and definition of functions and responsibilities and defining different subcommittees to operationalize the Board.	Bi-annual	Progress reports and evidence of actions provided by the PMU	Information verified by PMU and World Bank staff field visits	M&E Project team (PMU), MIAMBIENTE
Water balance ready for Nacaome	Water balance will be considered ready once basic studies are elaborated (e.g. inter alia: inventory of existing water resources, such as natural regime, ground- and surface-water; assessment of water use and demands per sector; water balance estimation to assess resources availability and demands; evaluation of the water quality) using the information provided by the water resource information system on physical variables (precipitation, evapotranspiration, percolation, runoff, soil moisture) and will serve as key inputs for guiding the development of water	Annual	Water resource information system Report by consultancy firm	Verification by PMU and WB team	M&E system (PMU) and MIAMBIENTE (DGRH/Nacaome basin board)



	resource management plans for the selected basin				
Increased water storage due to the SIAS	This indicator measures the water storage capacity provided by the SIAS to help beneficiaries increase their access to water for human consumption or agricultural production purposes.	After works completion and Project end	Reports provided by contractor and supervision firm	Information verified by the PMU and World Bank team	M&E Project team
Increased water storage in JCV dam	This indicator measures the water storage capacity enhanced in JCV dam through the spillway (gates)	After the completion of works and Project end	PMU	Information verified by the PMU and World Bank team	M&E Project team
Increased load factor	This indicator measures the increase in the load factor of the hydropower plant. The factor is a measure of the output of a power plant compared to the maximum output it could produce.	After completion of works (gates) and Project end	INSEP	Information verified by the PMU and World Bank team	M&E Project team, INSEP
Improved water production capacity	This indicator measures how the production and distribution capacity (m ³ /sec) of the network systems is improved through the water treatment plant and distribution pipes installed	After completion of works and commissioning of the system	Monitoring system of PMU and/or independent consultancy	The PMU will prepare a report using and will be verified during monitoring visits carried out by Bank's staff or independent consultant	M&E Project team



JCV dam with dam safety assessments completed and monitoring instruments installed	Measures the updating of tools, norms and guidelines for monitoring JCV dam safety	Annual	Panel of Experts, MIAMBIENTE	Project progress report verified by the WB team	M&E Project team
Number of people with access to improved sanitation services	This indicator measures the way the Project improves access of beneficiaries to sanitation through the provision of sanitation units. Improved sanitation facilities are those designed to hygienically separate excreta from human contact, and are defined by the Joint Monitoring Programme website.	Assessment at midterm and Project end.	Report provided by contractor and supervision	Information verified by the PMU and World Bank team	M&E Project team
Number of staff trained in the PMU	Number of staff trained in WB procedures, such as, inter alia, environmental and social standards.	Annual	Invest-H	Assistance record verified by the WB team	M&E Project team
% Beneficiaries satisfied with the participatory process to prepare and implement the Project (disaggregated by vulnerable groups)	This indicator measures the level of satisfaction of the beneficiaries with the participatory process (consultations, communication campaigns, citizen committees, etc) supported by the Project to identify and reflect citizen's needs and enhance their voice in both, preparation and implementation phases	Baseline, mid-term review and ex-post survey	Survey. Records, aide memoires, of public consultations	The indicator will be assessed through a survey and a representative sample of beneficiaries; assessment to be carried out by a third party. The sample for this indicator will consider that at least 30 percent of beneficiaries are	M&E process will rely both on official statistical data and first-hand data collection at the local level on a random sample basis.



				female, 20 percent are young people, and 10 percent are indigenous people. Records verified by the WB team	
% Beneficiaries that feels the Project reflected their needs	Level of beneficiary satisfaction with project activities (satisfied with access, quality, facilities, etc) (SIAS and JCV)	Baseline, mid-term review and ex-post survey	Survey	The indicator will be assessed through a survey and a representative sample of beneficiaries; assessment to be carried out by a third party. The sample for this indicator will consider that at least 30 percent of beneficiaries are female, 20 percent are young people, and 10 percent are indigenous people.	M&E process will rely both on official statistical data and first-hand data collection at the local level on a random sample basis.
Grievances and claims registered and addressed (GRM)	Grievances and claims addressed and resolved within the agreed time frame	Annual (starting year 3)	Report showing grievances and claims received and how has been addressed	The PMU will report on grievances and claims and will be verified by the WB team during supervisory missions	M&E Project team



			and resolved		
% females members in community-based decisionmaking and management structures	This indicator measures the participation of women as members in the community based institutions benefited by the Project	Baseline, mid-term and ex-post survey	Records, aide memoires and minutes of meetings, showing partipation and membership	Records verified by the WB team	M&E Project team
of which % in leadership roles	Percentage in leadership/management/decisionmaking positions (President, Treasurer). Baseline has been estimated during consultations carried out during Project preparation, when institutions reported that, when it comes to women in leadership positions, the participation is so low that there is not a meaningful percentage. A more detailed baseline will be calculated once the Project starts.	Same as main indicator	Same as main indicator	Same as main indicator	Same as main indicator
% female participants in irrigation related activities who have improved sources of income (compared with men)	Female participants in irrigation related activities who report they have improved their sources of	Baseline survey once the workshops	Record of beneficiaries.	The indicator will be assessed through a survey.	M&E process will relyon official first-hand data collection from the



	income as a result of having used the acquired knowledge. Target has been calculated based on results in similar initiatives (e.g. Sahel Irrigation Initiative Support Project, P154482; Women in Agricultural Networks in Honduras, ZAMORANO and Penn State University).	start and at the end of Project (ex-post).			survey.
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**Annex 1: Implementation Arrangements and Support Plan**

Republic of Honduras

Water Security in the Dry Corridor of Honduras

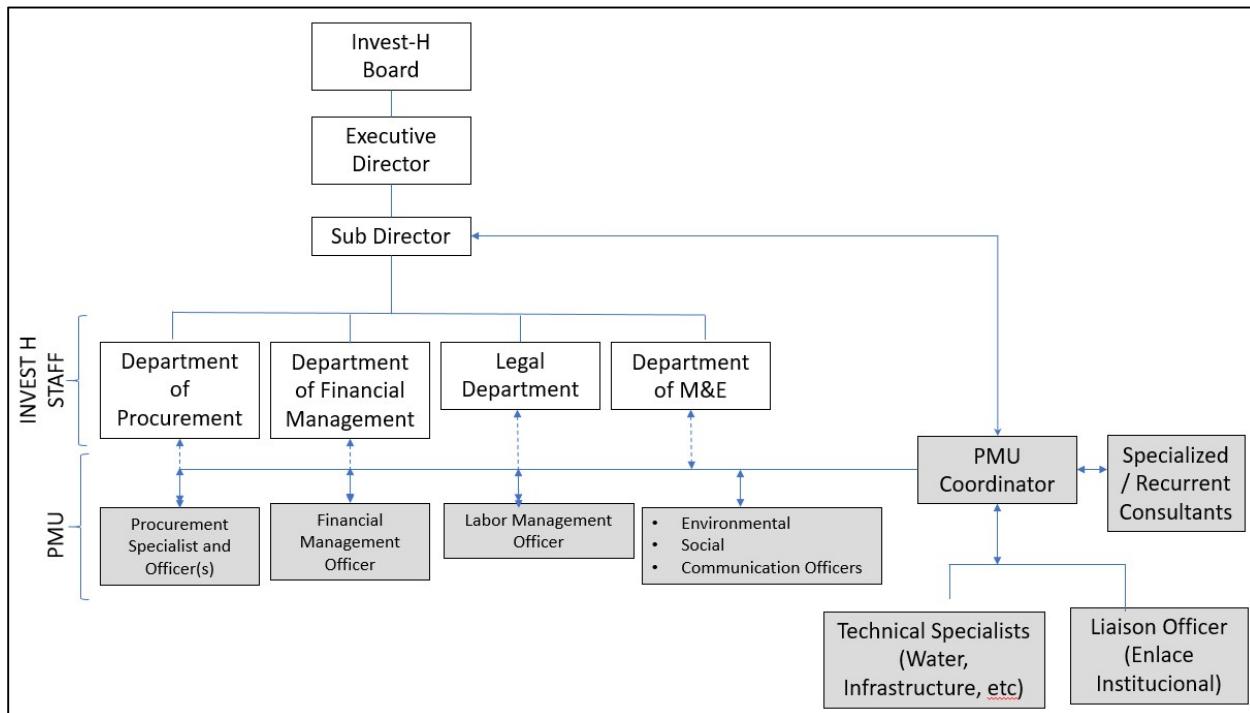
Project Management

1. **The Project will be implemented by INVEST-H, a government agency under the oversight of the General Government Coordination Ministry that supports implementation of strategic projects for the country's socioeconomic development.** INVEST-H will host the PMU and will coordinate with MIAMBIENTE, COPECO, ICF, INSEP, Ministry of Agriculture (SAG), environment units within the targeted municipalities, and local and basin-level water and irrigation organizations. Specifically, within MIAMBIENTE, INVEST-H will coordinate with the Directorate General for Water Resources (DGRH) and the Nacaome River Basin Board. The PMU will oversee all technical, administrative, and fiduciary aspects of the Project, as well as internal and external communications. It will ensure compliance with the World Bank's environmental and social standards and be responsible for M&E. The proposed institutional arrangements build on the successful experience with INVEST-H in implementing the Rural Competitiveness in Honduras (COMRURAL) Project (P101209), the Corredor Seco Food Security Project (P143787), and the Honduras Pilot Program for Climate Resilience (PPCR) Phase 1 Grant (P157795).
2. **INVEST-H was created by the Millennium Challenge Account Law (Ley de la Cuenta del Desafío del Milenio)** on September 21, 2005, as an entity under the Presidency to manage the US\$215 million Millennium Account Compact between the United States and Honduras. INVEST-H, as stipulated in the Law, consists of two entities: (a) a Board of Directors, and (b) a Management Unit. The Board of Directors is composed of the heads of three government entities (the Secretary of the Presidency, the Secretary of Finance – SEFIN, and the Secretary of Industry and Commerce) and two civil society representatives. The Board also has nine observers without voting rights, including representatives of SAG, the Road Infrastructure Ministry, the Social Investment Fund, the Environment Ministry and several civil society organizations.
3. **Project Management Unit.** Establishment of a Project Management Unit (PMU) hosted within INVEST-H is an effectiveness condition of the Project. The PMU will be headed by a Project Coordinator responsible for day-to-day management of the Project, including all fiduciary aspects and technical arrangements for project implementation. The Project Coordinator will ensure compliance with the WB's environmental and social standards, as well as with M&E arrangements. He or she will be required to submit semi-annual progress reports and quarterly environmental and social reports, as detailed in the POM to be adopted by project effectiveness.
4. **The PMU will be responsible for:** (a) preparing and obtaining approval of financial management arrangement for the Project; (b) coordinating and supervising project implementation; (c) submitting disbursement requests and documentation of expenditures to the Bank; (d) preparing and submitting unaudited interim financial reports (IFRs) to the Bank; (e) preparing and providing all financial documentation and project reports requested by external auditors and Bank staff; (f) preparing, updating and ensuring that all project executors follow the POM; and (g) ensuring proper coordination with SEFIN and other project stakeholders.
5. **In addition to the Project Coordinator, the PMU will comprise the following key staff,** who should be selected before effectiveness: a procurement specialist, a financial management specialist, an environmental specialist, a social specialist, and a communications and grievance management specialist. Administrative and support personnel will complete the PMU. In addition, the PMU will hire short-term consultants as needed to



provide technical expertise. Among others, the following profiles have been recommended to be in place within 30 days of effectiveness: (a) one procurement specialist and a procurement officer, (b) a labor and occupational health specialist, (c) a gender and social inclusion specialist, (d) a legal specialist, and (e) a resettlement of population specialist. Other technical staff may comprise: (a) a gender specialist, (b) M&E specialist, (c) institutional coordinator, and (d) an infrastructure specialist.

Figure 1.1 PMU Arrangements



6. **To ensure the long-term sustainability of project interventions**, several Inter-institutional Agreements will be signed between INVEST-H and the main stakeholders, to ensure their active participation and cooperation during implementation.

- For sub-component 1.1: INVEST-H, MIAMBIENTE (DGRH) and COPECO.
- For sub-component 1.2: INVEST-H and ICF at the local level (issuance of Legal Declarations of water source zones and watershed plans), as well as for the implementation of selected and prioritized actions of the agreed watershed plans.
- For sub-component 2.1: Agreements (one for each SIAS established) between INVEST-H and the municipality and the water/irrigation organization associated with each SIAS.
- For sub-component 2.2: Agreements between INVEST-H and MIAMBIENTE to ensure proper coordination of activities related to the JCV Dam. During implementation, INVEST-H will support a dialogue to conceptualize and promote the establishment of an agreement between MIAMBIENTE and downstream users that defines the mechanism(s) by which each user will contribute to financing O&M of the JCV Dam and protection of the catchment area.

7. **For sub-component 1.1**, a tripartite Inter-institutional Agreement will be signed between INVEST-H and two agencies: MIAMBIENTE and COPECO. The main actors within MIAMBIENTE will be the DGRH (at the national level, responsible for data collection) and the Nacaome Basin Council. Currently, COPECO is responsible for



collecting and processing the data to provide water information to the main users. Agreements and protocols for sharing information between MIAMBIENTE and COPECO will be put in place, particularly information regarding the target areas.

8. **For sub-component 1.2**, two Inter-institutional Agreements will be needed: one between INVEST-H and MIAMBIENTE and other between INVEST-H and ICF. The first, between INVEST-H and MIAMBIENTE, will apply to issues related to water governance at the national and basin levels (as in sub-component 1.1, actors will be the Nacaome Basin Council and the Lower Nacaome Drought Committee). The second, between INVEST-H and the ICF, will apply at the local level, in the areas targeted under sub-component 2.1. Specifically, INVEST-H will hire a consultancy firm to deliver the technical assistance, and ICF will be responsible for overseeing the issuance of Legal Declarations of water source zones, as well as for the elaboration of watershed management plans. The same type of agreement could be used for similar aspects at the basin level, if needed.

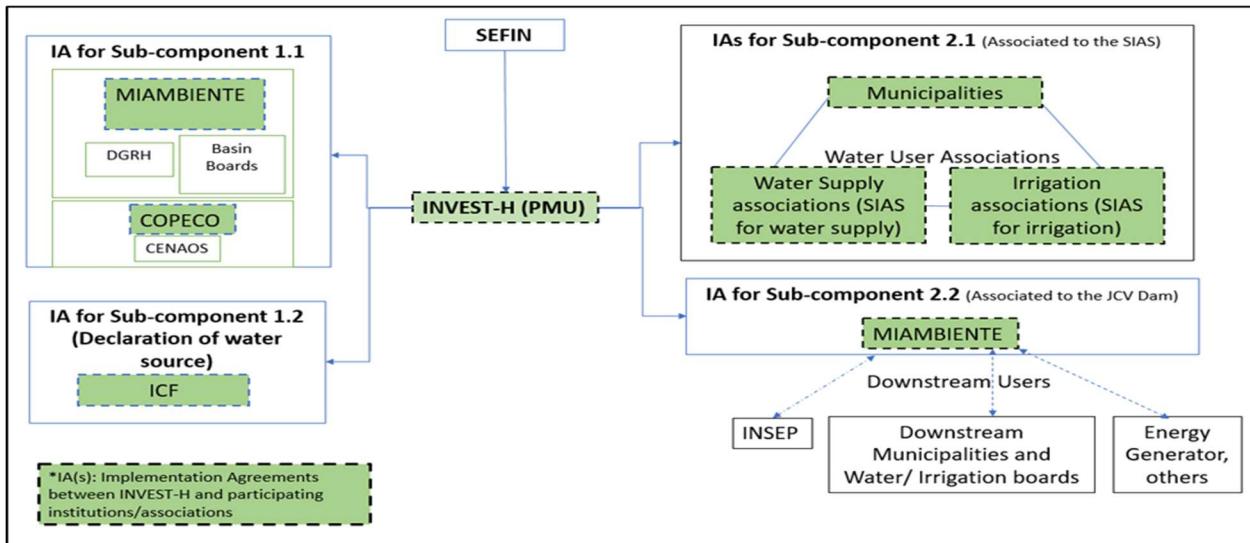
9. **For sub-component 2.1**, a tripartite Inter-institutional Agreement will be signed for each SIAS, between INVEST-H and each municipality and water or irrigation board. The abovementioned agreement between INVEST-H and ICF will be applicable during the implementation of some actions contained in the watershed management plans.

10. **For sub-component 2.2**, one Inter-institutional Agreement will be signed between INVEST-H and MIAMBIENTE to ensure proper coordination of the activities related to the JCV Dam during the lifetime of the Project. During implementation, INVEST-H will support the dialogue to conceptualize and promote the establishment of an agreement between MIAMBIENTE and the downstream users (INSEP, municipalities of San Lorenzo, Perspire, San Antonio de Flores and Nacaome) defining the mechanism(s) through which each user will contribute to sustainably financing O&M of the JCV Dam and the protection of the catchment area. The counterpart funding in the amount of US\$15 million will be used for infrastructure works related to the installation of the spillway gates and the dedicated CWTP.

11. **INVEST-H will prepare the Inter-institutional Agreements**, clearly detailing the roles and responsibilities of each stakeholder, and these will be drafted before the approval of the project by the Congress (Government of Honduras). The signing of these agreements has been established as a disbursement condition for their respective sub-components. The details will be specified in the POM.



Figure 1.2 Implementation Agreements



Financial Management

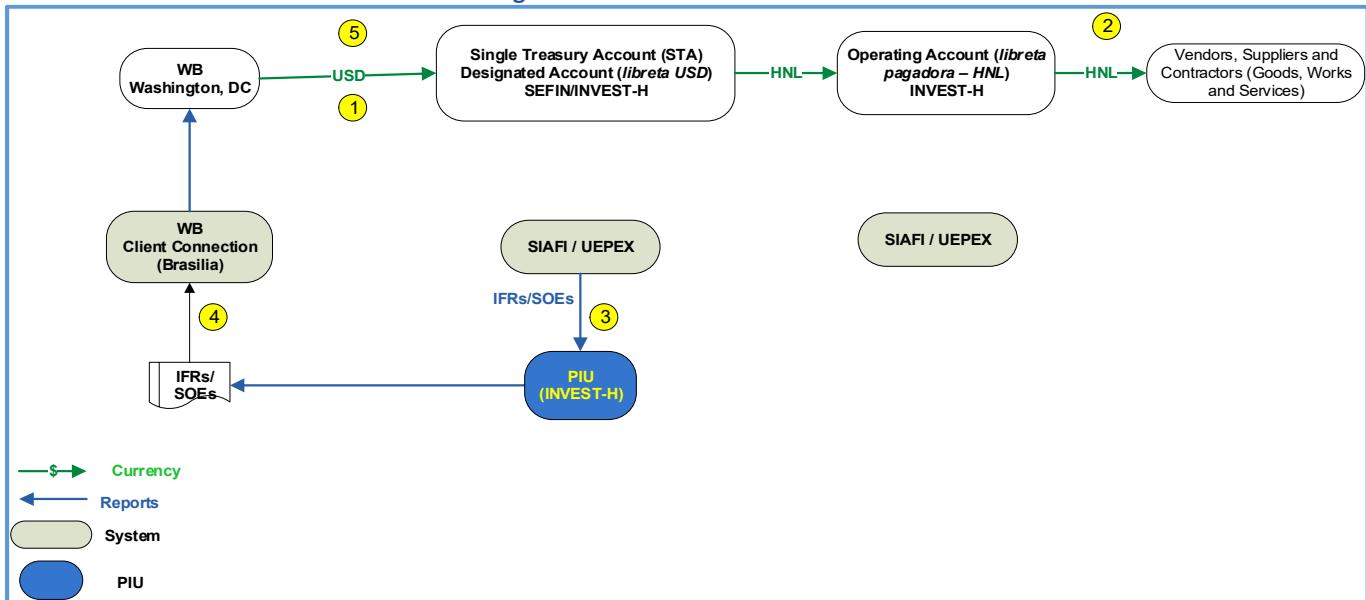
12. **Planning, Budgeting and Accounting.** The PMU will be responsible for preparing and monitoring the annual operating plan and the corresponding budget for the Project. The Project's budgeting and accounting transactions will be processed through SIAFI/UEPEX, the Government's official financial management information system (FMIS). The SIAFI/UEPEX accounting structure captures the Project information by component and sub-component. All payments will follow the official commitment, verification, and payment routine. INVEST-H will work closely with SEFIN to ensure information related to budget and fiduciary aspects of the Project is shared accordingly.

13. **Flow of Funds and Disbursement Arrangements.** The proposed funds flow and disbursement arrangements for the Project are streamlined to facilitate execution, avoid unnecessary incremental operational arrangements, and rely as much as possible on existing country public financial management (PFM) systems. All payments, for all components, will be made by INVEST-H using SIAFI/UEPEX, once payment obligations have been incurred, verified and properly documented. To make payments, the system requires that funds be committed by source, making possible the tracking of disbursements to project expenditures.

14. **The disbursement arrangements for the Project** will take into consideration the FM and procurement assessments of INVEST-H, the Project's flow of funds and cash flow needs, and the Recipient's experience with Bank operations. The disbursement of project funds will be processed in accordance with Bank procedures as stipulated in the Financing Agreement and Disbursement and Financial Information Letter. Withdrawal Applications and necessary supporting documentation will be submitted to the Bank electronically through the Client Connection website.



Figure 1.3 Flow of Funds



15. **The minimum application amounts for direct payments and reimbursements** are defined in the Disbursement and Financial Information Letter (DFIL). The Project will have a four-month grace period after the closing date to document expenditures incurred prior to the closing date.

16. **The following disbursement methods may be used to withdraw funds from the credit:** (a) reimbursement, (b) advance, and (c) direct payment, with the advance method being the primary disbursement method. Payments will be processed through SIAFI, interfaced with UEPEX. Funds will be disbursed to the Designated Account (*libreta*), within the Single Treasury Account (STA) in SIAFI and will then be transferred to the operating account (*libreta pagadora*) in Honduran Lempiras or U.S. dollars, as applicable, for payment to vendors.

17. **Financial Reporting.** INVEST-H, with the support of the financial coordinator in the PMU, will ensure the timely production of semi-annual interim unaudited financial monitoring reports (IFRs), to be submitted within 45 days after the end of each reporting period. These IFRs, prepared in the currency of the Project (USD), will be produced from financial information extracted from the SIAFI/UEPEX system and will consolidate financial data for all components. The format and content of the IFRs, on a cash accounting basis, will cover the following items:

- IFR 1-A: Statement of Sources and Uses of Funds, by project component and category, respectively (project-to-date, year-to-date and for the period).
- IFR 1-B: Statement of budget execution per sub-component (with expenditures classified by the major budgetary accounts).
- IFR 1-C: Designated Account Activity Statement.

18. **Requirements for financial reporting will be documented in the POM,** which will contain detailed procedures and guidelines for commitments, approvals, payments, disbursements and reporting. These procedures and guidelines were reviewed by the Bank during negotiations.



19. **External Auditing.** The external audit will be undertaken by a private external audit firm, to be selected following agreed Terms of Reference (TOR) acceptable to the Bank, and in accordance with International Standards on Auditing (ISAs) issued by the International Auditing and Assurance Standards Board (IAASB) of the International Federation of Accountants (IFAC), or in accordance with national auditing standards if the Bank determines that they do not significantly depart from international standards. The audited financial statements will also be prepared in accordance with accounting standards acceptable to the Bank. The auditors will be required to issue an opinion on the Project's IFRs and produce a Management Letter that identifies any internal control weaknesses, thereby contributing to the strengthening of the control environment.

20. **The auditor's report will be submitted to the Bank no later than six months after the end of each fiscal year.** The Bank will review the audit report and will periodically determine whether the audit recommendations are being satisfactorily implemented. The Bank also requires that the Recipient publicly disclose the audited financial statements in a manner acceptable to the Bank. Following the Bank's formal receipt of these statements from the Recipient, the Bank will also make them available to the public in accordance with the World Bank Policy on Access to Information.

21. **Terms of reference for the external audit** will include, but not be limited to: (a) fully reviewing the IFRs and use of the Designated Account; (b) reviewing the appropriate observance of the financial management arrangements included in the POM, the PAD, the Financing Agreement, as well as any other official Bank documentation; (c) reviewing the use of SIAFI/UEPEX and other FM monitoring systems; (d) ensuring that internal control arrangements are adequate; (e) observing agreed disbursement arrangements; and (f) ensuring that amounts disbursed were used for goods, works and services eligible under the agreed Emergency Preparedness Plans (EPPs) which are supported by the disbursement of credit proceeds.

22. **All supporting records used in the audit will be maintained at the PMU for at least** (a) two years after the closing date; or (b) one year after the Bank has received the audited financial statements covering the period during which the last withdrawal from the Credit Account was made, whichever is later.

23. **Financial Management Supervision.** FM supervision during implementation will include (a) review of the IFRs; (b) review of the auditor's reports and follow-up of issues raised by the auditor in the Management Letter, as appropriate; (c) follow-up on any financial reporting and disbursement issues; (d) responses to project team's questions; and (e) update of the FM risk and performance rating in the Implementation Status and Results (ISR) report.

24. **Reimbursement of INVEST-H for Operating Costs.** The Project will finance INVEST-H's share of indirect costs. Based on current indirect costs, salaries and operating costs, as projected until 2025, the estimated indirect cost rate is approximately 2.2 percent of total project costs. The rate will be reviewed every two years and, upon agreement with the Bank, the indirect cost contribution will be adjusted, if applicable. The Project will also finance INVEST-H for reasonable operating costs, defined as recurrent expenditures that would not have been incurred by INVEST-H in the absence of the Project. Operating costs may include insurance premiums, fuel, maintenance and repairs of vehicles and equipment, and per diems, among other items.

Procurement

25. **The Bank carried out a capacity assessment of INVEST-H to evaluate the adequacy of its procurement arrangements** in terms of staffing structure, procurement record system, internal controls and roles and responsibilities. and identified its specific needs for resources and strengthening actions. Key issues and risks include INVEST-H's capacity for (a) additional work as a result of the Project; (b) coordination between technical and procurement units; and (c) complex Inter-institutional arrangements. The corrective measures that have



been agreed to include: (a) hiring qualified staff for the PMU and the procurement unit; (b) setting appropriate rules and responsibilities for the technical and procurement units in the POM; and (c) establishing Inter-institutional Agreements that set forth the roles and responsibilities of ministries and agencies that play a key role in WRM and project activities.

26. **The procurement team of INVEST-H has experience with procurement processes** of other multilateral organizations/agencies (Inter-American Development Bank, Millennium Challenge Corporation-MCC and CABEI), and is currently implementing three WB projects. The procurement team and staff involved in Bank-financed projects participated in the Bank's regional procurement training held in March 2018. It has been agreed with the Recipient that, to properly carry out the required procurement functions for the Project, INVEST-H will hire two procurement specialists and a procurement officer. All procurement procedures, roles and responsibilities will be defined in the POM.

27. **Procurement will be carried out** in accordance with *World Bank Procurement Regulations for IPF Borrowers* (July 2016, revised November 2017 and August 2018) ("Procurement Regulations"). A Project Procurement Strategy for Development (PPSD) was prepared by INVEST-H, describing how procurements in this operation will support the PDOs and deliver value for money under a risk-based approach. The PPSD provides adequate supporting market analysis for the selection methods detailed in the Procurement Plan. The Mandatory Procurement Prior Review Thresholds of the Bank's Procurement Procedure will be observed.

28. **In accordance with paragraph 5.9 of the Procurement Regulations**, the WB's Systematic Tracking and Exchanges in Procurement (STEP) system will be used to prepare, clear, and update the Procurement Plan and conduct all procurement transactions for the Project (Table 1.1). The Procurement Plan was prepared by the Recipient in accordance with the results provided by the Project Procurement Strategy for Development (PPSD) and was agreed upon with the WB during negotiations. The summary of the PPSD includes the recommended procurement approach for higher risk/value contracts.

29. **The Procurement Plan includes:**

- **Civil works**, including the construction of structures adjacent to or part of the José Cecilio del Valle (JCV) Dam and the integrated water security systems (SIAS). Counterpart funding from INVEST-H will be used to complement the works contracts associated with the JCV Dam⁵⁶ to install the spillway gates and the dedicated CWTP.
- **Goods**, including hydrometeorological systems and software, irrigation and chlorination equipment and sanitation units, among other goods.
- **Consulting services**, which will focus on (a) strengthening water governance in targeted watersheds; (b) the provision of technical assistance to SIAS-level water user associations on WSS and irrigation; (c) strengthening O&M for the JCV Dam; and (d) the development of watershed management plans, among other services.

Table 1.1. Goods, Works and Services to Be Financed – Procurement Method

Description	Estimated cost (US\$)	Prior/Post review	Market approach	Procurement method
Goods				
Supply, installation, and	1,700,000.00	Prior	International	Request for bids

⁵⁶ The works associated to the JCV Dam will be financed partially by the counterpart's contribution to the project (US\$15 million).



commissioning of equipment for the automated hydroclimatic stations, piezometers, and water quality monitoring stations				
Works				
Supply and installation of the gates and other hardware for the José Cecilio del Valle Dam	12,000,000.00	Prior	International	Request for bids
Supply and installation of a Centralized treatment plant for potable water in the José Cecilio del Valle Dam	21,000,000.00	Prior	International	Request for bids
Consulting services				
TA for the strengthening of water and agri-food data management	800,000.00	Prior	International	Quality- and cost-based selection
Development and implementation of an Operations and Management System (SMAGE) and a Water and Agri-Food Safety Information System (SISHA)	1,500,000.00	Prior	International	Quality- and cost-based selection
TA to support the restructuring of the National Water Authority (ADA)	2,950,000.00	Prior	International	Quality- and cost-based selection
Supervision of the installation of Gates and other equipment at the José Cecilio del Valle Dam	2,000,000.00	Prior	International	Quality- and cost-based selection

30. Standard procurement documents shall be used for all contracts subject to international competitive procurement and for those contracts specified in the Procurement Plan tables in STEP. For bidding processes with a national market approach, bidding and request for quotations documents were agreed with the WB.

31. In addition to prior review supervision of procurement contracts, the WB will perform annual post-procurement review supervision missions and examine a minimum sample of 20 percent of all procurement contracts.

**Annex 2: Theory of Change****Republic of Honduras
Water Security in the Dry Corridor of Honduras**

1. **The proposed operation aims to increase water security in the Dry Corridor of Honduras** by strengthening water governance (outcome 2 of the PDO, supported by activities under Component 1 - C1) and improving water service delivery (outcome 1 of the PDO, supported by activities under Component 2 - C2).
2. **Improving water governance will hinge on two sets of activities in the Nacaome Basin as a pilot for activities** that could be scaled up elsewhere: (a) improving information and data on water resources; and (b) technical assistance (TA) and capacity-building initiatives for water governance institutions. The procurement of information systems and the development of user-friendly tools and hydro models will provide valuable information for decisionmakers that will aid in improved weather forecasting, drought and flood control, dam water releases, and water allocation rights for downstream users. These activities will also enable the establishment of water demand per sector and guide the preparation of IWRM strategies. The strengthening of water governance also relies on the provision of TA to establish adequate WRM structures at different levels, and on training to enhance the capacity for IWRM and integrate it into institutional planning and territorial development strategies.
3. **Water service delivery will be improved through two sets of activities:** (a) the design and construction of integrated and multipurpose water security systems for both water supply and irrigation; and (b) construction or upgrading of water infrastructure in the lower Nacaome River Basin (installation of dam gates; building of a CWTP and dedicated pipeline). These activities will help increase water storage, thus enhancing beneficiaries' access to improved water sources for water supply and irrigation and increasing the factor load of the hydropower plant near the JCV Dam. Other benefits include reduced saline intrusion, improved regulation of water flows, increase generation of clean energy and reduction of GHG emissions.
4. **By increasing water security year-round, the population living in the Dry Corridor (mostly dependent on agriculture) will avoid crop losses,** thus stabilizing and increasing yields, allowing diversification into more profitable crops, and stimulating value chains and ancillary services such as transport. Overall, this will lead to desirable long-term outcomes, such as improved livelihood and economic conditions, higher incomes, more employment opportunities, and reduced pressure to migrate. Additionally, the Project will have a positive impact on overall health, increased productivity and poverty reduction, as food security and a more diversified diet will contribute to better nutrition, and improved water quality will reduce the incidence of water-borne diseases.

5. The theory of change presented in Table 2.1 is based on the following assumptions:

- A1: GoH and authorities will put into effect the Water Law and the associated regulatory framework reforms
- A2: GoH will provide the support operationalize the ADA
- A3: PMU capacities will be strengthened to oversee the wide array of activities
- A4: Institutions will collaborate with Inter-Institutional Agreements in place to achieve inter-institutional coordination and better institutional arrangements will be put in place
- A5: GoH will adopt resilient and climate-smart practices and technologies



A6: Water resources data are available and water balances are ready to be used in plans and strategies

A7: Watershed management plans are implemented

A8: Communities will participate actively in project activities and decision-making

A9: Beneficiaries will adopt knowledge received through capacity-building activities

A10: Ownership of land is secured

A11: An Interinstitutional Agreement will be signed between INVEST-H and the project participants, providing clear guidelines

A12: Environmental services schemes will be established at the catchment level



Table 2.1. Detailed Results Chain

Component	Activities	Outputs	Intermediate outcomes	PDO/Outcomes	Long-term outcomes
C1: Strengthening institutional capacity for water governance and management					
1.1: Strengthening water resources information (WRI) in Nacaome Basin	<ul style="list-style-type: none"> Financing of equipment and TA for: <ul style="list-style-type: none"> Optimization Plan for the Modernization of Hydrological and Climate Services. Automated hydroclimatic data integration system and associated IT equipment A system to monitor water availability and support planning of water resources allocation Water demand analysis and assessments Staff & communities trained on IWRM 	<ul style="list-style-type: none"> Rehabilitated/ new stations installed and data feeding into the system O&M plan established WRI systems designed and developed^a Assessment ready to complement water balances Water use rights monitoring supported IWRM capacity of staff & increased 	<ul style="list-style-type: none"> WRI system in Nacaome Basin operational 	WRM enhancement in the Nacaome Basin and local level	<ul style="list-style-type: none"> Increased resilience to climate variability and change Enhanced capacity of government institutions to manage WR WRM Approach replicated throughout the Dry Corridor
1.2: Water governance and capacity building	<ul style="list-style-type: none"> Financing of TA for: <ul style="list-style-type: none"> Issuance of Legal declaration of water source Elaboration of watershed plans Capacity building and TA to municipalities and local organizations (water/irrigation organizations) Support for the establishment of a water basin board (Nacaome) Supporting and articulating new mechanisms for managing the multipurpose benefits of JCV (e.g. Dam Drought Sub Committee of the lower Nacaome Basin) Roadmap for ADA's operationalization 	<ul style="list-style-type: none"> Legal declaration of water source zones Watershed plans prepared Local organizations & municipalities strengthened with WRM plans prepared and approved^c Nacaome Basin boards established with water balance ready Committee for multipurpose issues supported^c Roadmap for operationalization of ADA prepared 	<ul style="list-style-type: none"> Area (ha) protected/ restored Local organizations and Municipalities strengthened Basin board established Commission established that rules on and resolves multipurpose issues^d ADA's roadmap approved 	Strengthened capacity for water governance	<ul style="list-style-type: none"> Avoided crops losses, stabilized and increased yield, intensification and crops diversification Improved access to markets, value chains boosted (ancillary industries)
C2: Scaling up resilient hydraulic infrastructure for water security in the Dry Corridor					
2.1: Promoting an integrated multipurpose micro-watershed management approach in the Dry Corridor	<ul style="list-style-type: none"> Financing of studies, designs, construction works and supervision for SIAS Catchment protection activities Provision of sanitation units and Communication campaigns on WASH TA for training on O&M and agriculture aspects <ul style="list-style-type: none"> Modules tailored to women on soft hard skills; info about land rights, financial options 	<ul style="list-style-type: none"> SIAS established Catchment protection plans and activities implemented Sanitation units in use Beneficiaries trained on O&M and agriculture aspects Females participants in irrigation related activities increase due to enhanced skills and better access to inputs/ credit/ land 	<ul style="list-style-type: none"> Catchment protected Increased water storage upstream Improved sanitation Female participants with improved decision-making and leadership roles 	Improved water service delivery	<ul style="list-style-type: none"> Improved livelihoods and incomes for farmers Reduced migration Lower rates of malnutrition and incidence of water-borne diseases



Component	Activities	Outputs	Intermediate outcomes	PDO/Outcomes	Long-term outcomes
	<ul style="list-style-type: none"> Promotion of female participation in WUAs <ul style="list-style-type: none"> Communication campaigns and sensitization Affirmative measures to increase women representation. E.g. delinking land ownership from membership; adequate timing, location. Workshops and mentorship with women leaders. 	<ul style="list-style-type: none"> Increased female members in community-based decision-making and management structures and in leadership roles 			
2.2: Maximizing multipurpose benefits of the JCV Dam in Nacaome	<ul style="list-style-type: none"> Financing of studies, designs, works and procurement of equipment for JCV / Nacaome Basin Hiring of experts for Dam Panel Solid advertisement and recruitment campaign targeting women, equal opportunity recruitment requirement for contractors and training 	<ul style="list-style-type: none"> Gates installed CWTP and pipeline built Dam safety action plan developed Increased targeting of female participation in JCV / Nacaome Basin related jobs 	<ul style="list-style-type: none"> Increased water storage downstream Increased energy generation Increased water production capacity Dams operating satisfactorily Increased women participation in activities associated to the Project Females with improved sources of income resulting from subcomponent activities 		
C3: Project management (PM) and capacity building	<ul style="list-style-type: none"> Financing of PMU to support implementation Training on Bank procedures Project's gender strategy designed 	<ul style="list-style-type: none"> Contracts executed with a gender-based approach Staff trained allowing equal participation 		<ul style="list-style-type: none"> Enhanced capacity for PM, E&S, M&E issues 	

Note: a. New data collected and applications developed (WRI tools/hydromodels) to translate data into information for decision makers: weather forecasts that respond to needs of end users (with a focus on small farmers), drought & flood control, dam releases, water allocation rights, etc.; water balances for establishing water demand per sector and guiding the preparation of WRM strategies (sub-component 1.2); water quality monitoring; Operations and Management System (SMAGE) for planning O&M and early detection of failures.

b. Capacity building provided will enhance capacity for using climatic data generated by the new systems, supporting the development, adoption, implementation and integration of IWRM plans and hydrology in territorial development strategies, etc.

c. The establishment of local water associations, basin boards and the Commission reflect support for the definition, approval and adoption of structure, roles, statutes, policies, etc.

d. The Commission will improve governance by addressing water conflicts; making decisions regarding dam water releases; monitoring water use rights and abstraction; determining water use and discharge fees, etc.

e. By increasing water security year-round, the population living in the Dry Corridor (mostly dependent on agriculture) will stabilize and increase yields (farmers will sustain production over the wet season and avoid production losses due to droughts), increase intensification (extend production into the dry season) and diversification into more profitable crops. Altogether will have indirect benefits, improving access to markets and competitiveness (farmers would have the opportunity to sell in regional markets) and stimulating value chains and ancillary services (agribusiness, transport, etc.). In addition, appropriate technical assistance on climate-smart water efficient farming practices as well as integrated pest management strategies, would contribute to both maximizing the value of the investment in promoting sustainable livelihoods, and minimizing the potential for water delivered through the Project to contribute to pollution of downstream waterways.

**Annex 3: Detailed Project Description****Republic of Honduras
Water Security in the Dry Corridor of Honduras****1. The Project is structured into four components.**

Project Cost by Component	Total (US\$ million)	Bank Financing (US\$ million)	Government Financing (US\$ million)
Component 1. Strengthening Institutional Capacity for Water Resources Governance and Management	6.0	6.0	0.0
Sub-component 1.1 Strengthening water resources information	3.0	3.0	0.0
Sub-component 1.2 Water governance and capacity building	3.0	3.0	0.0
Component 2: Scaling up, Revamping and Promoting Resilient Water Hydraulic Infrastructure for Water Security	70.0	55.0	15.0
Sub-component 2.1: Promoting an integrated and multipurpose micro-watershed management approach in the Dry Corridor	15.0	15.0	0.0
Sub-component 2.2: Maximizing benefits of the multipurpose José Cecilio del Valle Dam	55.0	40.0	15.0
Component 3. Project Management and Capacity Building	9.0	9.0	0.0
Component 4. Contingency Emergency Response Component	0.0	0.0	0.0
Total Costs	85.0	70.0	15.0

Component 1: Strengthening institutional capacity for water resources governance and management

6. The objectives of this component are (a) to strengthen the hydrometeorological network, water resources information system (WRIS), and capacity development targeting the Nacaome Basin; and (b) to develop basic instruments and tools necessary for transparent WRM and better water governance. Better governance and management of water resources will increase the amount and quality of water available and thus contribute to reducing water insecurity and risks in the Nacaome Basin as a pilot basin of the Dry Corridor. The aim is to create a platform that can be scaled up to other areas of the Dry Corridor as well as the whole country.

7. ***Sub-component 1.1: Strengthening water resources information systems in the Nacaome Basin.*** This sub-component will support WRM in the Nacaome Basin and ultimately build resilience by embedding the use of timely and reliable hydrometeorological information into water resources planning and management activities. To this end, this sub-component will finance the following activities for the targeted basin: (a) the development of an Optimization Plan for the Modernization of Hydrological and Climate Services and O&M Plan for the hydroclimatic network, including equipment and works investments to upgrade and expand the hydroclimatic network; (b) the development and implementation



of an automated hydroclimatic data integration system and associated Information Technology (IT) equipment, which will encompass specific platforms to facilitate real-time transmission, integration and accessibility of hydrological, weather and climate data, as well as digitalization of historic hydroclimatic records; (c) the development of a water resources demand analysis and groundwater assessment to complement the (physical) water balance supported by other donor partners; (d) the development of a system to monitor water availability will also integrate an updated database of water demand for different sectors (humans consumption, energy generation, agriculture, etc.), water authorizations and canon systems to inform monitoring and planning of water resources allocation; and (e) institutional strengthening to develop capacity on IWRM at the central (technical staff) and local community levels. These activities are described in more detail below:

- **Optimization Plan for the Modernization of Hydrological and Climate Services, O&M Plan and upgrade of the hydroclimatic network.** This activity envisages the development of an Optimization Plan for the modernization of hydrological and climate services (production and delivery of hydroclimatic information), primarily in the Nacaome Basin, based on identified user needs. The Project will also support the strengthening of in-situ data observation and monitoring of water resources; therefore, this activity will comprise a diagnosis of the current hydro-climatic, water quality and groundwater monitoring network, including a proposal for its upgrade and expansion. This activity will also include the development of an O&M Plan that encompasses manuals (procedures and protocols) and technical training to ensure standardized practices for the correct installation and use of hydroclimatic stations by DGRH and COPECO. The O&M Plan shall also include a road map to establish a dedicated O&M facility with the purpose of: (a) overseeing O&M activities in accordance with the manuals; and (b) facilitating the automated reporting of sensor/equipment failures to a control center for better and more strategic planning of O&M activities, as well as any necessary replacement of calibration equipment and tools to support O&M activities. This activity will also include equipment and works investments for the rehabilitation, acquisition and installation of hydroclimatic stations, in compliance with the O&M Plan and manuals. The physical investments for the new equipment and stations will entail minor civil works for which environmental and social standards⁵⁷ will be assessed and applied.
- **Automated hydroclimatic data integration system and associated IT equipment.** This activity includes the development of a platform within DGRH and COPECO to collect and facilitate the real-time transmission and (inter-agency) access of hydrological, weather and climate data and information, with specific modules tailored to the operation of each agency. The activity will also include the digitization of DGRH's historical hydroclimatic data records for the Nacaome Basin. An information system of this nature requires prior agreement to ensure the free and continuous exchange of hydroclimatic data among all relevant institutions that operate stations in the Dry Corridor, such as INSEP/National Electric Energy Company (ENEE), and the community hydromet networks established through regional development projects (i.e., USAID and the International Center for Tropical Agriculture-CIAT- for the Dry Corridor). This activity, therefore, will oversee the identification of key regional and local users and the implementation of decentralized nodes to collect their data. To formalize data exchange, the existing draft protocol for hydrometeorological data exchange between relevant agencies will be operationalized through the Inter-institutional

⁵⁷ The monitoring network will primarily target specific geographical areas in the Nacaome Basin and other micro basins where SIAS will be established under Component 2.



Agreement to be signed for under sub-component 1.1. Remote satellite sensory equipment and clusters of computers and servers to enhance the National Center for Atmospheric, Oceanographic, and Seismic Studies (CENAOS) and the DGRH's information and communication and technologies, as well as training and capacity building, will also be procured. The possible use of cloud-based services will also be evaluated, as it could present an opportunity to expand these services in the country.

- **Water resources demand and groundwater analysis to complement water balances.** Honduras has embarked on efforts to develop tools to support water resources planning in the country. The Agua de Honduras platform, developed by CIAT in coordination with MIAMBIENTE and financed by USAID and COSUDE, encompasses tools and applications to evaluate physical water balances and water resources use for irrigation, and access relevant information from other sectors. The platform also includes an interface that allows for crowdsourcing of data; users can upload local information that can be used for basic geo-spatial analytics. However, the platform contains water balance information only from selected basins in six departments of Honduras, leaving key areas of the Dry Corridor unattended. Water balance information includes data on physical variables (precipitation, evapotranspiration, percolation, runoff, soil moisture), which are key inputs for evaluating the supply of water resources. Only for selected cases does the platform include information on groundwater resources and water demands, necessary to effectively support water resources planning activities. As a complement to the Project, MIAMBIENTE will undertake the expansion of the Agua Honduras platform and the development of additional user-oriented applications of the platform, with COSUDE financing. This work will target the development of physical water balances for the 813 watersheds in Region 13 (as denominated in accordance with the country's official basin delineation), covering the Nacaome Basin and other key areas in the Dry Corridor. Envisaged IDA-funded activities under the Dry Corridor Project will gap-fill these efforts through the development of water demand and groundwater assessments to complement the physical water balances being commissioned for the Nacaome Basin. These efforts will provide a more comprehensive baseline from which the basin plans for this area (activities under sub-component 1.2) could be developed to support water resources planning and management activities. The water demand and groundwater assessment shall at least cover the characterization of water source uptakes, uses and demands, in close coordination with DGRH and in consultation with local actors, as well the digitalization and incorporation of the information into the water balance database and platform.
- **Digital system to monitor water availability and support planning of water resources allocation.** MIAMBIENTE, through DGRH, has the mandate to monitor, plan and issue water use permits. In the absence of a comprehensive data base and automated system, much of the recordkeeping is done manually. Activities under this component will target (a) updating of the water demand database, water authorizations and canon systems; and (b) the development of a digital platform for water demand for the Nacaome Basin. This platform, to be located in MIAMBIENTE/DGRH, will support and inform the application process, monitoring and planning of water resource allocations. It shall consider a flexible design and, to the extent possible, have open source systems so it can be scalable and expanded to cover other areas in the country.
- **Institutional strengthening.** Capacity development of the various actors is key to achieving the outcomes under this sub-component. Therefore, this activity will strengthen the technical and



institutional capacity of DGRH and CENAOS as leading national institutions in hydrology and meteorology, respectively, to improve the quality and delivery of information for water resources management in the Nacaome Basin. Institutional strengthening will include a training program on IWRM for technical staff and participating communities. From the WB's institutional analysis (2019) of COPECO-CENAOS, MIAMBIENTE-DGRH, and other related institutions in Honduras, it was concluded that the lack of sufficient well-trained staff is a strong constraint to achieving more accurate and timelier hydro-met services tailored to user needs. This activity will finance the organization and implementation of a training program for technical staff and participating communities with courses at different levels, oriented to operational hydrology, monitoring and planning of water resources, and water-related risks. The training program envisages various modalities, including collaboration with local universities with experience delivering short-term courses on IWRMs. A training of trainers program to build local capacity is also envisaged.

8. **Sub-component 1.2: Water governance and capacity building.** This sub-component will contribute to institutional strengthening and coordination of water management agencies. It will be implemented through TA, following a bottom-up approach to build on the experiences of INVEST-H at the micro-watershed level. Better governance and restoration of watersheds will protect against further environmental degradation (caused by erosion, sedimentation, salinization), optimize streamflow for various water uses, and promote local participation and decision-making in the management of resources. In addition, these actions will make the residents, farmers and communities of the targeted watersheds more resilient to climate-related droughts, floods and landslides, and help increase permanent land cover, which in turn will aid in soil protection, water retention, improved seasonal flows and higher Carbon Dioxide (CO₂) sequestration. This sub-component will support activities at the local/micro-watershed, sub-basin, basin and national levels:

- **At the municipal/micro-watershed level,** activities will include (a) the elaboration of watershed management and protection plans, water balances for targeted areas, and support for the issuance of Legal Declarations of water source zones; and (b) strengthening coordination among municipalities, water and irrigation organizations (*juntas de agua* and *juntas de riego*), water boards, and upstream stakeholders.⁵⁸ TA will be provided to the micro-watershed organizations to enable them to interact effectively with municipalities and cooperate with them in carrying out their environmental and socioeconomic responsibilities (water and sanitation, public health, sustainable development, environmental stewardship). Although the local water organizations are limited in scope (260 water boards in 20,000 rural settlements and 43 irrigation groups in 65 micro-

⁵⁸ The most common form of water organization in Honduras are water administration boards (*junta administradoras de agua*), which are present in an estimated 20,000 of the 30,000 rural settlements in the country. While it is not clear how many are functioning entities, their existence reflects the importance of water access to rural families. There are also relatively new local organizations known as irrigation groups (*grupo de regantes*). Although not recognized by the Water Law, increasing numbers of these groups are forming because of the need to promote irrigation, usually hillside irrigation for small farmers. In the context of the activities currently being undertaken by USAID under the Alliance for the Dry Corridor, these groups are important stakeholders in the protection of above-water intake structures (*obra tomas*). The Water Law also recognizes micro-watershed level water councils, although few of these have been formed in the Dry Corridor. Made up of representatives of water user organizations, farmers and local governments, the micro-watershed councils are the starting point for watershed management. Between 2017 and 2019, they were involved in the participatory elaboration of 65 micro-watershed plans, which bring together downstream and upstream users to promote micro-watershed management and protect upstream recharge areas. The plans have been approved or are undergoing approval by ICF.



watersheds), their important work of elaborating micro-watershed management plans, creating water source zones and protecting natural resources, is helping to restore degraded zones by increasing permanent landcover, promoting climate-smart land use practices, and protecting water quality in the micro-watersheds. TA will also be provided to the appropriate units in the municipalities (environmental, local development youth, women). The TA will focus on the areas of the intervention in Component 2 and build upon past successful experiences and existing capacities.

- **At the sub-basin level,** activities will focus on *mancomunidades* (groupings of municipalities based on common needs and objectives) as critical components of the watershed management strategy, especially given the decentralization of responsibilities envisaged in the Water Law. The Project will provide TA in support of several ongoing initiatives by different actors, including: (a) COSUDE, which is supporting the elaboration of the Nacaome, Choluteca, Sampile and Goascorán river basin plans, as well as a sub-basin level hydroclimate information system for the Goascorán River; (b) INVEST-H-USAID, which is building capacity by financing three experts (in institutions, water, and forestry) in seven *mancomunidades* of the upper parts of the San Juan River sub-basin (that is, the portion of the Lempa Basin located in Honduras), and investing in the installation of 27 basic climate stations, three remote transmission weather stations, and nine digital water level sensors; and (c) Trifinio, which jointly with OAS, GEF, UNEP and others, is also implementing an important watershed management component for the cross-border Lempa headwaters. The Bank's TA at this level will support the aspects of the COSUDE, INVEST-H-USAID, and Trifinio initiatives that focus on the lower part of the Nacaome Basin, including management of water resources related to *Jose Cecilio del Valle* Dam and implementation of the Drought Committee for the lower part of the basin. The TA will focus, in particular, on building the capacity of 77 *mancomunidades*, with the threefold objective of: (a) improving the planning and governance of land and water resources; (b) establishing and/or expanding hydroclimate information systems; and (c) drafting town-level (*cabeceras municipales*) and city-level water resources master plans to guide future water infrastructure investments.
- **At the basin level,** activities will focus on (a) strengthening the Nacaome Water Basin Board and Drought Committee of the lower Nacaome Basin, in collaboration with other partners; and (b) implementing key priority recommendations and activities envisaged in previous studies. In particular, the COSUDE project, Water Governance in Region 13, identified WRM limitations in the Fonseca Gulf basins of Nacaome, Sampile, Goascoarán and Choluteca, and provided a number of recommendations for investment as well as capacity building. It also recommended the creation of basin and sub-basin management plans and proposed the creation of basin and sub-basin water boards. This Project will support initiatives with the Nacaome Basin as a pilot basin in which to test integrated water resources management activities that could be replicated elsewhere in the country. The TA at this level will focus on (a) developing preliminary water balances and future scenarios that take into account the impact of land use, climate change, and water extraction to identify hot spots and recommend preventive actions; (b) drafting strategies to make micro-watershed, sub-watershed and basin-level water boards operational and sustainable; and (c) classifying sub-basins based on water supply stress level (considering demand versus supply) and pollution level (considering permanent land cover and climate change vulnerability).



- ***At the national level,*** this sub-component will develop a roadmap for the establishment of the National Water Authority (ADA), as provided in the National Water Law. The Law was approved in 2009 but its implementing regulations and institutional framework have yet to be adopted, due in part to the number of institutional actors involved and lack of clarity about their authority and responsibilities. The actors directly involved are the MIAMBIENTE, SAG, ICF, COPECO, ERSAPS (the National Water Supply and Sanitation Regulator) as well as the municipalities, which are undergoing a decentralization process in accordance with the 2003 Water Supply and Sanitation Law. The Project will provide TA to support the creation of a new national framework for water governance with transparent lines of institutional responsibility and inter-institutional collaboration, thereby allowing for clear regulations and norms to be developed. The TA will also identify and address barriers to establish the ADA.



9. The activities of this sub-component will build upon the results of activities currently being implemented by other donor agencies, as shown in Table 3.1.

Table 3.1: Overview of Activities Implemented by other Partners Complementing Sub-component 1.2

Objectives	Institution	Activities Being Implemented by Other Donor Agencies	Activities proposed under the WB Dry Corridor Project
Micro-watershed level <ul style="list-style-type: none"> • Reduce deforestation and restore degraded zones • Improve soil and crop management • Improve permanent land cover index by watershed • Improve water quantity and quality • Develop water stress index through water balances 	Municipalities Strengthen municipal water and environmental units as well as community water organizations (water boards and irrigation organizations).	INVEST-H (with USAID funding) <ul style="list-style-type: none"> • 65 simplified watershed management plans have been drafted, 12 approved and 65 are under implementation • 35 ongoing local processes to present documentation to ICF and MIAMBIENTE for declaring “Water Production Zones” • 27 micro-watersheds with basic climate station • 3 demonstrative micro-watersheds with hydroclimate instrumentation • 7 micro-watersheds with ecosystem services payment schemes • 35 municipalities being strengthened in water governance • 260 water boards and 43 irrigation organizations strengthened 	Similar process will be followed to declare the micro watersheds located upstream of the 4 SIAS (Curarén, La Venta, Manazapa and La Paz) as “Water Production Zones”.
Sub-basin level <ul style="list-style-type: none"> • Improve governance for maximizing benefit among users • Establish hydro-information systems at sub-basin/basin level 	Mancomunidades (e.g., San Juan River Sub basin, 955 km ²). Focused in the lower part of the Nacaome Basin.	INVEST-H (USAID funding) Used financial support for hiring three experts (institutional, water, and forestry) in seven 65 mancomunidades, as part of its governance program	The Project will finance the installation of Hydromet stations in the middle and upper catchment areas surrounding the JCV Dam and in the municipalities where the SIAS will operate. This will inform any existing and new hydro information systems which will generate data to improve water resource planning in these



Objectives	Institution	Activities Being Implemented by Other Donor Agencies	Activities proposed under the WB Dry Corridor Project
			areas.
<p>Basin level</p> <ul style="list-style-type: none"> Strategically develop the basin Manage the basin's flood risk Identify economic opportunities (department/region) 	<p>Water basin board Focused in the Nacaome Basin.</p>	<p>COSUDE (in the Choluteca, Sampile, Goascoarán and Nacaome Basins)</p> <ul style="list-style-type: none"> Conducted a diagnostic of the situation Elaborated strategic infrastructure plans Provided recommendations to strengthen the Nacaome Water Board to improve water governance 	<p>The Project took into consideration the results of the assessments prepared by COSUDE, which informed the design of component 1.2, particularly the strengthening of the Nacaome Water Board through the establishment of different subcommittees: a) the Water Discharge of the JCV Dam to regulate the demand for water from downstream users; b) the Dam Drought Sub Committee to establish an emergency response effort to address climate change; and c) and the establishment of a compensation mechanism from different users (municipalities, farmers, industry, generator) to ensure proper O&M of the dam, will be explored through the Project.</p>

Component 2: Scaling up resilient hydraulic infrastructure for water security in the Dry Corridor

- This component aims to implement prioritized infrastructure projects for resilient water management.
- Sub-component 2.1: Promoting an integrated and multipurpose micro-watershed management approach in the Dry Corridor.** This sub-component will finance consulting services, goods, and works necessary to improve water harvesting reservoirs and integrated watershed management. The lackluster results of past government-sponsored water harvesting projects, combined with the Bank's global experience, underscore the importance of adopting an integrated and multipurpose approach for successful micro-watershed management and water harvesting. Increasing the amount of water available year-round, will allow farmers to: (a) stabilize and increase yields, and avoid or minimize production losses due to drought; (b) intensify land use and extend production into the dry season; and (c) diversify production. The water reservoirs, meanwhile, could also be used for aquaculture. In the upper



catchments, project investments in reforestation as well as TA to promote sustainable management of the catchment areas will benefit the upstream communities. The Project is also expected to have a positive impact on overall health and well-being in the targeted rural areas, with improved food security and a more diversified diet contributing to better nutrition of the population at a critical age, in turn contributing to poverty reduction. In addition, communities that are suffering from water supply shortages during the dry season would benefit from year-round water availability. In addition, by increasing their productivity and production volumes, farmers will improve their competitiveness, which will allow them to be integrated into larger value chains. Pilot projects have shown that surplus production is sold in regional and even international markets, stimulating activities related to the agricultural value chain and ancillary services such as transport and farm inputs. Thus, the benefits will spill over to the rest of the local economy (in Honduras, the agriculture sector accounts for about 36 percent of total employment, and 61 percent for the bottom two quintiles).

12. Accordingly, the Project will adopt a micro-catchment approach to the planning and development of integrated water security systems (SIAS), and to improving watershed management. This sub-component will finance: (a) the development, construction and establishment of the SIAS; (b) the design and supervision of construction works (by an engineering consulting firm with experience and qualified staff); (c) TA to train project beneficiaries on O&M (including asset management and regular system maintenance) and agriculture aspects during at least two years after construction has been completed. For each SIAS, there will be one contract for construction works and one for supervision activities. The TA for training activities will be global and apply to all SIAS. The locations of the SIAS were selected by INVEST-H based on several criteria, including: (a) no permanent surface water sources throughout the year, and no accessible underground water sources; (b) level of poverty; (c) interest of local governments; (d) beneficiaries' participation; (e) land donated for the water reservoir; (f) dry season longer than six months over the last years; and (g) cost-benefits of the investments. Four sites already have their designs ready.

13. The integrated water security systems will include: *for all systems*, regardless of their purpose, water storage and protection of the upstream catchment area; *for rural water supply systems*, a CWTP and distribution and sanitation units (co-financed by the communities); *for irrigation systems*, a distribution system (co-financed by the communities), agriculture equipment, and a drip irrigation system⁵⁹; *for urban water supply systems*, the expansion and/or rehabilitation of bulk water systems. A total of four SIAS already have well-advanced designs—La Venta (rural water supply); Curarén (rural water supply and irrigation); La Paz (strengthening of urban water supply) and Manazapa (irrigation). The SIAS will (a) prevent agricultural production losses for roughly 650 poor people and increase their crop yields (Manazapa and Curarén SIAS); (b) improve access to reliable sources of water for approximately 7,000 rural inhabitants (La Venta and Curarén SIAS) and for 30,000 inhabitants of small urban areas (La Paz SIAS); as well as for (c) 129,450 inhabitants in the four municipalities downstream of the JCV Dam.

14. Overall, sub-component 2.1 will follow a community-based integrated watershed management approach aimed at: (a) improving water retention and storage (water harvesting), thereby increasing the targeted areas' resilience to droughts; (b) fostering climate change mitigation and resilience through reforestation and management of the vegetation cover (to reduce soil erosion and the risk of flash floods); (c) strengthening community-driven water governance institutions; and (d) improving livelihoods (as well as lowering water use for irrigation) through climate-smart agriculture and better value chain practices, while securing global environmental benefits (such as reduced sedimentation of waterways, improved

⁵⁹ Drip irrigation systems distribute water through a network of valves, pipes, tubing, and emitters.



interconnectedness and integrity of ecosystems, and higher rates of carbon storage). These water harvesting systems rely on gravity-fed infrastructure and therefore have zero greenhouse gas emissions; as their O&M costs are very low, their sustainability is ensured. In addition, training for the *juntas de agua* (rural water supply boards) in targeted areas will be provided to improve services and promote the adoption of the Rural Water and Sanitation Information System (SIASAR)⁶⁰ to monitor service coverage and quality in targeted rural areas. SIASAR data will inform decision-making at the local level and will also be shared with the national WSS regulator (ESRAPS).

15. Watershed management activities under this sub-component will also aim at the protection and sustainable use and management of available surface water, groundwater sources, and soil—for example, by developing and implementing catchment-area plans to reforest the critical zones of water recharge. To ensure the long-term sustainability of these measures, the Project will provide TA to build local capacity to manage catchment-level environmental protection mechanisms, in which downstream water user groups provide a financial incentive to upstream catchment landowners to maintain their lands' forest cover and water retention properties. These positive impacts will, in turn, make the residents of the targeted watersheds more resilient to climate change-related floods and landslides as well as improve water quality. Improved watershed management planning will help to better protect soil and vegetation, which sequester CO₂. This sub-component has estimated net emissions of -40,330 tCO₂-eq through reforestation, increased water flows and reduced sedimentation, and sustainable landscape management and erosion prevention.

16. As in each sub-component, implementation will be supported by a formal Inter-institutional Agreement, to be signed in this case by the project participants (each municipality and the *juntas de agua/riego* with INVEST-H), that establishes clear operational guidelines to minimize conflicts and ensure efficient operations.

17. The water catchment preservation and conservation plans used in this sub-component will be prepared under sub-component 1.2 (water governance and capacity building). As noted above, the plans will be prepared collaboratively, with community participation, to ensure their sustainability. Each community will receive the water harvesting reservoirs (water ponds, gravity-fed aqueducts) along with TA and training. Although the Project has a strong focus on increasing water for agricultural purposes, these water harvesting structures are also intended to serve as reliable providers of water for human consumption (thus, each water harvester may be used for water supply and/or irrigation purposes). The expected benefits of the Project are shown in Table 3.2.

Table 3.2: Expected Project Benefits

Overall Project benefits	<ul style="list-style-type: none">• Stabilized and increased yield (farmers will be able to sustain production over the wet season when rainfalls fail and avoiding production losses due to droughts)• Increased intensification (extend production into the dry season)• Increased diversification (explore more profitable cropping patterns)
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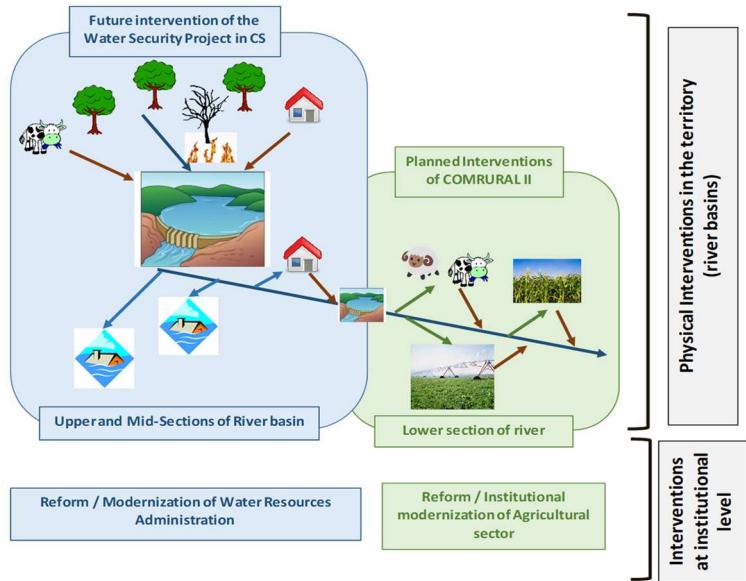
⁶⁰ SIASAR is a joint initiative launched by the governments of Honduras, Nicaragua and Panama, with the strategic purpose of having a basic, updated and comparable information tool on the rural water supply and sanitation services in place in a given country. Refer to website: <http://www.siasar.org/en>.



	<ul style="list-style-type: none">Indirect benefits: improved access to markets, competitiveness, value chains boosted (e.g. agribusiness and ancillary industries as transport)Increased food security and decreased incidence of malnutrition (diversification of diet) and water-borne diseasesIncreased farmers livelihood and economic conditions (employment, reduced migration, education, etc.)Improved agricultural practices and better inputs
Areas supported	Description
Increased water availability for water supply and irrigation	<ul style="list-style-type: none">Improvement of water retention and storage (water harvesting) with minimal environmental impact by diverting peak wet season flow rather than placing dams in riverbeds or catching rainy water.
Reforestation and land conservation	<ul style="list-style-type: none">Protection and restoration of the upstream catchment area through reforestation and natural resource management plans (soil, water, etc.), preventing pollution (coffee producers, fire, etc.), illegal extractions, etc.Reforestation of the upstream catchment by downstream beneficiaries ("Environment for Development"), which will help reduce soil erosion, flash floods, etc.
Resilience building	<ul style="list-style-type: none">Protection against flood and droughts
Community-driven water governance institutions and TA/ capacity building	<ul style="list-style-type: none">Training of municipalities/<i>mancomunidades</i> and beneficiaries on design, construction, and O&MTraining of "Water Associations," particularly women, to ensure sustainability and equity of operationsTraining on IWRM tailored to local contextStrengthening of farmer cooperatives and water associations
Local economy diversification	<ul style="list-style-type: none">Water ponds may also be used for tourism, recreation, and aquacultureBoosting of activities related to the value chain in the agriculture sector, such as the agribusiness industries or ancillary service providers (e.g., transportation, sellers of equipment, seeds, etc.).
Cross sector collaboration	<ul style="list-style-type: none">Coordination with COMRURAL-II on agribusiness aspects, seeking synergies in capacity building to strengthen climate-smart agricultureRural Water and Sanitation Information System: water allocation, weather forecasting, maximizing crop yields and optimizing crop planning

**18. Coordination with other WB initiatives.**

Under this sub-component, the Project will coordinate with other WB initiatives already under implementation in Honduras, most notably the Integrating Innovation for Rural Competitiveness Project in Honduras Project (COMRURAL II, P168385), which promotes interventions at the primary production level (farmer plots and farms), with the aim of adding value and improving access to markets. Depending on demand, COMRURAL II may also offer small investments in local water solutions. However, COMRURAL II will not work on watershed management (protection of water sources, reforestation); administration and planning of water resources (Water Law and regulations, development of information systems, granting of rights for different uses); quantitative (balance of use) and qualitative (pollution) water aspects; or larger hydraulic investments (multipurpose dams, medium or large irrigation systems, drinking water and sanitation systems). These are the activities to be covered by the Dry Corridor Project (Figure 3.1).

Figure 3.1. Relation between Dry Corridor Project and COMRURAL II**19. Leveraging additional resources to scale up water harvesting initiatives.** The Government of Honduras (INVEST-H), with support from other development partners (CABEI) is working to leverage additional resources for water harvesting through the Green Climate Fund's Climate Resilient Corridor Initiative (GCF-CRCI). A concept note is expected to be submitted to the GCF Committee for approval by the end of 2020.

20. Sub-component 2.2: Maximizing the benefits of the multipurpose JCV Dam. This sub-component will finance infrastructure modernization in the Nacaome Basin—the JCV Dam together with the water supply system downstream—to give the dam the multifunctionality for which it was designed. Investments will include: (a) the installation of gates on the JCV Dam spillway to increase storage, improve reservoir operation, and increase the factor load of the hydropower plant downstream⁶¹; (b) a central water treatment plant (CWTP) and dedicated pipeline to increase water quality and access⁶² for downstream users; (c) elaboration of dam safety procedures⁶³; and (d) TA to promote the establishment of an agreement between MIAMBIENTE and downstream users to ensure the O&M of the dam. Accordingly, this sub-component will finance *consultancy services* for: (a) feasibility studies, technical designs, and preparation of bidding documents for construction and supervision; (b) an Environmental

⁶¹ The installation of gates on the JVC Dam spillway is expected to raise the reservoir water level by 8 m, storage capacity from 29 to 43 million m³, and increase the factor load of the hydropower plant from 16 to 25 percent, on average.

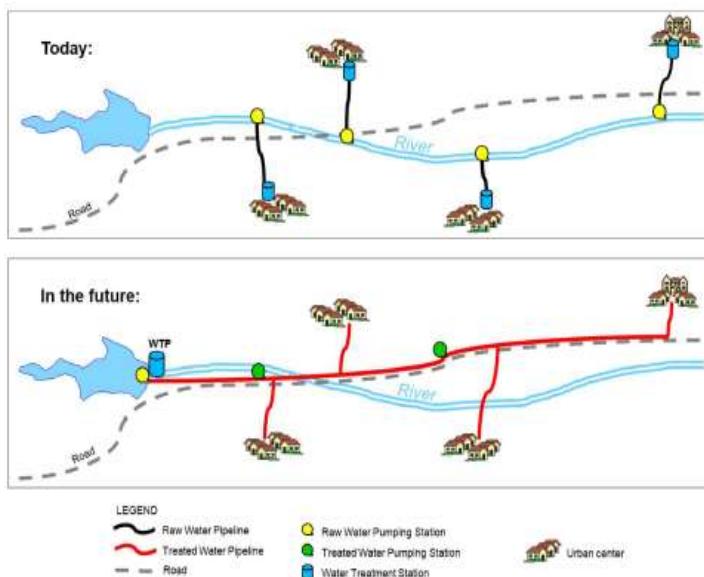
⁶² Access to water is anticipated to increase from 117 to 310 ltr/sec as a result of the new CWTP and dedicated pipeline.

⁶³ Improvements in the JCV Dam safety plan will include the preparation/completion of specific O&M manuals, a monitoring plan, a publicly approved emergency preparedness plan (EPP), and an emergency action plan (EAP) for high spillway discharge and dam break contingencies, to warn the population and implement partial or full evacuation, as necessary. The EPP will include a dam break analysis as well as the definition of security areas around the reservoir, the dam itself, and individual structures.



and Social Impact Assessment (ESIA); (c) a Resettlement Policy Framework (RPF) and Resettlement Action Plan (RAP); and (d) a panel of experts on dam safety issues (a hydrology and hydraulics specialist, a concrete dam specialist, and a hydromechanical equipment specialist) to review the studies and designs. In addition, this sub-component will finance *infrastructure works*, i.e., (a) the supply and installation of the spillway gates; and (b) construction of the water supply system. Finally, the sub-component will finance *implementation of associated environmental and social mitigation and management plans* as recommended by the ESIA study; these are expected to include a watershed management plan to support upstream landowners in restoration, reforestation and sustainable land use management practices. This sub-component is expected to have net emissions of -216,973 tCO₂-eq due to expanded hydroelectric generation, downstream energy efficiency gains from pumping, and increased carbon sequestration from greater access to irrigation, including some switching to perennial crops.

Figure 3.2. Current and Proposed Situation for Water Supply Abstractions



during low flows because of saline intrusion from seawater or because they are damaged/destroyed during high flows. Salinization of groundwater in the lower basin near the coastline is increasing because of overdrawing of groundwater and saline intrusion in the estuary. In addition, the Nacaome Basin has the highest land area at risk of flooding (49,550 ha) in the region, and one of the highest indexes of degradation of natural resources in the country.⁶⁴

21. Rationale for prioritizing interventions in the Nacaome Basin.

Water supply to the four municipalities downstream of the JCV Dam is currently suboptimal in that all four municipalities rely on capture of river water using temporary weirs or similar in-channel diversion structures, and all four municipalities discharge untreated sewage into the river, thereby degrading river water quality for downstream users (Figure 3.2). As a result, municipal water intakes are prone to operate poorly during low-flow periods and take in polluted water at other times. Particularly in the lower basin, ad hoc irrigation intakes (mostly using pumps or temporary weirs of substandard construction) are adversely affected

⁶⁴ A detailed feasibility study of the JCV rehabilitation works will be carried out during implementation to comprehensively assess the envisaged solutions and alternatives, in accordance with GIIP. This study will include, at a minimum, (a) updating the hydrological study for the JCV Dam, including reservoir sedimentation; (b) reviewing the JCV Dam's safety conditions (structural and hydraulic safety in both configurations—current and after rehabilitation), and preparing a feasibility study for remedial works required to ensure an acceptable level of safety, if necessary; (c) preparing/updating the JCV Dam's safety plans (instrumentation, O&M, emergency preparedness plan); (d) preparing a feasibility design of the flap gates; (e) preparing a feasibility study for the urban water supply system serving major municipalities (at least four), including a CWTP, a pipeline providing bulk water supply to the municipalities; and (f) the institutional arrangements necessary to ensure the long-term sustainability of the Project.



22. **The JCV Dam began operations in 1998 on the Nacaome River a short distance upstream of the community of San Antonio de Flores, in the Department of Choluteca.** The concrete dam is 54 m high, with a linear distance across the crest of 324 m. Maximum reservoir depth currently is 40 m, because gates were not installed on the spillway. Hence, the full supply level (FSL) should be 136 m as it was conceived and designed, but instead due to the lack of gates current elevation is 128 m, underperforming its potential.

23. **It is estimated that the JCV reservoir receives an average annual inflow of at least 500 million m³/year.** The urban supply demand of the 129,450 inhabitants to be served downstream is estimated at 10–15 million m³/year and the existent 2,000 ha of irrigated land is estimated to consume the same amount. This gives a total water use of 20–30 million m³/year, which is just a small fraction of the total natural yearly inflow. Therefore, even with its present storage capacity of 29 million m³, the JCV reservoir should be able to easily compensate for the water shortages in the annual dry periods. Nevertheless, both farmers and urban populations are experiencing water shortages because the existing water abstraction systems do not work efficiently; in fact, none of the four targeted municipalities (San Antonio de Flores, Pespire, Nacaome, and San Lorenzo) is capable of supplying more than 50 percent of the volume required to meet its urban needs.

24. **The operators of the four water supply systems in the area complain about:** (a) high turbidity of the abstracted water; (b) strong sediment entrainment during the wet season; and (c) insufficient river water depth during the dry season. The situation the water quality is worse, mainly because many of the wastewater treatment systems collapse or break down frequently, leading to untreated water being discharged into the riverbed of one city, only to be abstracted for potable water use by a city further downstream.

25. For these reasons, the Government of Honduras has asked the WB for financial assistance to help maximize the benefits of the JCV Dam, including support for infrastructure investments.

Figure 3.3. José Cecilio del Valle Dam

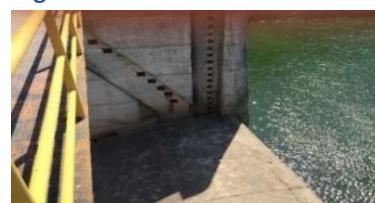


intakes located along the riverbanks.

27. **The present full supply level (FSL) of the reservoir is situated at an elevation of 128 m,** with a gross storage capacity of 29 million m³, significantly less than the capacity of 43 million m³ in the original design. To reach that storage volume, the FSL would need to be raised to 136 m by installing the missing 8 m flap gates in each of the eight 12.4 m wide spans of the dam spillway (Figure 3.4).

26. **Present situation of the JCV Dam.** The Nacaome catchment is one of the most significant catchments of the Honduran Dry Corridor, with a total surface area of 3,478 km². One large piece of infrastructure exists in this catchment, which commands water resources along the entire lower part of the basin. That infrastructure is the José Cecilio del Valle concrete gravity and rockfill dam (Figure 3.3), with a 30 MW powerhouse at its foot, dominating a catchment area of 1,050 km². This dam regulates part of the river flow and sends it modulated to the river reach downstream, to be abstracted at several

Figure 3.4. No Gates Installed



**Figure 3.5. Makeshift Water Diversion Weir****28. Urban water supply system for small towns.**

Downstream of the JCV Dam, there are four river water intake structures that are used for urban water supply to the municipalities of San Antonio de Flores, Pespire, Nacaome and San Lorenzo. Some of these intakes pump water straight from the riverbed, without using a diversion weir. This means that a given extraction volume from the river requires a much higher flow through the riverbed, to provide enough extraction depth. As a result, the flows regulated by the dam upstream are only partially used downstream and not very efficiently.⁶⁵

29. Even where there are small weirs in the riverbed supporting the intake, efficiency is hampered by the fact that these weirs are makeshift structures made of earth fill and sandbags (Figure 3.5), which are destroyed by floods and have to be rebuilt every year. In addition, no sediment exclusion devices are built into these weirs, so intakes are frequently clogged. Furthermore, many of the intake structures and their adjacent pumping stations are periodically submerged when significant river flooding occurs.

30. Irrigation system. The irrigation system downstream of the dam will be further studied during project implementation. The highest water use for irrigation seems to occur near the mouth of the Nacaome River, where a number of intakes for that purpose are located, including one belonging to the Nacaome Farmers Association and another belonging to a more sophisticated and well-organized agricultural company. One option to improve the efficiency and effectiveness of irrigation intakes would be the construction of a permanent weir, which would not only improve the abstraction efficiency but also prevent salinization of the river water during the high tide periods of the dry seasons. Small farmers would see significant benefits from a permanent weir. Alternative options will also be studied during implementation. No financing is included in the Project for any of these options.

31. Institutional considerations. The institutional aspects of the management of the water main will be finalized during the design phase. It is envisaged that: (a) MIAMBIENTE, as owner of the dam and responsible for raw water, will be responsible for O&M of the dam and reservoir; (b) the four municipalities, functioning as a consortium (*mancomunidad*), will be responsible for management of the CWTP and the treated water distribution system, and will be pay a fee (to be defined during implementation) to MIAMBIENTE for the treated water⁶⁶; and (c) INSEP, as owner of the hydroelectric plant, will continue to be responsible for the hydropower plant, and as a beneficiary of the increased load

⁶⁵ The prefeasibility study for the urban water supply system has considered the intake, a CWTP and adduction mains in the design. At present, demand for potable water in all seasons is higher than average production of existing CWTPs. The objectives of building a regional aqueduct with a CWTP nearby the JCV Dam are to: (a) use the waterhead pressure as much as possible to reduce energy costs associated with the production process and water distribution to various demand centers; (b) reduce chemical production costs and increase treatment safety, as water directly sourced from the dam is less turbid and less prone to be contaminated by untreated urban wastewater spillages; (c) take advantage of economies of scale in the production and distribution processes; and (d) avoid the severe operation problems that arise at the existent river intakes due to sediment entrainment and high floods levels. Further studies may be financed through the project on the tidal/irrigation weir at the mouth of the Nacaome River to assess the availability of water for irrigation in the Nacaome Delta.

⁶⁶ It is envisaged that the water boards of the four municipalities will set a mechanism in which each will contribute to financing the O&M of the system as well as activities to protect the catchment area.



factor, would pay an additional fee (to be defined) to MIAMBIENTE for the raw water.⁶⁷ All these institutional aspects, including the *mancomunidad* approach, and the extent to which MIAMBIENTE would be involved in water distribution to the four cities, will be explored during implementation, with a view to ensuring cost-recovery of the investments and long-term sustainability (O&M, financial, environmental) of the dam, the water system and the upstream catchment area.

Component 3: Project management and capacity building

32. **This component will finance project management activities, including:** (a) project coordination, operating costs of the PMU, consultancies; (b) monitoring, results evaluation, and impact assessment of project activities; and (c) project fiduciary administration, internal controls and audits. It will also finance capacity building activities related to: (a) project environmental and social risk/safeguards management; (b) stakeholder outreach and citizen engagement; (c) feasibility and environmental and social impact assessments of key interventions; and (d) training support for PMU staff. This component will also identify possible future projects at the level of prefeasibility, including corresponding environmental and social assessments, as agreed between the WB and the GoH during project implementation.

Gender-specific activities under each sub-component

33. **Sub-component 1.1: To address the lack of disaggregated information by gender,** which is a burden for designing interventions with a gender equity approach, assessments will incorporate the gender dimension with respect to access to and control of water resources. In addition, terms of reference for studies will include gender considerations to ensure that the climate and hydrometeorological information is properly disclosed and equally accessible to men and women.

34. **Sub-component 1.2: The Project will support and advocate for the inclusion of specific proposals for the inclusion of the gender equity approach in sectoral policies** (e.g. National Water Law); foster the creation of specific units (e.g. gender committee/subcommittees and/or focal points in targeted basin and sub-basins) and provide assistance in case of already existing institutions (e.g. Gender Committee and Gender Network within the Ministry of Environment); as well as TA to ADA, when established, to create a Gender Committee and elaborate a Gender Strategy for the interventions in the water sector.

35. **Sub-component 2.1: The training and capacity building will include specific modules for women** on soft (financial **literacy**, financial management, business management) and technical (water supply fitters, plumbers, fee collectors) skills. The TA will also support increased economic opportunities for women by providing training on land rights, improved crop inputs, and financing options for starting income-generation activities. In addition, contractors will be required to widely disseminate information on available jobs, have recruitment guidelines based on gender equality, provide training for women hired for technical jobs, and provide an appropriate working environment (e.g., separate toilets, working hours). The Project will help enhance women's voice in community-based organizations through workshops and communications campaigns, respectively aimed at publicizing the benefits of greater female participation

⁶⁷ INSEP has an O&M contract with Elecnor, energy generator company, until December 31, 2022. Elecnor produces energy and INSEP pays for the O&M costs. Elecnor, in turn, has a merchant-seller agreement with ENEE, for a maximum of 30 MW of electricity, also until December 31, 2022. The works to be financed by this Project do not imply any impediment to existing contracts and agreements because the maximum ceiling of 30 MW will not change before the end of the contracts. The installation of the gates, which will change the load and amount of hydropower generated, will not take place until the beginning of 2023, after the necessary technical studies have been carried out.



in the water associations and promoting water conservation and hygiene practices. To further ensure leadership and participation, the Project will advocate for: (a) delinking the requirement of land ownership from membership in water user organizations; (b) minimum female meeting attendance quotas; and (c) minimum quotas for female participation in scheme management, both as members and in management positions (president, treasurer). The Project will also foster adequate timing and locations of meetings and workspaces to encourage the participation of women and will seek to empower women to take an active part in decision-making through workshops with established women leaders.

36. Sub-component 2.2: Terms of reference for contracts and studies to be developed under the Project will include a gender approach. Contractors will be encouraged to hire women in technical positions and to establish decent work standards that include affirmative actions to ensure that working women have equal access to jobs and training and guarantee equal pay for work of equal value.

37. Component 3: INVEST-H will be responsible for the design and implementation of the Gender Strategy and Action Plan. To do so, INVEST-H will designate at least one full-time person in charge of the integration of gender considerations in all aspects of programming and will allocate specific budget for gender activities. The Project Operational Manual (POM) will include a "gender section" detailing the Gender Strategy and the gender-sensitive approaches. INVEST-H will ensure the inclusion of the gender approach in the terms of reference of service provision contracts, consultancies, works contracts, etc. As part of M&E, INVEST-H will set up specific tools and practices such as the collection of information and data disaggregated by gender and systematized.

Table 3.3: Indicative Gender Action Plan

Gender Gap	Factors Affecting Gap	Gender actions to address Gap ⁶⁸	Gender Indicators
Lack of interventions with a gender equity approach	Insufficient/ non-existing disaggregated information by gender	All components: Assessments to be carried out will incorporate this dimension	
Policies, legislation, normative, human resources (HR) rules are constraining employment in the water sector	Lack of specific proposals for the inclusion of gender approaches in sectoral policies	Through Subcomponent 1.2: Assistance to create gender strategies/policies and gender committees/subcommittees/ focal points	
Women's lack of voice in local level water and watershed decision-making	--Limited education --Gender stereotypes --Low self esteem --Lack of leadership & management skills --Land ownership requirements for membership in WUAs and Irrigation Assoc. --Male domination of local organizations and local	Through Subcomponent 2.1: --Promotion of female participation, voice, leadership in WUA, Irrigation and other organizations formed by project. --Communication campaigns and sensitization to promote female participation in WUA, etc. -Training for women on, <i>inter alia</i> , management, public speaking, finance, and leadership -- Foster: i. adequate timing, location and	% females members in community-based decision-making and management structures % of which % in leadership roles

⁶⁸ The actions need to be linked to project components and described briefly in the project component of the Project Appraisal Document (PAD) as well as in the Project Operational Manual.



	government --Limited time to do domestic and family farm burdens	friendly environment for ensuring participation; ii. Targets/ affirmative measures to increase women representation; iii. Delinking land ownership from membership. --Support activities that empower women to take active part in decision making (workshops with women leaders).	
Women's limited economic opportunities in agro sector/ rural areas Women are less employed in infra projects	Limited access to: --Information --Land/ property title --Credit --Inputs --Education and training --Gender role stereotypes --Heavy domestic workload and farming for household	Through Subcomponent 2.2: --Training in soft (negotiation, finance, marketing for the commercialization of agro-products and management of small enterprises) and technical skills (e.g. water supply fitters, plumbers, and fee collectors). --Information about job opportunities --Equal opportunity recruitment -- Gender friendly environment (e.g. separate toilets, working hours, etc.) --Reduce female water carrying burden by providing safe reliable water	% female participants in irrigation related activities who have improved sources of income (compared with men)

**Annex 4: Economic and Financial Analysis****Republic of Honduras
Water Security in the Dry Corridor of Honduras****World Bank value added**

1. The World Bank is well placed to provide value-added support to the GoH through its global experience with infrastructure projects in WRM, and its experience in applying and adapting evidence-based technical knowledge at scale, in support of infrastructure projects, to promote climate adaptation and mitigation. The proposed Project, based on a multifocal approach, will require close collaboration across various areas of the WB's Water, Agriculture and Food, Environment, Natural Resources and the Blue Economy global practices and Climate Change unit.

Methodology and parametric assumptions

2. The economic and financial analysis⁶⁹ includes an assessment of the Project's development impact, the rationale for public sector provision of financing, and the World Bank's value added. The economic analysis also addresses the fiscal and financial sustainability of the proposed investments. A standard cost benefit analysis (CBA) was carried out using 20-year projections of incremental costs and benefits for the Project's infrastructure investments (Component 2), which have quantifiable benefits and are amenable to CBA, at 2019 constant prices. The life of the infrastructure assets is assumed to be 50 years and the rate of discount 6 percent, as the Project deals with climate change issues. The exchange rate is 24.5 lempiras per US\$1.

Development impacts

3. The Project intends to mitigate the impact of prolonged spells of drought in the Dry Corridor (Box 1), and results in the following development impacts:

- (a) Increased water for irrigation stored in small reservoirs for farmers in the Dry Corridor, affected by droughts during the "Canícula" and dry seasons;
- (b) Increased access to potable water for people in rural areas and small towns of the Dry Corridor;
- (c) Increased storage capacity at JCV Dam, which will make possible (i) increased potable water for population centers downstream, including fast-growing Nacaome and San Lorenzo; (ii) increased agricultural production in cultivation areas in the Nacaome Delta including access to water for irrigation during "canículas"

Box 1: Risks of prolonged spells of drought in the Dry Corridor

The Dry Corridor rural populations are hit disproportionately by the effects of climate change; i.e., they confront the risk of extended (beyond two weeks) "Canícula" periods resulting in the loss of their first annual crops. They also confront the risk that the dry season begins prematurely resulting in a loss of their second crops; see figure below.



Similarly, in the southern part of the Dry Corridor, in the Nacaome Valley, farmers and urban residents have to confront yearly the same "Canícula" and premature beginning of the dry season risks.

⁶⁹ The economic and financial analysis follows the World Bank guidelines for economic analysis of investment project financing, and the guidelines on carbon accounting and the social value of carbon in project appraisal.



and dry season; and (c) increased energy production in the existing hydropower plant at the foot of the JCV Dam; and

- (d) A strengthened water resources information system, which will produce critical inputs for improved decision-making on the management of water resources.

Cost benefit analysis

4. Two options are considered in the CBA —a future scenario with project (WP) infrastructure investment interventions and a future scenario without project (WOP) interventions.

5. For the WP scenario, a summary of infrastructure investments is presented in Table 4.1. The total infrastructure investment cost is US\$76.49 million, of which US\$55 million will be financed by IDA and the difference financed by the Government of Honduras (INVEST-H), beneficiaries and municipalities. The breakdown of investments and financing for small reservoirs for irrigation solutions to benefit poor peasants in the Dry Corridor, water supply and sanitation solutions for rural and small towns in the Dry Corridor, and the installation of JCV Dam gates and water supply infrastructure for major urban centers, is provided in Table 4.1.

Table 4.2: Investment costs, expected funding and investment plan (US\$ million).

	Funding (US\$ m)			Investment implementation plan (US\$ m)					
	IDA	Local*	Total	Y1	Y2	Y3	Y4	Y5	Y6
2.1 Small reservoirs (Cosechadoras de Agua)	15.00	1.70	16.70	0.15	4.62	5.98	4.71	0.62	0.62
2.1.1 Irrigation solutions for peasants in the dry corridor	8.28	0.08	8.35	0.08	2.31	2.99	2.36	0.31	0.31
2.2.2 Water Supply & Sanitation solutions in the dry corridor	6.72	1.63	8.35	0.08	2.31	2.99	2.36	0.31	0.31
2.2 JCV Dam and Water Supply Infrastructure	40.00	19.79	59.79	0.06	1.79	16.69	24.15	14.69	2.41
2.2.1 Installation of gates in the JCV dam	16.90	0	16.90	0.02	0.51	4.72	6.82	4.15	0.68
2.2.2 Water supply, SA de Flores, Pespire, Nacaome and S. Lorenzo	23.10	19.79	42.89	0.04	1.28	11.97	17.32	10.54	1.73
Total	55.00	21.49	76.49	0.21	6.41	22.67	28.86	15.31	3.03

* Local funding includes Invest-H, Municipalities, and contribution from beneficiaries

6. In the WOP scenario, rural dwellers in the area of project interventions will be subjected to the risks of crop losses due to drought events and to drinking water scarcity. Similarly, farmers downstream of the JCV Dam will face the risk of water scarcity during periods of drought and dry seasons, without the possibility of improved access to drinking water, increased crop production and increased hydropower production.

Incremental costs

7. Incremental costs, the difference between WP and WOP investment and production/maintenance costs, have been estimated for each group of beneficiaries of infrastructure investments financed by the Project, indirect costs not included. The incremental costs during the five-year implementation period amounted to US\$77.71 million; thereafter, incremental cost was limited to O&M costs of water supply facilities and production costs of irrigation.

8. **Incremental cost for the irrigation solution for poor peasants in the Dry Corridor.** The WP scenario, based on feasibility studies, includes: (a) two water reservoirs with combined storage capacity of about 490,000 m³; and, (b) on-farm drip irrigation systems for 400 farmers. As a result of these investments, up to 400 additional parcels of land will have drip irrigation by year 5 of project implementation. As the drip irrigation systems are implemented, beneficiaries will improve their productivity and increase their production. In the WOP scenario, investments are assumed to be zero and the production costs are assumed to grow proportionally to the number of parcels under cultivation. Investment and production



costs for both scenarios are detailed in Table 4.2. and further details are available in the Economic and Financial Analysis (EFA) Appendix in project files.

Table 4.3: Incremental costs of irrigation solutions in the Dry Corridor (US\$ million).

	Y1	Y2	Y3	Y4	Y5	5 year
With Project						
Investment costs, reservoirs	0.22	1.77	2.29	1.80	0.24	6.32
Investment costs, Irrigation systems	0.07	0.54	0.70	0.55	0.07	1.93
Total investment costs	0.28	2.31	2.99	2.36	0.31	8.25
Production costs	0.00	0.04	0.06	0.24	0.72	1.07
Total investment and production costs with project	0.28	2.35	3.06	2.59	1.03	9.31
Without project						
Investment costs, reservoirs and irrigation systems	0.000	0.000	0.000	0.000	0.000	0.000
Production costs	0.002	0.002	0.002	0.008	0.024	0.039
Total investment and production costs without project	0.002	0.002	0.002	0.008	0.024	0.039
# of Parcels fed by irrigation systems	36	36	36	132	400	400
Incremental investment and production costs	0.28	2.35	3.05	2.59	1.01	9.28

9. Incremental costs, water supply and sanitation solutions in the Dry Corridor. The WP scenario includes: (a) three water reservoirs (at Curarén, La Venta and La Paz with storage capacity of 86,000, 155,000 and 236,686 m³, respectively); (b) water supply systems (at Curarén, La Venta and La Paz-Cane, with water treatment plants of capacities of 10 ltr/sec, 10 ltr/sec and 100 ltr/sec plus distribution system for 2,000, 5,000 and 50,000 beneficiaries, respectively); and (c) sanitation solutions (units) consisting of latrines, septic tanks, adequate management and handwashing and behavior change activities for 2,000 beneficiaries in Curarén and 5,000 in La Venta. As investments take place and as new water supply systems are put into operation, beneficiaries will improve their access to water supply and sanitation, and operation and maintenance costs of the services will go up gradually.

10. In the WOP scenario, investments are assumed to be zero and the production costs are assumed to be kept constant at US\$0.55 million per year. Investment and production costs for the WP and WOP scenarios, including the incremental costs, year by year, are presented in Table 4.3 and further details are available in the EFA Appendix in project files.

Table 4.4: Incremental costs of water supply and sanitation solutions in the Dry Corridor (US\$ million)

	Y1	Y2	Y3	Y4	Y5	Y6	6 year
With Project							
Investment cost, reservoirs	0.03	1.05	1.36	1.07	0.14	0.14	3.79
Investment cost, Water Supply Systems	0.03	0.98	1.27	1.00	0.13	0.13	3.54
Investment cost, Sanitation Solutions	0.01	0.28	0.36	0.29	0.04	0.04	1.02
Total investment costs	0.08	2.31	2.99	2.36	0.31	0.31	8.35
Operations and maintenance costs	0.42	0.44	0.45	0.60	0.60	0.60	3.10
Total investment and production costs with project	0.50	2.75	3.44	2.95	0.91	0.91	11.45
Without project							
Investment costs, reservoirs and irrigation systems	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operations and maintenance costs	0.55	0.55	0.55	0.55	0.55	0.55	3.27
Total investment and production costs without project	0.55	0.55	0.55	0.55	0.55	0.55	3.27
Incremental investment and production costs	-0.05	2.21	2.89	2.41	0.36	0.36	8.18

11. Incremental costs, JCV Dam and downstream infrastructure investments. The WP scenario includes: (a) installation of spillway gates in the JCV Dam, financed by IDA; (b) central water treatment plant (CWTP) and bulk water supply conveyance mains, financed by IDA, INVEST-H and downstream



municipalities and beneficiaries for the expansion of the reticulation networks in the various distribution centers in the San Antonio de Flores, Pespire, Nacaome and San Lorenzo municipalities; and (c) commercial farmers expansion of new lands (about 1,350 Ha) under commercial irrigation which is expected to be fully financed by commercial farmers.

Table 4.5: Incremental costs JCV Dam and downstream infrastructure investments (US\$ million)

	Y1	Y2	Y3	Y4	Y5	y6	6 year
With Project							
Investment cost, installation of flap gates into JCV dam	0.02	0.51	4.72	6.82	4.15	0.68	16.90
Investment cost, CWTP + transmission mains	0.04	1.28	11.97	17.32	10.54	1.73	42.89
Investment cost, service network Urb municipalities	0.43	0.43	0.43	0.43	0.43	0.43	2.57
Investment cost, new irrigated lands Nacaome delta	0.00	0.00	0.38	0.38	0.38	0.38	1.51
Total investment costs	0.49	2.22	17.50	24.95	15.50	3.22	63.87
Operations and maintenance costs	0.96	1.03	1.03	0.89	0.89	0.84	5.64
Total investment and production costs with project	1.45	3.24	18.52	25.84	16.39	4.06	69.51
Without project							
Investment costs, reservoirs and irrigation systems	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operations and maintenance costs	1.08	1.10	1.10	1.10	1.10	1.10	6.57
Total investment and production costs without project	1.08	1.10	1.10	1.10	1.10	1.10	6.57
Incremental investment and production costs	0.37	2.15	17.43	24.74	15.29	2.96	62.93

12. The spillway gate installed at the JCV Dam will raise its storage capacity from current 29 million m³ to about 43 million m³. In parallel, construction of the CWTP and mains will make it possible to improve availability of water for human consumption (~48,348 m³/day) and for irrigation. For these to happen, it is expected that municipalities will expand their service networks and commercial farmers in the Nacaome Delta will expand their cultivated areas. Improved service delivery will have an impact on O&M costs. Over the first six years, the O&M cost of water service provision in the WP scenario WP will go down slightly compared with the O&M costs under the scenario WOP, as a result of a mostly gravity-based system with minimum use of energy for pumping with lower energy costs over the life of the assets. Detailed costs for both scenarios are provided in Table 4.4, and full details, including the composition of water supply production costs, are detailed in the EFA Appendix available in the project files.

Incremental benefits

13. Incremental benefits at constant 2019 market prices—i.e., the difference between benefits in the WP and WOP scenarios—were estimated for each group of infrastructure investments. Altogether, the value of incremental benefits is estimated to go up from about US\$0.28 million by year 2 of project implementation up to US\$4.51 million by year 5; thereafter, they are estimated to grow at an annual average rate of 8 percent for 15 years after completion of project implementation.

14. **Incremental benefits from irrigation investments in the Dry Corridor.** As investments in small reservoirs take place, beneficiaries with access to water for irrigation will improve their productivity and increase their production. The value of such production is the benefits in the WP scenario. The benefits in the WOP scenario is the valuation of the beneficiaries' production assuming they did not have access to irrigation; they go up in direct proportion to number of farms in the project areas. The incremental benefits will grow gradually (incremental benefit for year 2020, in all calculations, is the present value of incremental benefits for the remaining life of the infrastructure assets). See Table 4.5.

**Table 4.6: Incremental benefits of investments in irrigation solutions, base case (US\$ million)**

	Y1	Y2	Y3	Y4	Y5	Y10	Y15	Y20
Benefits with project	0.013	0.060	0.124	0.452	1.251	1.294	1.130	16.779
Benefits without project	0.007	0.007	0.007	0.025	0.076	0.076	0.076	0.076
Incremental Benefits	0.006	0.046	0.102	0.371	1.020	1.057	1.059	14.505
Number of parcels with access to irrigation	0	36	36	132	400	400	400	400

15. Incremental benefits from investments in water supply and sanitation solutions in the Dry Corridor. As investments in small reservoirs for water supply in rural areas take place, rural dwellers in the project areas will get increased consumption of reliable water supply. The valuation of such increased consumption of water supply will be the benefits for the WP scenario; such valuation is done here using beneficiaries' "willingness to pay" for safe potable water produced by the Project, corrected by a factor equal to 0.8; i.e., at US\$0.35/m³ in Curarén, La Venta and La Paz. For the WOP case, Curarén and La Venta do not have water services, hence their benefits from water services for the WOP scenario is zero; however, the municipality of La Paz provides rationed water services to its population which has been valued at current tariff US\$0.1/m³. A summary projection of estimated incremental benefits is presented in Table 4.6.

Table 4.7: Incremental benefits of investments in water supply and sanitation (US\$ million)

	Y1	Y2	Y3	Y4	Y5	Y6	Y10	Y15	Y19	Y20
Benefits with project	0.00	0.03	0.10	0.90	0.91	0.92	0.97	1.04	1.09	12.91
Benefits without project	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	3.65
Incremental Benefits	-0.22	-0.19	-0.11	0.68	0.69	0.70	0.75	0.82	0.87	9.26

* benefits at year 20 are the present value of future benefits for remaining of infrastructure life at 10% discount rate

16. Incremental benefits from investments in JCV Dam and downstream infrastructure. Project investment to expand storage capacity at JCV Dam from 29 million m³ to 43 million m³ will make it possible to have benefits in three main areas (Table 4.7 presents details for the incremental benefits):

- **Benefits from the production of potable water at the CWTP.** For the WP scenario, the Project will make it possible to improve water supply services, eradicate rationing and reach 99 percent of the population (approximately 99,000 people). Valuation of benefits is based on "willingness to pay" corrected by a factor of 0.8. For the WOP scenario, it is assumed that the existing water treatment plants will continue to ration water services to about 60 percent of urban populations.
- **Benefits from water used by commercial agriculture production.** For the scenario WP, it is assumed that about 1,350 ha will gradually be put into production, in addition to 4,000 ha that are already under production over a 17-year period beginning at year 3 of project implementation. The valuation of benefits for the WP scenario is done using production and productivity assumptions that are detailed in the EFA Appendix available in the project files. For the WOP scenario, it is assumed that the production and high levels of productivity of the existing 4,000 ha of commercial agriculture will remain constant.⁷⁰
- **By-product benefits from increased energy production.** For the WP scenario, energy production will go up by about 17.5 GWh per year as a result of increased volumes of water dispatched from JCV Dam

⁷⁰ As benefit in the scenario WOP is constant over the 20-year projection period, and as it forms part of the benefits of the scenario WP, it will cancel out when the difference between WP – WOP is performed.



and an 8 meters higher average head.⁷¹ The increased energy produced is valued at US\$0.07/kWh, which is the current price paid by ENEE to INSEP.⁷² Increase in production is assumed to take place beginning in year 4 of project implementation. For the WOP scenario, benefits are assumed to be zero.

Table 4.8: Incremental benefits of investments in JCV Dam and Downstream infrastructure (US\$ million)

	Y1	Y2	Y3	Y4	Y5	Y6	Y10	Y15	Y19	Y20
Benefits with project										
Benefits1 - From improved water supply	3.96	4.25	4.55	4.84	5.13	5.42	6.59	8.06	9.23	91.81
Benefits2 - From new irrigated lands	0.00	0.00	0.00	0.39	0.39	0.79	2.41	4.53	6.30	65.08
Benefits3 - From increased energy production	0.00	0.00	0.00	1.23	1.23	1.23	1.23	1.23	1.23	11.81
Total benefits with project	3.96	4.25	4.55	6.46	6.75	7.44	10.23	13.81	16.75	168.71
Benefits without project	3.75	3.84	3.92	4.01	4.10	4.20	4.59	5.14	5.63	57.56
Incremental benefits	0.21	0.42	0.62	2.44	2.65	3.24	5.64	8.67	11.12	111.15
Memo: Population w/access to water supply WP	72,344	77,688	83,032	88,376	93,719	99,063	120,439	147,158	168,534	173,878
Access rate WP	62%	65%	68%	71%	74%	76%	85%	93%	98%	99%
Population w/access to water supply WOP	68,518	70,070	71,660	73,286	74,950	76,653	83,872	93,885	102,772	105,125
Access rate WOP	59%	59%	59%	59%	59%	59%	59%	60%	60%	60%

Summary of incremental net costs/benefits

17. The summary of net incremental financial costs/benefits are presented in Table 4.8, which show incremental benefits, incremental costs and the net incremental cost/benefit. The financial Internal Rate of Return (IRR) and Net Present Value (NPV), at 6 percent discount rate, indicators are estimated using the net incremental cost/benefits flows at the bottom of the table.

Table 4.9: Summary of financial incremental benefits and costs (US\$ million)

	Y1	Y2	Y3	Y4	Y5	Y10	Y15	Y19	Y20
Total project ncremental benefits	0.00	0.28	0.62	3.55	4.51	7.61	10.70	13.35	137.11
Total project incremental cost	0.72	6.77	23.44	29.94	16.84	1.54	3.47	1.54	-45.77
Net incremental cost/benefit	-0.72	-6.49	-22.82	-26.39	-12.34	6.07	7.24	11.81	182.88

18. Similarly, Table 4.9 presents the summary of economic net incremental costs and benefits prepared using 2019 economic prices. The Economic IRR and NPV (at 6 percent discount rate) indicators are estimated using the summary net incremental cost/benefits flows at the bottom of the table.

Table 4.10: Summary of economic incremental benefits and costs (US\$ million)

	Y1	Y2	Y3	Y4	Y5	Y10	Y15	Y19	Y20
Total project ncremental benefits	0.00	0.28	0.61	4.85	5.72	9.12	12.54	15.44	157.70
Total project incremental cost	0.72	6.76	23.43	29.90	16.73	1.42	3.36	1.42	-45.88
Net incremental cost/benefit	-0.72	-6.48	-22.82	-25.05	-11.02	7.69	9.19	14.02	203.57

⁷¹ Honduras' energy mix includes 38 percent fossil fuels and coal, 26 percent hydropower, 18 percent solar, 9 percent wind power, and 8 percent biomass. Source: *Boletín de Datos Estadísticos, Gerencia de Planificación*, ENEE, Dec, 2018.

⁷² ENEE (Honduras National Electricity Company); INSEP (Ministry of Infrastructure and Public Services) owner of the Hydroelectric Plant at the foot of JCV Dam. The price of US\$0.07/kWh, set in a seller-merchant contract between ENEE and INSEP, is taken as a market price. The economic price used for the economic evaluation is US\$0.14/kWh; this price is the average price charged to ENEE by producers of fossil fuels.



Climate change considerations and carbon emissions

19. The carbon emissions assessment of the Water Security in the Dry Corridor of Honduras Project has concluded that the project activities will have negative net contributions to carbon emissions of -12,446 CO₂ tons equivalent per year; i.e., sub-component 2.1 (Small reservoirs) and sub-component 2.2 (JCV infrastructure improvements) will contribute to the reduction of global carbon emissions, as outlined in Table 4.10.

Table 4.11: Project emission reductions (CO₂ Tn equivalent)

	Y1	Y2	Y3	Y4	Y5	Y6	Y10	Y15	Y19	Y20
Small reservoirs	0	0	0	-2,017	-2,017	-2,017	-2,017	-2,017	-2,017	-7,508
JCV infrastructure investments	0	0	0	-10,429	-10,429	-10,429	-10,429	-10,429	-10,429	-38,831
Total project	0	0	0	-12,446	-12,446	-12,446	-12,446	-12,446	-12,446	-46,339

20. The monetary valuation of these emissions, using the shadow price of carbon (SPC) lower bound (SPC-L) and higher bound (SPC-H) is provided in Table 4.11, and full series for the 20-year period of the appraisal can be found in the EFA Appendix available in the project files.

Table 4.12: Lower bound and higher bound of the SPC and range valuation of project emissions

	Y1	Y2	Y3	Y4	Y5	Y6	Y10	Y15	Y19	Y20
Low shadow price of carbon (in USD/tCO ₂ e)	40.00	40.90	41.83	42.77	43.73	44.72	48.90	54.67	59.77	61.12
High shadow price of carbon (in USD/tCO ₂ e)	80.00	81.81	83.65	85.54	87.47	89.44	97.79	109.34	119.54	122.24
Value of emission reductions at SPC (L), US\$ m	0.00	0.00	0.00	-0.53	-0.54	-0.56	-0.61	-0.68	-0.74	-2.82
Value of emission reductions at SPC (H), US\$ m	0.00	0.00	0.00	-1.06	-1.09	-1.11	-1.21	-1.36	-1.48	-5.65

SPC as per the report of the High-Level Commission on Carbon Pricing, chairs: Stiglitz, J.E. and Stern, N., supported by World Bank Group

Year 2020 is the same as Y1

21. To do the Cost Benefit Analysis (CBA), the range of monetary valuation of emissions attributable to the Project is subtracted from the net Incremental economic cost/benefit (bottom line of Table 4.9) to obtain a range estimate of net incremental cost/benefits that includes the valuation of carbon emissions (results summarized in Table 4.12). These range estimates, including SPC, are used to estimate the range economic (IRR) and economic NPV in the following section.

Table 4.13: Range estimates of net economic cost/benefit including SPC (US\$ million)

	Y1	Y2	Y3	Y4	Y5	Y6	Y10	Y15	Y19	Y20
Lower bound of net cost/benefit with SPC-L	-0.72	-6.48	-22.82	-24.52	-10.47	3.09	8.30	9.87	14.76	206.40
Upper bout of net cost benefit with SPC-H	-0.72	-6.48	-22.82	-23.99	-9.93	3.64	8.91	10.54	15.50	209.22

Cost Benefit Analysis (CBA) Results

22. Table 4.13 shows the results obtained for the CBA indicators for the Project and per component, including economic, financial and range estimates for the IRR that includes the effects of the project activities on the reduction of GHG emissions. Table 4.13 also includes the economic, financial and range estimates for the NPV for the Project and per component.

**Table 4.14: Cost benefit indicators for the project and per component**

	Economic	Financial	Range estimate, incl SPC	
			SPC (L)	SPC (H)
IRR, project	13.3%	11.2%	13.9%	14.6%
IRR, small irrigations systems	8.1%	9.1%	9.1%	10.2%
IRR, small WS&S systems	11.8%	10.7%	11.8%	11.8%
IRR, JVC and downstream infrastructure	14.2%	11.6%	14.9%	15.6%
NPV (US\$ m, @ 6% discount rate), project	68.6	48.2	74.72	80.81
NPV, small irrigations systems	2.0	3.1	2.94	3.91
NPV, small WS&S systems	5.5	4.5	5.56	5.58
NPV, JVC and downstream infrastructure	61.1	40.6	66.24	71.35

23. The Project is economically and financially viable and contributes to a net reduction of GHG emissions. The economic IRR is 13.3 percent and the financial IRR is 11.2 percent, both well above the 6 percent discount rate used for projects that deal with climate change effects. When the effects of project activities on carbon emissions are considered, the project IRR will be even higher, in the range of 13.9 and 14.6 percent. With this considered, according to the IRR indicator, the Project is economically and financially viable, and when the effects the project's activities on carbon emissions are taken into account, the Project is assessed to contribute to global social benefits.

24. The estimates of the NPV at a 6 percent discount rate confirm the assessment done using the IRR; i.e., from an economic prices perspective, the Project will deliver US\$68.6 million on top of recovering the present value of investments and operation/production costs; and from a financial perspective, it will recover US\$48.2 million on top of recovering investment and operations/production costs. When the Project's effects on carbon emissions are taken into account, it will deliver an excess NPV between US\$74.7 million and US\$80.8 million. Hence, again, the Project is economically and financially viable, and it contributes to global social benefits.

Benefits by Component

25. **Water Information System (Sub-component 1.1).** Given that this component will create water resources management information that is a public good the use of which is non-rival (i.e., all those who want the information could get it) and non-excludable (i.e., no interested party that wants the information will be excluded or prevented from getting it), it will be in the interest of the Project and the country to put the information system in place at the least possible cost. The procurement of consulting services and goods for the system, between years 2 and 6 of project implementation, will be competitive, in line with WB procurement rules, and be aimed at achieving minimum cost. This component will be implemented during the first three years of implementation.

26. **Small water reservoirs for irrigation solutions in the Dry Corridor (Sub-component 2.1).** For the base case scenario for irrigation solutions, where small farmers achieve two harvests per year and introduce new high-value crops, the economic IRR is 8.1 percent which makes this sub-component marginally economically viable and better than marginally financially viable (financial IRR 9.1 percent). The economic NPV is US\$2 million, which makes the project marginally economically viable and better than marginally financially viable (financial NPV US\$3.1 million). When mitigation of carbon emissions is taken into account, the economic IRR goes up to between 9.1 and 10.2 percent and economic NPV to between US\$2.94 million and US\$3.91 million, making this sub-component economically viable. However, achieving economic and financial viability will depend on the technical assistance activities provided by this component to enable participating beneficiary farmers adopt higher-value crops, achieve at least two



harvests per year, and adopt WRM practices that deliver the global benefits. During appraisal, it was verified that such technical assistance activities will focus on establishing water user associations, which will receive the TA during the last two years of project implementation. The higher financial than economic IRR is due to the fact that irrigation interventions, from the farmers' perspective, do not include investment subsidies; and that significant improvement in productivity and the adoption of higher-value crops will benefit small rural beneficiaries more than the economy as a whole.

27. Small water reservoirs for water supply and sanitation solutions in the Dry Corridor (Sub-component 2.1). The economic IRR is 11.8 percent, making this sub-component economically viable; which is confirmed by the economic NPV of US\$5.5 million. However, these very promising results depend on the establishment of water boards (*Juntas de Agua*), with effective governance rules to ensure the technical and financial sustainability of the infrastructure installed to provide the water supply services during the life of the assets. This component will include technical assistance for the establishment of such water boards, including TA activities over the last two years of project implementation to ensure the adoption of sound governance principles by the water boards.⁷³

28. JCV Dam and downstream infrastructure (Sub-component 2.2). The installation of the spillways at the JCV Dam, to raise the height of JCV Dam by 8 meters and increase its storage capacity to 14 million m³, will create benefits on three fronts—improved water supply services in the main urban centers in the Nacaome Valley, increased commercial agriculture, and increased production of energy at the existing hydropower plant at the foot of the dam. The combined economic IRR of investments in the JCV Dam and downstream infrastructure is 14.2 percent and its financial IRR is 11.6 percent, making this component the most economically and financially viable. In terms of economic NPV using a 6 percent discount rate, the infrastructure investments will generate in excess of US\$61.1 million. If contributions to the mitigation of GHG emissions are taken into account, the economic IRR of this component goes up to between 14.9 and 15.6 percent, and the economic NPV to between US\$66.2 million and US\$71.4 million. Such a high rate of return is explained by the triple nature of benefits generated by the multipurpose JCV Dam; i.e., water supply, commercial agriculture and energy production. However, these benefits will depend on the establishment of an institutional mechanism with sound governance principles to achieve the technical and financial sustainability of the investments. Component 2.2 includes technical assistance for the setting up of such institutional mechanism with sound governance principles, which includes getting agreements from the served municipalities prior to the commissioning of the final design studies for the infrastructure investments.

Sensitivity analysis

29. A sensitivity analysis of the Project and various components to cost overruns, and to productivity of farmers benefitting from small water reservoirs, is summarized in Table 4.14.

⁷³ According to the Honduran W&S legal framework, communities where the service is managed by Water Boards or similar entities established in accordance with the law may have their own regulations for the attention of users' requests and complaints, taking from this Special Regulation the provisions that adapt to their circumstances.

**Table 4.15: Cost benefit indicators for sensitivity analysis**

	Whole project		Rural irrigation		Rural water supply		JCV & downstream	
	EIRR	FIRR	EIRR	FIRR	EIRR	FIRR	EIRR	FIRR
Base case	13.3%	11.2%	8.1%	9.1%	11.8%	10.7%	14.2%	11.6%
10 percent cost overrun	12.3%	10.4%	7.3%	8.3%	10.9%	9.9%	13.2%	10.8%
20 percent cost overrun	11.5%	9.7%	6.6%	7.6%	10.1%	9.2%	12.4%	10.1%
30 percent cost overrun	10.8%	9.1%	6.0%	6.9%	9.4%	8.5%	11.6%	9.4%
Failure to achieve 2 harvests per year	12.8%	10.7%	1.7%	2.3%	11.8%	10.7%	14.2%	11.6%
Failure to diversify crop production	13.3%	11.2%	5.1%	5.8%	11.8%	10.7%	14.2%	11.6%
3 harvests per year rather than 2	13.8%	11.8%	12.7%	14.0%	11.8%	10.7%	14.2%	11.6%

30. **Sensitivity to cost overruns.** Cost overruns of 10 percent across all project components reduces the economic IRR by 1.0 percent; 20 percent cost overruns reduce overall economic IRR by 1.8 percent. At a 20 percent cost overrun, the Project remains economically viable, but component 2.1.1 (irrigation solutions in the Dry Corridor) is close to become non-viable as its economic rate of return is 6.6 percent, just above the rate of discount. In all cases, managing costs within budget will make the Project more economically and financially viable, particularly in the irrigation solutions sub-component.

31. **Sensitivity to failure to achieve two harvests per year and to achieving three harvests per year in irrigation activities fed by small reservoirs.** Failure to achieve two harvests reduces the project economic IRR by 0.5 percentage point and makes the rural irrigation sub-components economically and financially nonviable; i.e., its economic and financial rates of return fall to 1.7 and 2.3 percent, respectively. Viability will depend on the effectiveness of technical assistance in enabling small farmers to achieve two harvest per year. On the positive side, successfully meeting the challenge of increasing the number of harvests per year from two to three has a significant impact on the viability of the irrigation systems; their economic IRR goes from 8.1 percent in its base case scenario up to 12.7 percent, making this sub-component highly economically and financially viable. It also has a meaningful impact on the Project overall, raising its economic IRR from 13.3 percent in the base case up to 13.8 percent.

32. **Sensitivity to failure to diversify crop production.** Failure to diversify crop production, i.e., continuing to produce only maize and beans, will adversely impact the economic viability of the irrigation systems; i.e., their economic IRR falls from 8.1 percent in its base case scenario down to 5.1 percent, making this sub-component not economically viable. Thus, it is highly important that small farmers be supported in introducing higher-value and higher-nutrition crops in their menu of crop production. During appraisal, it was agreed, and funds were allocated, to provide for specialized technical assistance to small farmers, to enable them to identify and implement activities that will enable them to adopt new crops.

Rationale for public sector financing

33. **Public sector financing** is justified by the high degree of public good in the services provided by the multipurpose JCV Dam, including drought and flood management. As JCV is a state-owned asset, public sector financing is also justified by current Honduran institutional and regulatory realities; high regulatory risks would result in higher costs of private financing, resulting in demands for high cost recovery tariffs for JCV's water for human consumption and for irrigation services. Hence, JCV and downstream infrastructure will be financed by the Government with the IDA credit. Releases of water from the dam will be done according to a schedule that gives first priority to water for human consumption, second priority to water for irrigation, and third priority to energy generation as a byproduct. Under such priority rule, the potential fees collected from the various groups of beneficiaries are intended to cover O&M costs to guarantee long-term sustainability of the infrastructure assets. Private sector funding for the small



water reservoirs is also not possible because of the public good characteristics of the interventions. Small reservoirs will harvest rainwater that will be used by poor beneficiaries during spells of droughts and during dry seasons, to prevent crop losses and improve their crop production and livelihoods. Any fees paid by the intended beneficiaries of small reservoirs will only cover O&M of the small reservoirs. The Government will finance investments in infrastructure with the IDA credit.



Annex 5: Map of Project Area

Republic of Honduras Water Security in the Dry Corridor of Honduras

