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Report No: PAD2792

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT

IN THE AMOUNT OF SDR 38.3 MILLION

(US$55 MILLION EQUIVALENT)

TO THE

REPUBLIC OF MOZAMBIQUE

FOR A

SMALLHOLDER IRRIGATED AGRICULTURE AND MARKET ACCESS PROJECT

May 30, 2018

Agriculture Global Practice
Africa Region

CURRENCY EQUIVALENTS

Exchange Rate Effective April 30, 2018

Currency Unit =	NEW MOZAMBIQUE METICAL (MZN)
MZM 59.9 =	US$1
US$1.436 =	SDR 1

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AIMU	Agriculture Investment Management Unit
CBO	Community-Based Organization
CPF	Country Partnership Framework
CSA	Climate Smart Agriculture
DA	Designated Account
DINAS	Directorate of Agriculture and Silviculture
DNEA	*Direção Nacional de Extensão Agraria/*Directorate of Agricultural Extension Services
DPCI	*Direcção de Planificação e Cooperação Internacional/*Directorate of Planning and International Cooperation
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EX-ACT	Ex-Ante Carbon-balance Tool
FAO	Food and Agriculture Organization
FFS	Farmers' Field School
FMT	Financial Management Team
GHG	Greenhouse Gas
GRS	Grievance Redress Service
ICR	Implementation Completion and Results Report
IFAD	International Fund for Agricultural Development
IFR	Interim Financial Report
IIAM	*Instituto de Investigação Agronómica/*Agricultural Research Institute
IFMIS	Integrated Financial Management Information System
IGASA	*Inspeção Geral de Agricultura e Segurança Alimentar*/ General Inspection of Agriculture Services and Food Security
IGF	*Inspeção Geral de Finanças/G*eneral Finance Inspection
INIR	National Irrigation Institute
IPF	Investment Project Financing
IPSAS	International Public-Sector Accounting Standards
IRRIGA	Smallholder Irrigated Agriculture and Market Access Project
M&E	Monitoring and Evaluation
MASA	Ministry of Agriculture and Food Security
MET	Monitoring and Evaluation Team

MGM	Matching Grants Manual
MIC	*Ministério do Comercio e Industria*/Ministry of Trade and Industry
MIS	Management Information Systems
MITADER	Ministry of Land, Environment, and Rural Development
MOPHRH	Ministry of Public Works, Housing, and Water Resources
NPCC	National Project Coordination Committee
NPF	New Procurement Framework
NPV	Net Present Value
O&M	Operation and Maintenance
PCC	Project Coordination Committee
PDST	Provincial Design and Supervision Team
PEDSA	Strategic Plan for Development of Agriculture Sector
PIM	Project Implementation Manual
PITTA	*Programa Integrado de Transferência de Tecnologias Agrarias/*Integrated Program for Technology Transfer
PIU	Project Implementation Unit
PMP	Pest Management Plan
PNI	*Programa Nacional de Irrigação*/ National Irrigation Program
PNISA	National Agriculture Sector Investment Plan
PPC	Provincial Project Coordinator
PPIU	Provincial Project Implementation Unit
PPSD	Project Procurement Strategy for Development
PRIMS	Progress and Results Information Monitoring System
PROIRRI	Sustainable irrigation Development Project
PPP	Public-Private Partnership
PT	Procurement Team
QCBS	Quality and Cost-Based Selection
RAP	Resettlement Action Plan
RF	Results Framework
RPF	Resettlement Policy Framework
SDAE	*Serviços Distritais de Actividades Económicas*/ District Office of Economic Activities
SMEs	Small and Medium Enterprises
SMT	Safeguards Management Team
SOPs	Series of Projects
SUSTENTA	Agriculture and Natural Resources Management Project
TA	*Tribunal Administrativo/* Administrative Tribunal
TDST	Technical Design and Supervision Team
ToC	Theory of Change
WUA	Water User Association
WUG	Water User Group

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BASIC INFORMATION

Country(ies)	Project Name	
Mozambique	Smallholder Irrigated Agriculture and Market Access Project- IRRIGA 1	
Project ID	Financing Instrument	Environmental Assessment Category
P164431	Investment Project Financing	B-Partial Assessment

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[✓] Contingent Emergency Response Component (CERC)
[✓] Series of Projects (SOP)	[✓] Fragile State(s)
[ ] Disbursement-linked Indicators (DLIs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
21-Jun-2018	31-Dec-2024
Bank/IFC Collaboration	Joint Level
Yes	Complementary or Interdependent project requiring active coordination

Proposed Development Objective(s)

The proposed Project Development Objective (PDO) is to improve smallholder agriculture productivity and market access in the project areas developed with irrigation and provide immediate and effective response to an eligible crisis or emergency.

The Program objective of the Series of Projects (SOP) is to increase farmers' productivity and improve rural livelihoods through increased access to irrigation and markets.

Components

Component Name	Cost (US$, millions)
Component 1-Institutional Capacity Building	8.00
Component 2-Smallholder Irrigation Development and Management	28.00
Component 3-Agriculture Intensification and Market Linkages	15.00
Component 4- Project Management and Monitoring and Evaluation	6.00
Component 5-Contingency Emergency Response	0.00

Organizations

Borrower:	Ministry of Finance and Economy
Implementing Agency:	Ministry Of Agriculture and Food Security

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	57.00
Total Financing	57.00
of which IBRD/IDA	55.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	55.00
IDA Grant	55.00

Non-World Bank Group Financing

Counterpart Funding	2.00
LOCAL: BENEFICIARIES	2.00

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	Total Amount
National PBA	0.00	55.00	55.00
Total	**0.00**	**55.00**	**55.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2018	2019	2020	2021	2022	2023	2024
Annual	0.00	3.09	7.47	11.32	13.00	11.89	8.22
Cumulative	0.00	3.09	10.57	21.89	34.89	46.78	55.00

INSTITUTIONAL DATA

Practice Area (Lead)

Agriculture

Contributing Practice Areas

Environment & Natural Resources, Transport & Digital Development, Water

Climate Change and Disaster Screening

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

Gender Tag

Does the project plan to undertake any of the following?	
a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF	Yes
b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	Yes
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	High

3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	High
7. Environment and Social	Substantial
8. Stakeholders	Low
9. Other	
10. Overall	Substantial

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

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36		✓
Pest Management OP 4.09	✓	
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37	✓	
Projects on International Waterways OP/BP 7.50	✓	
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

Schedule 2, Section I.A Project Coordination Committee (PCC)

1. Not later than three (3) months after the Effective Date, the Recipient shall establish, and thereafter maintain, throughout Project implementation, the PCC, with composition and mandate acceptable to the Association, which shall be headed by a high-level representative of MASA and shall include high level representatives of the line ministries involved in Project implementation, as further detailed in the PIM. The PCC shall be responsible for coordinating, including at the inter-ministerial level, and providing overall strategic guidance for Project implementation and approval of proposed Annual Work Plans and Budgets, acceptable to the Association.

Sections and Description

Schedule 2, Section I.A Provincial Project Coordination Committee (PPCC)

2. Not later than three (3) months after the Effective Date, the Recipient shall establish, and thereafter maintain, throughout Project implementation, the PPCC, headed by each Provincial Governor, and with composition and mandate acceptable to the Association, as further detailed in the PIM. The PPCC shall be responsible for coordinating and providing overall strategic guidance for Project implementation at the Provincial level, as further detailed in the PIM.

Sections and Description

Schedule 2, Section I.A Accounting and Financial Management

3. The Recipient shall, not later than four (4) months from the Effective Date, appoint or designate an independent external auditor, under terms of reference and with qualifications and experience acceptable to the Association.

Conditions

Type	Description
Effectiveness	1. The PIM has been adopted, in the form and substance satisfactory to the Association;
Effectiveness	2. The AIMU has been established, with sufficient resources and staff appointed including the project coordinator, the procurement specialist and the financial management specialist, under terms of reference and with qualifications and experience satisfactory to the Association.

Type	Description
Disbursement	Financing Agreement Scheduled 2, Section III.B.1. (a) no withdrawal shall be made for payments made prior to the Signature Date, except that withdrawals up to an aggregate amount not to exceed SDR 1,500,000 may be made for payments made prior to this date but on or after April 1, 2018, for Eligible Expenditures under Category (1) and (2); or (b) under Category (3) unless and until a Matching Grants Operations Manual, in form and substance satisfactory to the Association, is approved by the Recipient; and (c) under Category (4), for Emergency Expenditures under Part 5 of the Project, unless and until the Association is satisfied, and has notified the Recipient of its satisfaction, that all of the conditions have been met in respect of said activities.

MOZAMBIQUE
SMALLHOLDER IRRIGATED AGRICULTURE AND MARKET ACCESS PROJECT

TABLE OF CONTENTS

I. STRATEGIC CONTEXT

A. Country Context

1. **Mozambique is a southeast African country, with a population of about 29 million people,[1] of which about 70 percent reside in the rural areas**. It is estimated that about 90 percent of the rural population depend on agriculture as the main source of their livelihood. With the current population growth rate of 2.7 percent, Mozambique's population is expected to reach 46 million by 2040. The country is endowed with potentially large arable land, water, energy, gas, and mineral resources and is also strategically located to support economic development in the region.

2. **Poverty levels remain high and economic growth has been highly inequitable.** Despite significant economic growth and macroeconomic stability over the last two decades between 1995 and 2015, rapid economic growth rates have not translated into poverty reduction. The country ranks 180 out of 187 countries in the 2015 Human Development Index as reported by the United Nations Development Programme, and nearly half of its population live in poverty. Approximately half (43 percent)[2] of the children under the age of five in Mozambique are stunted due to long-term effects of malnutrition and micronutrient deficiencies. Economic growth has been driven primarily by few large-scale capital investment projects, with very limited benefits to the poor living in the rural areas. Poverty is particularly persistent in the country's two most populous provinces, Nampula and Zambezia, where poverty rates have increased, while the rest of the country has experienced reduction in the poverty rates by over 10 percent between 2003 and 2015.

3. **The country's near-term economic prospects have been worsened by political and economic instability.** Against the backdrop of the longer-term challenge of stimulating more inclusive growth, political and economic developments in 2016 led to a rapid and dramatic deterioration in Mozambique's macroeconomic framework. With large unreported debts and increased violence, the fast growth of the economy before 2016 slowed down significantly, marked by high inflation and depreciation of local currency, coupled with falling commodity prices and exports. The country also suffered from the El Ninõ effects that led to extremely low rainfalls and a prolonged drought (2014– 2018), which resulted in limited water supply and low agricultural productivity. This led to a humanitarian crisis in some of the most critical regions of the country.

4. **However, medium-term economic prospects appear positive as the country recovers from the recent economic crisis.** Real gross domestic product (GDP) growth fell below 4 percent in 2016 but is expected to pick up in the range of 5–6 percent in 2018. Inflation has stabilized at about 18 percent, following some tight monetary policy reforms to curb currency depreciation and fiscal deterioration. Amidst a medium growth rate forecast, the country still faces a number of development constraints, including high dependence on rain-fed agriculture, limited access to basic services such as water supply

[1] National Statistics Institute-INE (2018), Maputo, Mozambique.
[2] Disease data from the Ministry of Health and mortality data from the National Statistics Institute (MICS 2008).

and electricity, and lack of resilience to climatic events due to limited infrastructure and institutional capacity, among others.

5. **Mozambique is among the countries most affected by climate change in Sub-Saharan Africa.** Globally, Mozambique ranks 36 in terms of vulnerability and 144 in terms of readiness,[3] indicating significant risk to national social and economic development. The country has also been experiencing high rainfall variability, with more frequent droughts and floods. Highly variable rainfall, combined with limited water storage and flood control infrastructure, are among the main factors contributing to crop losses. The pattern, frequency, and severity of floods and droughts are also changing over time with significant adverse implications for agriculture productivity and production.

B. Sectoral and Institutional Context

6. **Agriculture is the largest economic sector in Mozambique.** The agriculture sector accounts for 26 percent of GDP and employs 78 percent of the labor force. However, most of the population is engaged in smallholder, rain-fed subsistence agriculture which frequently suffers from climate-induced shocks with significant negative impacts on overall economic growth and poverty reduction. Only about 10 percent of its 36 million ha of arable land is currently under cultivation. In 2012, there were about 3.9 million farms in Mozambique, of which 99 percent were smallholders, and only about 1 percent were medium- and large-scale commercially oriented farms involved in competitive value chains, primarily for cash crops. More recently, however, there is an emerging trend and potential for the involvement of commercially oriented smallholders in the value chains of horticulture and other crops such as the out-growers' systems developed under the implementation of the Sustainable Irrigation Development Project (PROIRRI, P107598).

7. **Low agricultural productivity is a binding constraint to Mozambique's economic growth and poverty reduction.** The country's agriculture productivity levels are lower than the average of the low-income countries in Southern Africa, particularly for maize and rice, two important crops for food security and trade in the region. According to 2016, Food and Agriculture Organization (FAO) statistics, the average yield of maize in Mozambique is 35 percent lower compared to Malawi and 76 percent lower compared to Zambia. Average rice yields are similarly lower in Mozambique and are estimated to be 60 percent lower compared to Malawi and 50 percent lower compared to Zambia. Key constraints include limited use of improved crop varieties (less than 3 percent of farmers); limited use of fertilizers (less than 5 percent of the farmers); inadequate agricultural support services, including extension (there are only 1,200 agricultural extension officers employed by the public sector in the country); small area under irrigation (2.5 percent of the cultivated area); limited access to agricultural credit; limited access to mechanization and animal traction services (less than 9.5 percent of farmers used animal traction in 2014); and low connectivity and limited access to markets for inputs and outputs (road networks provide access to only about 33 percent of the rural population). Moreover, climate-related events and an inadequate land rights system present a substantial risk to agriculture productivity and sustainability and reduce the efficiency of land use.

[3] ND-GAIN (University of Notre Dame Global Adaptation Index) is a global index that summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience.

8. **A gender gap persists in agricultural productivity in Mozambique.** Female-headed households tend to be poorer and lack access to productive assets and labor. In addition, they are less likely to adopt improved technologies. As a result, they tend to be less productive than male-headed households. In 2014, the average maize yield among female-headed households was 50 kg less than the average among male-headed households, which represents an 8 percent yield gap. This result is consistent with the findings of the literature on agricultural productivity in Sub-Saharan Africa.

9. **The provinces of Manica, Nampula, Sofala, and Zambezia have the highest agriculture potential**, covering some of the most fertile soils in the country, along the Zambezi River basin, which accounts for about 17 percent of the irrigable land and 47 percent of the country's water resources.[4] Also, these four provinces are home to about 1.85 million smallholder farmers or 47 percent of all the country's smallholder farmers. Nampula and Zambezia provinces face specific challenges: it is estimated that 11.21 million people or about 40 percent of the population in Mozambique live in these two provinces, but due to limited accessibility, rural households are more isolated and income from farm activities is three times lower as compared with the rest of country. In addition, there are generally low levels of irrigation coverage, and current investment patterns are not consistent with the highest potential agriculture areas.

10. **Irrigation has the potential to significantly enhance smallholder agriculture productivity.** Mozambique has a potential to irrigate 3 million ha. However, only about 180,000 ha are equipped with irrigation infrastructure and only about half of this is currently fully operational. Thus, only about 3 percent of the country's irrigation potential is currently being exploited. Under the World Bank financed PROIRRI Sustainable Irrigation Development Project (P107598, closing is being extended from June 2018 to December 2018), smallholder farmers have doubled their productivity in vegetable crops and increased cropping intensity to three harvests per year from investments in improved irrigation infrastructure and services. PROIRRI developed a total of 3,000 ha under irrigation, out of which 1,700 ha for rice, 800 ha for horticulture, and 500 ha for out-grower crops.

11. **The Ministry of Agriculture and Food Security (MASA) is the lead institution for agriculture development.** The MASA is responsible for formulating and implementing agricultural policies at the national level, including agrarian services, crop development, livestock, irrigation, forestry, and food security. Irrigation development is the responsibility of the National Irrigation Institute (INIR) under the MASA. INIR works in close collaboration with the other MASA departments responsible for agriculture and extension services, such as the national Directorate of Agriculture and Silviculture (DINAS), the National Directorate of Agriculture Extension, and the Agriculture Development Fund which finances agriculture projects. Other relevant institutions for irrigation development include the National Directorate of Water Resources Management from the Ministry of Public Works, Housing, and Water Resources (MOPHRH), which is responsible for water resources planning and allocation and for the development and operation of major hydraulic works through the Regional Water Administrations; and the National Directorate of Land and Forestry in the Ministry of Land, Environment, and Rural Development (MITADER), which is responsible for land allocation and titling.

12. **INIR was created by the Council of Ministers Decree 9/ May 11, 2012, with legal, technical, and administrative autonomy to promote the development of an efficient and sustainable irrigation sector in the country.** Currently, INIR focuses on technical assistance to small irrigation schemes, including the

[4] INIR. 2015. *Programa Nacional de Irrigação*.

oversight of design and construction supervision of irrigation rehabilitation, as it lacks the technical capacity to do the design and construction supervision of these rehabilitation investments in new irrigated areas. INIR is also responsible for oversight of two large state-owned irrigation enterprises operating a total of 41,000 ha of irrigated land along the Limpopo river basin (23,000 ha in Chokwe and 18,000 ha in Xai-Xai). Other large irrigation schemes are owned and fully managed by private agribusiness enterprises engaged in sugarcane production along the major river basins.

13. **In 2016, the National Irrigation Program (PNI) was approved by the Government.** The PNI consists of a series of reforms and investments to address critical irrigation development needs and medium-term food security targets for the country. The MASA developed three scenarios to implement the PNI: moderate, medium, and high. In the moderate scenario, about US$1 billion is needed to develop a minimum of 122,500 ha (32,000 ha public and 90,500 ha private) of irrigated land by 2042. The initial phase of the program is focused on strengthening MASA's institutional capacity to plan irrigation infrastructure and related services and to establish and provide training to Water User Groups (WUGs) and Water User Associations (WUAs) to improve on-farm water management, and operation and maintenance (O&M) of the irrigation schemes. Moreover, the MASA intends to coordinate with relevant sector institutions to promote agriculture intensification and market linkages for smallholder farmers.

14. **To support the PNI, the Government of Mozambique has requested the World Bank to support INIR's capacity-building program and finance priority irrigation infrastructure investments along the central-northern region.** Under PROIRRI, the World Bank supported key sector reforms, including the development of the PNI, the Water User Associations Decree Law,[5] and the draft regulations for private sector engagement on irrigation development. PROIRRI also financed the construction of 3,000 ha priority smallholder irrigation schemes in Manica, Sofala, and Zambezia provinces, including the establishment and training of WUAs and WUGs, and facilitated market linkages through existing agribusinesses. Through the Agriculture and Natural Resources Landscape Management Project (SUSTENTA) (P149620, approved by the Board on June 30, 2016), the World Bank is supporting small emerging commercial farmers and strengthening market linkages in a landscape approach in 10 districts of Nampula and Zambezia. The Smallholder Irrigated Agriculture and Market Access Project (IRRIGA) will build capacity for planning, design, construction, and operation of irrigation infrastructure as proposed under the PNI and further develop services required to enhance agriculture productivity in the northern-central region of the country. IRRIGA therefore builds on PROIRRI achievements and partners with SUSTENTA to maximize value chain development.

15. **The Government has also requested project support for the establishment at the central level, of an agriculture investment management unit (AIMU) that will be responsible for coordinating all donor support to the sector.** Participation of the World Bank is therefore key to contribute to the implementation of the PNI and is expected to help catalyze additional financial contributions from the other development partners and the private sector. The World Bank has been a long-standing and valued partner in the agriculture sector in Mozambique, supporting the development of institutional reforms as well as infrastructure investments. The proposed investment operation will build upon and leverage the World Bank's deep involvement in the agriculture sector over time.

[5] Decreto Lei nº 2/2015 de 31 de Dezembro.

16. **The World Bank support will be through a Series of Projects (SOPs) to support the MASA in the implementation of the National Agriculture Investment Plan (PNISA).** The SOP will support a program aimed to enhance farmers productivity and improve rural livelihoods through increased access to irrigation and markets. The program will also provide resources for rehabilitation of a combined amount of 8,000 ha of irrigated land, benefiting 12,000 smallholder farmers. The project description below refers to the first project (SOP1).

C. Higher-Level Objectives to which the Project Contributes

17. **The project is aligned with the Country Partnership Framework (CPF, FY17–21),[6] which acknowledges low agriculture productivity as a major constraint to economic growth and poverty reduction.** Specifically, the project contributes to Focus Area 1 of the CPF on Promoting Diversified Growth and Enhanced Productivity and Focus Area 2 of the CPF on Investing in Human Capital. The project also follows the joint IFC-World Bank Action Plan for Agribusiness and Rural Development for Mozambique finalized in December 2017.

18. **The project addresses the Government of Mozambique's priorities.** Irrigation development is a strategic objective under Priority III (promote jobs, productivity, and competitiveness) and Priority IV (develop social and economic infrastructure) of the Government's five-year plan 2015–2019. The project also supports the Strategic Plan for the Development of Agriculture Sector, 2010–2019 (PEDSA) and the National Agriculture Sector Investment Plan (PNISA), 2014–2019, which aim at increasing food security and income of agricultural producers in a competitive and sustainable manner while guaranteeing social and gender equity.

19. **The project also contributes to the World Bank Group's twin goals of ending extreme poverty and promoting shared prosperity.** Improved agriculture and irrigation practices will contribute to increased agriculture productivity and income generation for the rural communities in Mozambique. It will also contribute to improvements in human nutrition by improving the quality and quantity of food and reducing food insecurity. Moreover, the project will contribute to women's empowerment by improving access to water and enable multi-seasonal production, as well as establishing participatory governing bodies for water management. In addition, the project will promote private sector participation mainly through the market linkages and where possible through public-private partnerships (PPPs) to invest in and operate small irrigation schemes.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

20. The proposed Project Development Objective (PDO) is to improve smallholder agriculture productivity and market access in the project areas developed with irrigation and provide immediate and effective response to an eligible crisis or emergency.

[6] World Bank. 2017. "Country Partnership Framework (CPF) for the Republic of Mozambique for the Period FY17–FY21."

B. Project Beneficiaries

21. The project will directly benefit 9,000 smallholder farmers,[7] including women and youth, with improved access to irrigation and agriculture services to enhance agriculture productivity and production and improve market linkages. In addition, 200 government staff and 100 service providers, including nongovernmental organization (NGO) staff at different levels will also benefit from training and skills development programs to enhance their capacity to plan and deliver agriculture services.

C. PDO-Level Results Indicators

22. The key PDO-level results indicators for the proposed project are

- Average crop yield of selected commodities in irrigated production systems (Tons/year);
- Proportion of total agricultural production marketed for selected commodities (Percentage);
- Farmers reached with agricultural assets or services (disaggregated by gender) (Number); and
- Number of beneficiaries (disaggregated by gender) (Number)

Theory of Change

23. **The Theory of Change** (ToC) describes and illustrates (see figure 1) how and why the achievement of the PDO—that is, increased productivity and improved market access—is expected to come about through the project. In the context of the project, the long-term goal is to contribute to: (a) reducing poverty; (b) improving food security; and (c) strengthening resilience to climate change in the target area. The contribution will be in the form of increased production of farm households from their newly irrigated land and the production surplus that can be marketed (for example, to processors and ultimate consumers). It will be a result of, and can be attributed to: (a) agricultural productivity through increased intensification; and (b) improved functioning market linkages between producers and buyers (that is, market access).

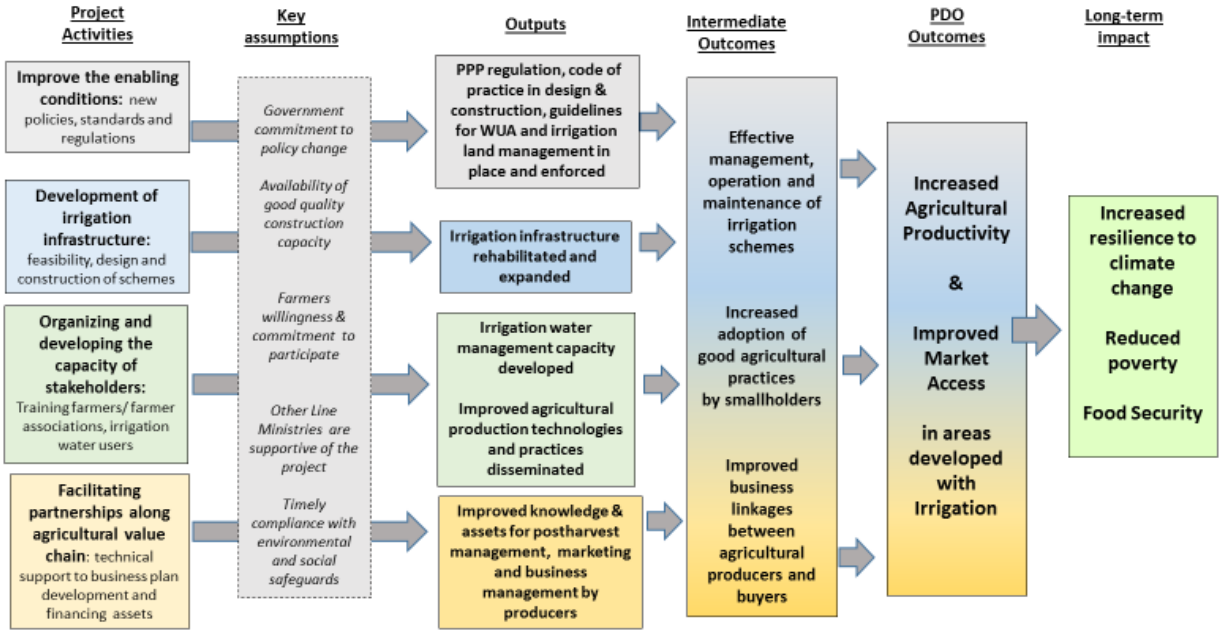
24. **Agricultural productivity** will be achieved through: (a) more conducive policies, regulations, and practice standards (that is, the enabling conditions); (b) irrigation infrastructure development; (c) more effective water use monitoring, management, and operation of the rehabilitated irrigation schemes; and (d) improved agricultural production technologies and practices (for example, improved seeds, climate smart agriculture [CSA], integrated pest management).

25. **Market access**, that is, better functioning business linkages between producers and buyers that will facilitate the profitable sale of the (processed) produce on the end market depend on many factors (for example, rural infrastructure, access to inputs, collective action of producers, post-harvest and

[7] Smallholder farmers in Mozambique represent a group of agriculture producers engaged in household farming with an average field area of 1.7 ha, limited ownership of productive assets, and little engagement in off-farm activities. Most of them have not completed three months of agriculture courses and are not able to read or write.

business management and marketing skills). The project will address: (a) access to inputs as well as finance assets for post-harvest management; (b) behavioral change toward stronger collective action for leveraging efficiency gains in marketing; and (c) the development of knowledge about improved practices (for example, business management, post-harvest management). Other determining factors, such as rural roads and transport, are being addressed through complementary investment projects (Rural Feeder Roads Project, SUSTENTA P149620).

Figure 1. Theory of Change, IRRIGA



III. PROJECT DESCRIPTION

A. Project Components

26. **The first phase (SOP1) is expected to improve agriculture productivity and market access to smallholders on 3,000 ha of irrigated land rehabilitated under PROIRRI and on an additional 3,000 ha of irrigated land to be rehabilitated under the project for a total of 6,000 ha.** While investments in agricultural intensification and market access will be primarily in these 6,000 ha, they will be also extended to areas beyond those rehabilitated irrigation areas (in coordination with and involvement of the private agribusiness sector) as the opportunity arises. IRRIGA will establish and strengthen WUGs and WUAs, improve water service delivery and on-farm water management, expedite the introduction and transfer of improved agriculture technology, and improve the input and output market linkages to irrigated and non-irrigated areas.

27. **The project will be implemented in four selected provinces—Manica, Nampula, Sofala, and Zambezia.** The main criteria for the selection of these four provinces were: (a) significant agricultural

potential; (b) availability of water for irrigation in areas currently or formerly irrigated; (c) potential for complementarity with other World Bank-funded agriculture operations and other partners; (d) large share of population being rural and involved in agriculture for their livelihood; (e) high level of poverty; (f) potential for linkages with the private agribusiness sector and other development projects; and (g) availability of recently rehabilitated irrigation schemes under PROIRRI.

28. The project will finance the following five components: (a) institutional capacity building; (b) smallholder irrigation development and management; (c) agriculture intensification and market linkages; (d) project management and monitoring and evaluation; and (e) contingency emergency response. The following paragraphs contain the summary description for each component. A detailed project description is presented in annex 1.

29. **Component 1: Institutional Capacity Building SDR 5.57 million (US$8 million equivalent of IDA grant).** The objectives of this component are to strengthen the institutional capacity and to improve the enabling policy environment, support the regulatory framework of the institutions involved in the development of irrigated agriculture, and enhance beneficiaries' capacity for sustainable development and management of irrigated agriculture. In response to a request from the MASA, the project will strengthen MASA's capacity for investment planning, implementation, coordination, and management of all donor funding for agriculture sector development in the country. This component will finance three main activities: (a) strengthening irrigation institutional capacity; (b) strengthening agriculture institutional capacity and market linkages; and (c) establishing the AIMU.

30. **Subcomponent 1.1: Strengthening Irrigation Institutional Capacity.** This subcomponent will finance technical assistance to support INIR to improve the enabling environment in the irrigation subsector and develop regulatory tools and a professional code of conduct to improve irrigation services delivery. Specifically, this subcomponent will finance studies, training, and equipment to: (a) improve the institutional and regulatory framework for the irrigation sector to advance irrigation service delivery; and (b) establish a national irrigation water monitoring system that will collect data at the watershed and irrigation perimeter level. These regulatory tools and processes are broadly identified in the PNI and include the following: prepare the PPP regulations; develop regulations and contract models for partnerships in irrigation and guidelines for licensing irrigation development in the country; and develop partnerships with formal education systems in the country (for example, University Eduardo Mondlane, Instituto Superior Politecnico de Manica, among others), including provision of internships up to 12 months for irrigation engineering and irrigation economics graduates for practical field work.

31. **Subcomponent 1.2: Strengthening Agriculture Institutional Capacity and Market Linkages.** This subcomponent will finance capacity building of institutions involved in the development of irrigated agriculture, specifically: (a) the national Directorate of Planning and International Cooperation (DPCI) at the MASA to strength the statistic services, agriculture market information systems to collect, process, and disseminate market and price information (through digital mobile devices) in the country, and provision of training to staff; (b) the national Directorate of Agricultural Extension Services (DNEA) and the Agricultural Research Institute (IIAM) to increase their capacity for the dissemination of improved agriculture technologies and practices in the project areas developed with irrigation; and (c) the national DINAS to establish a satellite monitoring system to monitor the use of all areas developed with irrigation in the country. This subcomponent will also establish an 'agricultural observatory' to generate reports for decision making for relevant institutions involved in the agriculture development. These reports will

support relevant departments at the MASA, including IIAM, DNEA, DINAS, MITADER, MOPHRH, and the Ministry of Trade and Industry (MIC), including input suppliers, traders, and private agribusiness operators to improve their planning to support the development of the agriculture sector.

32. **Subcomponent 1.3: Agriculture Investment Management Unit.** This subcomponent will finance technical assistance and incremental operating costs for the establishment of the AIMU to lead agriculture sector investment planning and implementation at the MASA. The AIMU will report to the Technical Committee, comprising the National and General Directors of the MASA and headed by the Permanent Secretary. The AIMU will initially manage and implement IRRIGA under the strategic guidance of INIR and then gradually evolve into the MASA operational unit for agriculture programs implementation, thus hosting all the MASA's investment operations with donor funding in close coordination with the Policy Unit of MASA, in charge of the PEDSA and PNISA. The goal is to create strong, long-term operational capacity within the MASA and achieve economies of scale while reducing the burden on other functional areas tasked with regulatory and policy functions.

33. The AIMU will consist of five teams: Financial Management Team (FMT), Procurement Team (PT), Safeguards Management Team (SMT), Monitoring and Evaluation Team (MET), and Technical Design and Supervision Team (TDST). Under IRRIGA, the unit will be responsible for the design of irrigation schemes and assurance of technical quality in all phases of the development of the irrigation schemes.

34. **Component 2: Smallholder Irrigation Development and Management SDR 19.50 million (US$28 million equivalent of IDA grant).** This component will finance engineering designs of 5,000 ha for irrigation development and construction supervision, equipment, and civil and hydraulic works for 3,000 ha of irrigated land in the project areas to improve water availability and resilience of irrigation services. About 40 potential districts have been identified in the four beneficiary provinces based on Government strategies for agriculture development, market needs and existing agroclimatic conditions, land and water availability, and existing markets. The location of the potential districts is presented in annex 6. Out of the 3000 ha, 500 ha have already been assessed (feasibility) under PROIRRI and 2,500 ha additional schemes will be further assessed in the first eight months of project implementation to determine the exact scope of irrigation works to be financed by the project. The timeline for project implementation is presented in annex 1.

35. **Subcomponent 2.1: Irrigation Infrastructure Investment.** This subcomponent will finance technical assistance for detailed engineering designs for 5,000 ha irrigated land, of which 3,000 ha will be rehabilitated and modernized under SOP1 and 2,000 in SOP2. The rehabilitation and modernization will consist of: (a) upgrading of the water intake and transmission main; (b) rehabilitation and expansion of water collection and storage structures; (c) upgrading of the distribution system; (d) installation of water distribution and control structures; and (e) rehabilitation and protection of the catchment area and embankments for conservation and erosion control. The AIMU will be responsible for the technical oversight and quality control of the irrigation infrastructures to be constructed under this component. Priority will be given to gravity-fed open canal irrigation systems as they are relatively simple to operate and maintain and are less costly compared to pumped systems. Pumping will be considered, if at all, only for high-value crops and under exceptional cases. The construction of the irrigation infrastructure will take into consideration environmental and social risks and will utilize the relevant safeguards instruments to implement appropriate mitigation measures.

36. **Subcomponent 2.2: Irrigation Infrastructure Management.** This subcomponent is designed to support the establishment and capacity strengthening for the WUGs and WUAs in all irrigation schemes in the project areas to manage, operate, and maintain the irrigation and drainage systems. Specifically, the project will finance technical and logistical support to establish WUGs and WUAs, develop manuals and associated learning materials and media products, and deliver trainings on O&M of the schemes. The project will also finance incremental operating costs for transitional O&M and investment costs for WUAs operational offices and equipment.

37. The expected outputs from this subcomponent would be: (a) establishment of WUGs and WUAs in all areas developed with irrigation infrastructure to manage, operate, and maintain the irrigation and drainage systems at turnout and tertiary levels; and (b) improvement of the level of bulk water service delivered to the WUAs. Expected benefits include: (a) improved maintenance of irrigation systems; (b) improved water distribution; (c) increased level of water fee collection; and (d) enhanced transparency and accountability.

38. **Component 3: Agriculture Intensification and Market Linkages SDR 10.46 million (US$13 million equivalent of IDA grant and US$2 million from beneficiaries).** This component will improve productivity, production, cropping intensity, competitiveness, and market access for 9,000 smallholder farmers cultivating roughly 6,000 ha of land in the project area. This component builds on successful intervention models in the country and the region. It will finance training, technical assistance, equipment, and matching grants. This component will finance three main activities and specific eligibility criteria will be further developed in the Project Implementation Manual (PIM) to ensure equity and avoid duplication of activities under the PROIRRI project.

39. **Subcomponent 3.1: Capacity Building for Smallholder Farmers.** Under this subcomponent, the project will support organization of farmers into producer groups and provide training through Farmers' Field Schools (FFSs) and through the Integrated Program for the Transfer of Agricultural Technologies (*Programa Integrado de Transferência de Tecnologias Agrárias* [PITTA]), using methodologies currently used by the MASA. Training to farmers will include: (a) supporting the establishment of smallholder farmers organizations and producers groups; (b) strengthening the knowledge of farmers on improved agricultural practices, technology, inputs, and marketing; (c) strengthening the functional literacy and numeracy of farmers; (d) improving household nutrition; (e) improving soil fertility and integrated nutrient management; (f) promoting climate smart and conservation agriculture and other CSA technologies and practices; and (g) conducting demonstration trials at the farm level (FFS). The project will also support training to staff from the local government institutions and service providers, including local NGOs, to provide technical assistance to the project's smallholder farmer beneficiaries to prepare business plans. It is expected that up to a total of 9,000 farmers and 200 Government staff and more than 100 local service providers will benefit from the project support.

40. **Subcomponent 3.2: Investment Support to Enhance Smallholder Agricultural Production.** This subcomponent will finance vouchers for eligible farmers to allow access to improved farm technologies. These would include but not be limited to seeds, inputs, mechanization services such as those using draft animals, power tillers, tractors, and so on for individual farmers. The mechanism will enable market access to agricultural inputs and services and improve the capacity of suppliers to plan and deliver quality inputs and services based on voucher system. The voucher serves as a financial credit for the purchase of inputs and services and will be cofinanced by the beneficiary. This approach will build on and expand a model

promoted in the country and in other neighboring countries such as Zambia with FAO support, which proved successful in equipping farmers and promoting local input providers. It is expected that this subcomponent will assist up to 9,000 farmers, of which half are expected to be women. The PIM will specify a sliding scale for financial support, with an increasing cofinancing percentage paid by the beneficiary as the value of support provided by the project to the farmer increases.

41. **Subcomponent 3.3: Matching Grants for Market-led Production and Value Chain Development.** This subcomponent will finance matching grants to support business proposals to improve production, post-harvest, value addition, equipment, storages, and marketing facilities. Matching grants will either finance business plans for groups of producers (window 1, including equipment, storage facilities, and technical assistance) or for small and medium enterprises (SMEs) (window 2 for processing and value addition to improve existing businesses that benefit producers in the project area by purchasing equipment for production, grading, packaging, and so on). Typical investments would include technical assistance and equipment to clean, sort, grade, wash, weigh, package, store, or any other activity that adds value.

42. The matching grant structure will be similar to that implemented under the World Bank-financed SUSTENTA (window 1) and will typically be up to US$100,000 of which 50 percent will be grant, 40 percent credit from a commercial bank to be repaid by the beneficiaries, and 10 percent beneficiaries' own contribution. Window 2 projects would be above US$100,000 and up to US$1 million. Specific details of the matching grants schemes will be further detailed in the PIM and matching grants manual (MGM).

43. The eligibility criteria for the grants (see table 1.3) will take into consideration the capacity level of the farmer's organization, including the availability of a business/investment plan, agronomic skills and experience, and alignment with project-supported value chains. The implementation arrangements and grant delivery structure will be reflected in the PIM and harmonized with similar programs under implementation by the Government of Mozambique.

44. **Component 4: Project Management and Monitoring and Evaluation SDR 4.18 million (US$6 million equivalent of IDA grant).** The objectives of this component are to: (a) ensure project management efficiency and efficacy; (b) ensure the use of resources in accordance with the project's objectives, procedures, and fiduciary guidelines; and (c) finance M&E activities during the project implementation and report regularly on implementation status and performance and the achievement of project indicators and development objective. Specifically, the project will finance: (a) incremental operating costs for project implementation at the national level led by the AIMU and at the provincial level led by the Provincial Project Implementation Units (PPIUs); (b) technical assistance and incremental operating costs for irrigation systems planning, design, construction supervision, and training; and (c) the establishment of a management information system (MIS) for irrigated agriculture and the project M&E system.

45. **Component 5: Contingency Emergency Response (US$0).** This component will provide immediate response in the event of an eligible crisis or emergency. This is a 'zero dollar' Contingency Emergency Response Component. In the case of an adverse event that causes a major disaster, the Government of Mozambique may request the World Bank to channel some financial resources from this component to address the emergency. If the World Bank agrees, part of the project resources will be reallocated to this component to finance any critical emergency activities under this component. This

component will facilitate access to rapid financing by allowing reallocation of uncommitted project funds in the event of a natural disaster, either by a formal declaration of a national or regional state of emergency or upon a formal request from the Government of Mozambique. Component 5 will use the IDA Immediate Response Mechanism.

B. Project Cost and Financing

46. **The project cost is US$57 million.** The project cost (SOP1) will be financed through an IDA grant of US$55 million and contribution from beneficiaries of US$2 million. Table 1 shows a summary of the project costs and financing structure. A detailed cost breakdown is provided in annex 1.

Table 1. Project Costs and Financing

Project Components	Project Cost (US$, millions)	IDA Financing (US$, millions)	Counterpart Funding (US$, millions)
Institutional Capacity Building	8	8	0
Smallholder Irrigation Development and Management	28	28	0
Agriculture Intensification and Market Linkages	15	13	2
Project Management and Monitoring and Evaluation	6	6	0
Total Costs	57	55	2
Total Project Costs	57	55	2
Front End Fees			0
Total Financing Required	57	55	2

C. Lessons Learned and Reflected in the Project Design

47. The project design draws lessons from the previous agriculture and irrigation projects in Mozambique, particularly PROIRRI, which laid the foundation for irrigation subsector development; the early lessons from SUSTENTA; and global experiences and trends on irrigation development. The key lessons, which are reflected in the project design, are summarized in the following paragraphs.

48. **Capacity development of the MASA is critical for sustainable irrigation.** Under PROIRRI implementation, there were gaps on quality assurance for engineering design of irrigation schemes and supervision of construction and contract management. The quality assurance was mostly left to external service providers with little supervision capacity from INIR. This project will finance the establishment of an AIMU with capacity for technical design and supervision, which will lead the implementation of the irrigation schemes. This team will consist of qualified experts to lead an efficient operation and expansion of irrigated agriculture in the project areas. This unit will also be responsible for developing and updating engineering design tools, guidelines and norms for each phase of irrigation development that will result in improved quality of construction and operation of the irrigation schemes.

49. **Cost reduction can be achieved through clustering of irrigation schemes for design, construction, tendering, and improved technical due diligence.** Under PROIRRI, the unit cost of construction of irrigation schemes varied significantly and the overall average cost was US$12,000 per ha.

Later in the implementation of PROIRRI, significant cost reductions were achieved where contractors were awarded more than one scheme and could rationalize resources used during the construction. Also, limited oversight from INIR (due to capacity limitations) led to limited accountability on both the design firm and contractor. Thus, the proposed project will benefit from the technical team expertise to provide due diligence on design concepts to favor the most appropriate and less costly technologies and ensure the required levels of technical supervision during construction. Where possible, the project will also consolidate some irrigation schemes into larger and more attractive tender packages to increase the level of competition to reduce per unit construction cost.

50. **Gravity-fed irrigation systems are more suitable for smallholder farming and appeared to be more sustainable in rural areas of Mozambique.** Gravity-fed systems with open canals have lower O&M cost than any other systems used under PROIRRI, despite relatively lower efficiency of water use and distribution when surface distribution is used. The use of pumping systems has proven to be challenging in some of the rural communities where access to electricity and spare parts for the equipment is limited. Many beneficiaries had challenges mobilizing resources for energy generation and replacing broken parts. The project design was prepared with these lessons in mind, and therefore in case of pumping, the project will favor solar powered pumps. Diesel and electric pumping will be considered on an exceptional basis and only, if at all, for high-value crops. Also, innovative approaches for efficient water distribution using gravity-fed systems with canals will be explored as part of the research and technology development, including capacity building for the WUAs on water management.

51. **Market linkages of smallholder farmers with private sector are critical to enhance agriculture productivity and sustainability.** PROIRRI supported the rehabilitation of irrigation schemes for three business lines: rice, horticulture, and out-grower crops. Out of the three business models, the out-grower model has proved to be the most effective and sustainable in the long term. PROIRRI experience with out-grower schemes involving private agribusiness companies has been positive. The model involves provision to out-growers of technical advice, on-credit supply of modern agriculture inputs, and purchase of final produce at an agreed price by private agribusiness companies. The model has created incentives for farmers to deliver agreed qualities and quantities at a specific time resulting in a win-win situation for both smallholders and agribusinesses.

52. **Cost-sharing grants (matching grants) promote adoption of modern agricultural technology to enhance productivity and profitability.** Matching grant mechanisms are being used in several World Bank-financed projects worldwide and were likewise implemented under PROIRRI and contributed to increased productivity and crop intensity of vegetable crops. Building on this experience, IRRIGA will promote a demand-driven approach to ensure local ownership and sustainability.

53. **Training and capacity development at the farm level is critical for efficient use of resources.** Because the agriculture extension system is weak in Mozambique, farmers have limited knowledge about modern technology and the role of market linkages for promoting modern commercial agriculture. In this context, appropriate training and capacity development of smallholder farmers will enhance productivity, profitability, and efficient use of public and private resources.

54. **Integration of implementation arrangements with the provincial directorates of agriculture is essential to promote project ownership.** PROIRRI had small PPIUs in each of the provinces with only three staff (project coordinator, driver, and transaction assistant). The linkage with the provincial authorities

and the integration of the project activities was variable in the three beneficiary provinces. To increase sustainability of the irrigation systems and ownership, the project will be implemented at the national and provincial levels. The AIMU at the central level will coordinate the implementation arrangements with the provincial departments of agriculture and district services of economic activities.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

55. The project will be implemented by the MASA at three levels of implementation: national, provincial, and district levels (figure 2). Detailed implementation arrangements are provided in annex 2 and will be further detailed in the PIM.

56. **At the national level.** The MASA will be responsible for the overall implementation of the project in consultation with the other relevant ministries to ensure that the project activities are consistent with the national policies and programs. A Project Coordination Committee (PCC), chaired by the minister (or—by delegation—by the vice minister), with participation of the MOPH, MITADER, MIC, National Directors of MASA and the Provincial Directors of DPASA of the four beneficiary provinces, will have the overall decision-making responsibility regarding the management of the project; review decisions made by the AIMU; and issue directives to guide project interventions, methods, and criteria. The PCC will be responsible for the approval of work plans and budgets and oversight on compliance with World Bank fiduciary requirements. The Permanent Secretary of the MASA will be the executive-level head responsible for strategic direction of the project with support from the Technical Committee composed of the national and general directors of MASA. The AIMU will be responsible for day-to-day management of the project and will comprise a program coordinator, a communication specialist, an environmental safeguards specialist, a social safeguards specialist, an M&E specialist, a procurement specialist, a FM specialist, and the lead specialists for TDST. The detailed composition of the TDST is presented in annex 2.

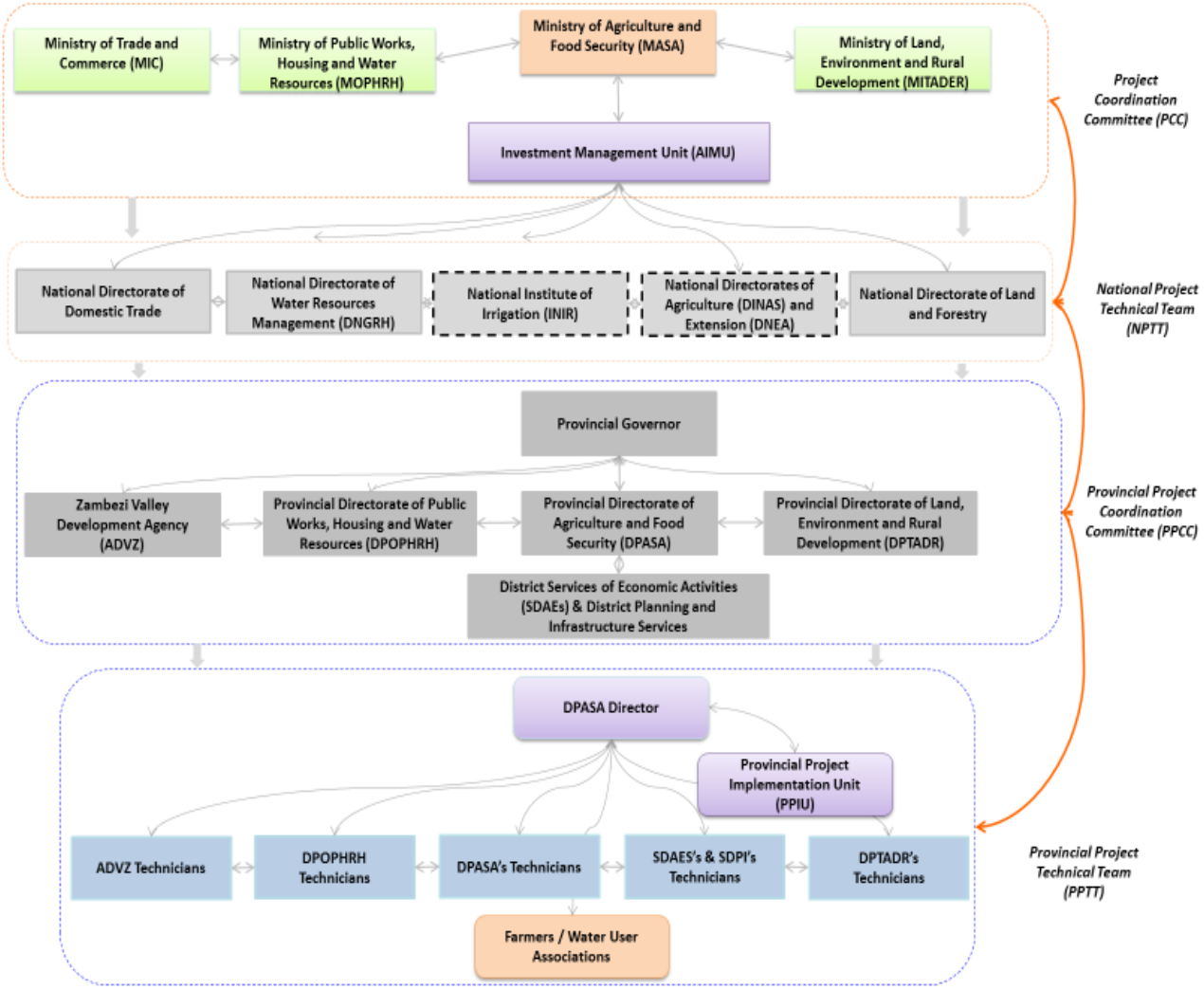
57. **AIMU.** The MASA will establish an AIMU at the national level that will: (a) be responsible for the project coordination and management of fiduciary issues in conformity with the standards and requirements agreed with the World Bank; and (b) manage the project in accordance with the Financing Agreement and other project documents such as Project Appraisal Document (PAD) and the PIM.

58. **At the provincial level.** Each beneficiary province will have a PPIU with a minimum of five staff, including provincial coordinator, irrigation engineers, and safeguard team. The PPIUs will collaborate with beneficiary districts to facilitate the project implementation.

59. The Provincial Director of Agriculture (within the provincial government) will be responsible for the strategic direction of the project at the provincial level with support from the PPIU headed by a Provincial Project Coordinator (PPC) that will be responsible for day-to-day project management. The Provincial Directorate of Agriculture will be responsible for implementation of the project in coordination with the provincial government directorates and district governments. A Provincial Project Coordination Committee (PPCC), chaired by the Provincial Governor, will oversee project implementation, including monitoring project progress at the provincial level and making decisions in line with the objectives and

institutional arrangements that are consistent with the project document and Legal Agreements. The PPCC will approve and monitor the implementation of activities at the provincial level.

Figure 2. IRRIGA Implementation Arrangements



60. Activity implementation on the ground will primarily be handled by service providers with involvement of local technical staff at the Provincial Directorate of Agriculture. Component 2 will hire qualified engineering firms to undertake the design of the schemes and supervise the construction based on terms of references (TORs) agreed with the World Bank. Component 3 will be implemented by service providers hired on a competitive basis, based on TORs also agreed with the World Bank. Component 3 will provide training and demand-based support in the e-vouchers for eligible farmers and farmer groups for production, processing, and marketing subprojects. A specific cost-sharing grant will be prepared by the project to guide the implementation of the grants in accordance with the policies of the Government of Mozambique and World Bank. The AIMU and the PPIU will be responsible for overall coordination of implementation of the approved projects.

61. **At the district Level.** Agricultural activities and marketing take place at the district level. Given that the capacity is in most cases weak, the project will provide capacity building and targeted technical assistance. The District Office of Economic Activities (*Serviços Distritais de Actividades Económicas,* SDAE) will be responsible for project implementation at the district level, in coordination with District Services for Planning and Infrastructures and in consultation with the District Administration. The SDAE will be actively involved in site identification and general oversight of the irrigation infrastructure development at the district level and identification and selection of subproject proposals for matching grants with the administrator's guidance. The preparation and implementation of subprojects for matching grants is at the level of irrigation scheme and smallholder farmer groups and associations. To effectively participate in the implementation of the project, local SDAEs will have to carry out their work in accordance with their usual functions (training, extension, technical advice, among others), but they will require capacity building. To facilitate this process, the project will: (a) assist in capacity building; (b) provide technical assistance; and (c) engage service providers to assist local SDAEs. The farmers will also be involved in the design and construction works for the irrigation schemes and will be fully responsible for O&M of the schemes.

B. Results Framework and Monitoring and Evaluation

62. **The Results Framework (RF) lays out the intended project results, including indicators of progress made and results achieved.** Indicator data will be collected at farm, irrigation scheme, and organizational level (for example, Component 1 results indicators will be collected from INIR, DPCI, AIMU; Component 2 results indicators will be measured at irrigation scheme level; and Component 3 at farm, WUG, WUA, producer organizations, SME level). Data will be collected largely through progress reporting by implementing agencies and their service providers (including verification of deliverables) and through household, community, and organizational surveys.

63. **The project will establish a Progress and Results Information Monitoring System (PRIMS) at the MASA to monitor the implementation progress and the project outcomes.** The system will be programmed as a web-based data reporting and management tool that will help: (a) collect, document, analyze, and generate reports on project progress and results indicators; (b) cross-reference annual work plan and budget tables with progress and results information; (c) integrate progress and results data of all subprojects (that is, monitoring of business plan implementation); (d) store and document geo-referenced data on seasonal water flow and use, agricultural production at the plot level, and input/output markets; and (e) serve as a project-related grievances monitoring database. The PRIMS will be procured in the first year of implementation and financed under Component 4.

64. **The RF and the arrangements for monitoring results are reported in section VII.** The RF will be used to periodically track progress in achieving the project's objectives. Also, the critical processes to achieve the project's objectives, such as procurement, safeguards, technical assistance, and institutional development activities, will be closely monitored. The project will rely on existing data sources at the MASA and other Government agencies including the National Institute of Statistics, supplemented by regular data collection, and special surveys and assessment updates will be carried out by contracted specialists. Both quantitative and participatory M&E methods will be used to assess the social and gender inclusion of project participants. All teams involved in the implementation of the project will participate

in the process of data collection, compilation, analysis, and use. The project will finance MIS costs under Component 4.

65. **The MASA will recruit an M&E specialist using project funds to be responsible for tracking progress on project results indicators.** The M&E specialist, reporting to the AIMU, will be responsible for managing the PRIMS. The PRIMS will include an activity-specific database aligned with the annual activity plans and the M&E plan for all outcome and intermediate performance indicators. The M&E specialist will be responsible for regularly updating the PRIMS and producing quarterly progress reports. Two evaluations of project outputs and outcome will be commissioned, first at midterm and the second at completion. An M&E unit will be established within the AIMU and the MIS and procedures for data collection and reporting will be prepared to the World Bank's satisfaction. The project will finance M&E costs, including the impact evaluations (mid-term and completion) as well as the Implementation Completion and Results Report (ICR).

C. Sustainability

66. **The project is consistent with the Government of Mozambique's strategies for irrigation development and there is full commitment by the Government to the project outcomes at all levels.** The project is aligned with the Government's five-year plan, PNISA and PNI, as well as the provincial and district five-year and annual plans for agriculture development and food security. The Government is committed to gradually increase the capacity for promoting irrigated agriculture services and the number of agriculture extension officers to assist smallholder farmers. The project will finance the establishment of the AIMU, which is expected to significantly increase the capacity to mobilize financing for implementing the agriculture development programs. In addition, the project interventions are expected to increase cropping intensity, crop productivity, production, and profitability of irrigated agriculture through the adoption and use of improved agricultural practices and technology. Both interventions are critical for the sustainability of the project outcomes over time.

67. **The project design includes several interventions to enhance project sustainability.** First, priority is given to capacity development and institutional strengthening of the MASA for investment management, agriculture and extension services, farmers' organizations, local service providers such as input suppliers, traders, NGOs, and local government institutions. Second, the project is designed to improve productivity, develop and strengthen market linkages, and improve market access. Project investments are demand-driven and project beneficiaries' knowledge and capacity will be strengthened to manage them. Third, most project activities will be demand driven and owned and managed by project beneficiaries. This significantly increases the prospects that they will be sustained after project completion. Finally, as part of project sustainability, particular focus will be given to the development of O&M for all schemes, and WUGs and WUAs will be trained in financing and implementing the O&M activities.

D. Role of Partners

68. **The Government of Mozambique has been mobilizing resources from various development partners to finance the PNI.** Different development partners are expected to finance parallel and/or subsequent projects to help achieve the proposed outcomes under the PNI. So far, the Government,

International Fund for Agricultural Development (IFAD), and the African Development Bank have committed about US$70 million for the rehabilitation and expansion of irrigated land in the country. The proposed project will complement these initiatives by scaling up the achievements of PROIRRI. It is also expected that the establishment of the AIMU will help the Government in mobilizing additional funding to implement PNI.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

69. **The overall risk of the project is considered Substantial.** A brief explanation of the key risks and the proposed mitigation measures are summarized in the following paragraphs.

70. **Political and Governance Risks - Substantial.** The country's political landscape remains fragile and it still faces the sequels of the civil war, which ended in the early 1990s. Persistent poverty, lack of inclusiveness, and unequal distribution of the economy have led to violent tensions between the former warring parties and a break in the formal peace agreement in 2013. These tensions were softened in 2016, when both parties embraced a pathway for a greater decentralization and inclusiveness in the country's economy. Moreover, the project is exposed to risks related to corruption and fraud. The 2016 World Bank Country Policy and Institutional Assessment shows a gradual decline of government effectiveness, control of corruption, the rule of law, and voice and accountability over the past several years. These are substantial country risks that reach deep into most aspects of public services delivery, at both the national and local levels. These risks will, to some extent, be mitigated by prioritizing the provinces with the highest poverty rates and promoting more inclusive growth and development of the rural economies, as well as building broad public support for the project through enhanced communication. Furthermore, the project will support strengthening of government institutions at the national and local level to improve effectiveness on service provision and governance.

71. **Macroeconomic Risks – High.** The project is highly exposed to macroeconomic risks. Rapid economic deceleration due to low commodity prices and the disclosure in April 2016 of previously unreported debt compound Mozambique's macroeconomic challenges. Admission of previously undisclosed loans worth US$1.4 billion (10.7 percent of GDP) revealed that public debts reached 120 percent of GDP in 2016, shifting the risk of debt distress to High. Public expenditures declined significantly, partly due to suspension of direct budget support from donors, a decline in foreign direct investment, and a sharp currency depreciation. GDP growth fell from 6.6 percent in 2015 to 3.6 percent in 2016. Although the economy is showing some positive signs of recovery, with the tight fiscal and monetary reforms, the economic prospects remain uncertain. Therefore, the prevailing economic conditions may undermine the achievement of the project objectives, particularly with regard to high cost of inputs, limited levels of private investments, and limited availability of counterpart funds for key project activities. These risks have been mitigated by including substantial price contingencies in the project cost estimates and by limiting the counterpart funds to small in-kind contributions related to logistical support under Component 3.

72. **Sector Strategies and Policies - Substantial.** The project is substantially exposed to uncertain implementation of sector strategies and policies. The sector policy framework and strategies are adequate

for the purposes of the project and most of the critical policy reforms for irrigation development have been implemented with support from PROIRRI. However, implementation of some of the key policies remains a challenge, given the limited availability of financial and human resources. Furthermore, the irrigation subsector lacks the regulatory tools required to ensure efficient service delivery and balance the farmers' and the state's interests on irrigation planning and service delivery.

73. **Technical Design of the Project - Substantial.** The risks associated with the technical design of the project are assessed as Substantial. This accounts for possible delays in the preparation of designs including the fact that the Project Implementation Unit (PIU) is not yet established. To reduce implementation delays, the team prepared most of the TORs for the design work during appraisal to be launched for procurement as soon as the project is approved.

74. **Institutional Capacity for Implementation and Sustainability - Substantial.** The overall institutional capacity in the agricultural sector (including INIR) remains weak, hence the substantial risk rating. There are gaps on both legal and technical processes and procedures for all the phases of irrigation development, particularly engineering design, supervision, and operation of the irrigation schemes. This was evident under the implementation of PROIRRI because there were serious gaps on quality assurance for engineering design, supervision, and contract management. These risks will be addressed through: (a) the establishment of AIMU and hiring of the TDST, which will be responsible for technical oversight for irrigated agriculture investment planning and implementation in the country; and (b) substantial technical assistance to support preparation and supervision of irrigation infrastructure investments planned under the project, and O&M of the irrigation schemes.

75. **Fiduciary - High.** The AIMU is yet to be established under the MASA. Initially, the AIMU will only manage IRRIGA. For preparation of IRRIGA, the MASA relied on existing capacity at INIR through the implementation of PROIRRI. After establishment of the AIMU, this agency will be assessed by the World Bank to evaluate its capacity to provide reasonable assurance that financing proceeds will be used for intended objectives and in line with the Financing Agreement and other relevant project documents. Because the AIMU is yet to be established, the fiduciary risk is High. The fiduciary risk will be mitigated as follows: (a) the AIMU is established, housed, and equipped to perform its role; (b) qualified procurement, FM specialists are hired with TORs agreed with the World Bank; (c) the AIMU will submit unaudited interim financial reports (IFRs) on a regular basis, which will be reviewed by the World Bank FM Specialist; (d) the project's transactions will be internally audited at least twice a year; and (e) the project's financial statements will be externally audited by independent private auditors under TOR to be agreed with the World Bank.

76. **Environmental and social - Substantial.** The project is exposed to environmental risks related to water quality deterioration along the main river basins due to increased human activity. There are also risks associated with natural disasters and climate change impacts on weather and water resources availability. These risks have been assessed and adequately considered as part of the technical design of the project. Overall, it is expected that the project will result in significant socioeconomic improvements.

77. The project may however have some unintended negative environmental and social impacts such as soil erosion, salinization, water pollution with fertilizers and pesticides, health risks for farmers due to agrochemicals usage, limited water availability for downstream users, and biodiversity loss in mountain water springs. Expansion of irrigation areas may also result in land acquisition. Limited water availability

for downstream users may potentially result in loss of crops and livelihoods and therefore may cause potential conflicts between water users. Although irrigation works to be undertaken under IRRIGA will be of small scale, with limited impacts, some of the construction works may require the hiring of an external work force, with the risk of labor influx in rural areas. Such risks should be manageable and will be adequately addressed through application of standard World Bank safeguard instruments (Environmental and Social Management Framework [ESMF], Resettlement Policy Framework [RPF], Environmental and Social Impact Assessment (ESIA)/Environmental and Social Management Plan [ESMP], and Resettlement Action Plan [RAP]). The screening procedure and arrangements developed in the ESMF will ensure adequate mitigation/compensation of the potential environmental and/or social impacts. In addition, the MASA will strengthen its capacity on safeguards by hiring additional safeguards staff at the AIMU and the PPIUs. All contracts will include the cost of implementing ESMPs.

78. Under PROIRRI the ESMPs for the subprojects (32 irrigation schemes) were recently approved. The PIU has submitted a remediation plan which needs to be consolidated and implemented, to which end it will be necessary to ensure that sufficient time and resources are allocated. The MASA's capacity to implement sound safeguard management procedures is low, but improving; therefore, although global environmental and social impacts from IRRIGA are considered to be moderate, the environmental and social risk to the overall project, including its capacity to perform adequate project safeguard management and procedures, is substantial.

79. **The project is also exposed to weather- and climate-related risks.** Mozambique is highly exposed to climate change. The country is frequently hit by extreme climate-related events such as floods and droughts, which are expected to worsen both in terms of frequency and intensity. Extreme droughts will lead to a reduction in the amount of water available for irrigation, while excessive rainfall and floods result in river overflow, inundation of farms, and loss of crops, which has significant socioeconomic impacts on the poor smallholder farmers. In addition, both droughts and floods can deteriorate water quality and that may adversely affect the quality of the produce. The project will mitigate these risks by collaborating with IIAM and support them in the development of drought-tolerant varieties and building climate-resilient infrastructure, as well as by strengthening the capacity of the farmers associations and Government entities to improve preparedness and build resilience to climate shocks. A contingency emergency response component is part of the project design to increase the flexibility of the MASA to respond to any climate-related events affecting the project areas or related irrigation infrastructure and services.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

80. Rationale for Public Intervention. Most of Mozambique's critical infrastructure including irrigation was destroyed during the civil war. The project will primarily support the rebuilding, rehabilitation of irrigation schemes, including agricultural value chain infrastructure, institutions, and production capacity. The benefits generated by this support will be reinvested in part in the creation of new infrastructure and production capacity, thus serving as a catalyst for the development of additional private assets even after the project has ended.

81. The World Bank Value Added. The project is well aligned with the priority themes of the PDSA and PNISA and the overall goals/strategic themes of the Agriculture Global Practice, which seek to provide financing and advice to address critical constraints to agriculture sector growth, and will contribute to key areas of growth. This notably covers: enhanced access to markets for smallholders, linking them to private sector agribusiness and to financial institutions; capacity building and infrastructure to reduce post-harvest losses; access to improved technologies and technology transfer; promotion of CSA; and due consideration of nutrition-sensitive agriculture. Ultimately, the project will contribute to the World Bank's twin goals of ending extreme poverty and promoting shared prosperity.

82. Beyond financing, the added value arises mainly from the World Bank's technical input based on international experience for similar smallholder and value chain development projects; introduction of innovative financing mechanisms with enhanced linkages of smallholders with private sector; support for capacity development of farmers' organizations and other value chain actors during implementation through training-of-trainers methodologies (notably for the ex-ante preparation and financial analysis of subprojects/business plans); and knowledge sharing and communication. By providing this important support, the World Bank will complement—and aim to correct deficiencies of—national sources of expertise and business advisory support services to farmers, resulting in increasing the project's development impact in ways that go beyond what could be realized by exclusive reliance on the Government's own institutions or existing national consulting firms.

83. In addition, as an important development partner in promoting economic and agricultural development in Mozambique, the World Bank's involvement will help formulate a harmonized framework among development partners for supporting smallholder agriculture. Because of its convening power, the World Bank can maintain a dialogue and work with other development agencies that are active in smallholder agriculture in Mozambique. For example, the International Fund for Agricultural Development has indicated openness to work within the same framework of IRRIGA to reduce duplication and improve the impact of the development assistance provided.

84. **The project is expected to result in increased productivity due to access to improved agriculture services and water for irrigation.** Approximately 9,000 farmers are expected to benefit from improved irrigation and agriculture services, resulting in significant improvements in agriculture productivity and production. Furthermore, the project is expected to help reduce inequalities in rural areas by improving access to new and improved technologies and access to markets. Higher-level benefits include improved nutrition, poverty reduction, and improved food security. In addition, the MASA's capacity to deliver agriculture services will significantly improve because of the project interventions.

85. **The financial analysis considers the estimated benefits from the viewpoint of individual farms, while the economic analysis considers the estimated incremental benefits and costs of the project investment to society.** Details of the analysis and assumptions are included in annex 5. Tangible and quantifiable benefits expected from the project include improved crop productivity and marketed production for farmers. This will be achieved by: (a) improved access to irrigation water; (b) adoption of new improved technologies by farmers; (c) investments in value addition by SMEs; (d) improved access to technical assistance to farmers; (e) reduced transaction costs; and (f) improved access to input and output markets for farmers. The project is also expected to generate several institutional benefits that cannot be quantified. These include an improvement in the technical and institutional capacities of the MASA and INIR, which is needed for the implementation of the PNI.

86. **The results of gross margin analyses are summarized in annex 5 (table 5.3), along with assumed yields (detailed assumptions on other technological coefficients and market prices are reported in annex 5).** Vegetables are the most profitable crops, followed by sugarcane. The profitability of rice improves when rice is harvested twice per year (the table only reports yields per single production cycle). Maize and sweet potato have the lowest gross margins and are the crops for which the project will not provide support.

87. **The economic and financial analysis indicates that the project is economically and financially justifiable with a positive net present value (NPV) and an economic internal rate of return (EIRR) of 21 percent.** With a discount rate of 5.5 percent and a 20-year time horizon (including the six years of project implementation), the economic net present value (ENPV) is US$44.9 million, which is equivalent to US$4,984 per beneficiary. This was calculated assuming that the 25 percent of the land irrigated through the rehabilitated schemes is cultivated with rice, 10 percent is cultivated with sugarcane, and the rest with vegetables.

88. **A sensitivity analysis was conducted, which shows that the project is not sensitive to moderate cost increases, delays in the accruals of benefits, reduction in expected yields and in farmers' participation.** Reasons that could make the ENPV negative are an uptake of improved practices and a use of rehabilitation irrigation schemes by 30 percent of target farmers (instead of 70 percent as in the baseline scenario) or a simultaneous reduction in yields for all crops included in the with-project scenario of 30 percent (see table 5.5).

89. **The project will generate savings in foreign exchange.** Mozambique is a net rice importer. If 25 percent of the land irrigated with the rehabilitated irrigation schemes is cultivated with rice, the project will cause an additional rice production of 6,450 tons per year (once farmers reach expected yields and cropping intensity). The corresponding savings in foreign exchange will be approximately US$1.3 million per year. Given that the incremental quantity of rice that will be produced due to the planned activities is about 2 percent of imports, no reduction in farm-gate prices is expected.

90. **A crucial expected impact of the project is a reduction of rural poverty.** All farm models envisaged in the analysis will raise household incomes above the national poverty lines for rural areas in the target provinces (table 5.1). The same conclusion holds in case the international poverty line of US$1.9 (2011 purchasing power parity) is used. Considering that on average each household has 5.9 members,[8] approximately 53,100 persons will raise their income above the mentioned poverty thresholds. This is equivalent to a reduction of the poverty headcount ratio for rural poverty at the national level of 0.6 percent.

91. **The project is also expected to have impacts on employment creation.** More specifically, the project will create 1,450 full-time jobs in the agricultural sector. In addition, estimates included in annex 5 suggest that the rehabilitation works funded by the project are expected to create 195 jobs for three years in the construction sector.

[8] *Source:* PROIRRI baseline survey (2014).

B. Technical

92. **The technical design of the project is based on solid experience from PROIRRI, sound engineering assessments, and extensive consultations with key stakeholders.** The analysis dealt with the following technical aspects of the project during the process of designing IRRIGA: (a) Institutional capacity building; (b) selection of priority areas and investments; (c) improved market linkages and modernization of the agricultural sector; (d) investment in farm assets and improved technology through matching grants, (e) responsiveness to climate change; and (f) human nutrition.

93. **The design of the institutional capacity-building activities to be funded by the project is based on extensive gap analyses and institutional assessments of the MASA and related institutions.** Under PROIRRI, several institutional assessments have been carried out and consolidated as part of the PNI. The key capacity gaps are assessed in the PNI. Lack of appropriate regulatory tools and norms for irrigation were identified as a critical limitation for quality control on irrigation development. In addition, the inability of INIR and other MASA departments to hire qualified staff is a key constraint to the implementation of the PNI. Also, capacity limitations at the farm level will need to be addressed to sustain irrigation and agriculture development in the country. Capacity development will therefore cover several critical areas, including irrigation, extension, research, data and statistics, market information systems, and policy analysis as well as managerial and organizational skills.

94. **The selection of priority investments and project areas is based on a detailed countrywide assessment of irrigation potential, including the water and land availability assessment.** An extensive inventory has been carried out to identify arable land, existing markets, and farmer groups involved in irrigated agriculture. Geo-referenced systems and satellite imagery were used in assessing the irrigation potential in the major river basins, using an integrated water resources management approach and multi-criteria analyses for investment prioritization. Moreover, under PROIRRI, lessons were learned on appropriate methods for technology selection and tender concepts to maximize competition and reduce per unit construction costs and, at the same time, ensure good quality construction. Where possible, clustering of schemes will be explored to reduce construction costs and maximize the use of resources and associated benefits.

95. **Improved market linkages and modernization of the agriculture sector is critical to enhance productivity and profitability.** The IRRIGA design not only incorporates critical lessons about technical aspects from PROIRRI, but it also adds new activities that are critical for promoting transformation of the agriculture sector from subsistence to commercial agriculture. Positive experiences, from other countries in Africa, such as Angola and Nigeria, that are involved in modernizing the agriculture sector, were also considered. These experiences have shown that a package of improved institutional capacity, service delivery, investment in productive assets, and market linkages can be important to expedite commercialization of subsistence agriculture at the level of smallholder farmers. The project's design promotes the transition from subsistence agriculture to market-oriented agriculture through enhanced market linkages, post-harvest management, and value addition.

96. **Investments in farm assets and improved technology are promoted through training and matching grants.** IRRIGA is designed to provide training and agricultural investment support in areas related to agricultural intensity, productivity, production, marketing, and value addition. As far as agricultural production is concerned, the focus will be on promoting improved agricultural practices, use

of modern agricultural technology, and irrigation. Irrigated agriculture will facilitate multiple cropping and the cultivation of high-value crops such as vegetables. A cost-sharing mechanism for matching grants will be used to support investment subprojects. This matching grant mechanism was implemented under PROIRRI and has been used as a best practice in other countries in Africa. This approach will not only promote increase in cropping intensity, productivity, production, and competition but will also be demand driven, thereby promoting local ownership and sustainability.

97. **Adaptation to climate change.** A climate risk assessment was performed using the climate screening tool, and results were used to for the selection of appropriate technology and the identification of priority capacity-building activities. Crop production within the target locations is highly sensitive to climate variabilities and falls short of expected yields. Also, dependence on rain-fed agriculture further exposes households to climatic shocks such as droughts that lead to increasing reliance on other natural resources such as clearing land and forests for charcoal production. When there is available rainfall, floods have been known to wreak havoc as recently as 2018. The project will promote the CSA and climate adaptation using improved technologies and conservation agriculture. The proposed potential adaptation activities planned to help address the above vulnerabilities include: (a) investments in irrigation infrastructure; (b) increased investments in knowledge and capacities, at the national level, and in the incorporation of climate change and climate vulnerabilities in agricultural policies and in particular irrigated agriculture; (c) investments in improved agronomic and management practices and applied research and technology development and dissemination; (d) increased investments in extension services—skills and personnel at the local level; (e) continued investments in irrigation infrastructure; (f) investments in weather and market information systems; and (g) investments in knowledge, skills, and capacities among smallholders and providing matching grants to increase their production and productivity in tandem with facilitating market access. The total expected climate co-benefit is 49 percent of the total project cost.

98. **Human nutrition.** Smallholder farming households are both producers as well as consumers of food crops. IRRIGA will promote only feasible value chains, beginning with at least three crops—rice, cabbage, and onions,—which are known to contain high levels of energy, vitamins, and minerals. Other crops, mainly fruit crops are likely to be added as part of the out-growers support. In this context, IRRIGA is likely to contribute in three main frontlines for improving human nutrition for households. First, through higher food production, particularly rice and vegetables, household food security and nutrition will improve. Beneficiary households will be encouraged to consume part of their production to improve their micronutrient and vitamin intake. Second, through increased marketed surplus of food crops, food security and nutrition in the region will improve, as people will generally have more access to vegetables and cereals. Third, the proposed training and capacity development programs under the FFSs, including training for extension agents and farmers, will include food and human nutrition aspects to enable the farmers' households in maximizing the nutritional benefits of their products for their own consumption and their communities in general.

C. Financial Management

99. An FM assessment was carried out in accordance with the World Bank's Policy and Directive for Investment Project Financing (IPF) and the Financial Management Manual for World Bank IPF Operations issued by the FM Sector Board on March 1, 2010, and last reviewed on February 10, 2017. The overall

conclusion of this assessment is that the proposed project's FM arrangements have an overall residual FM risk rating of Substantial as the PIU, the AIMU, has not yet been established. However, the proposed FM arrangements are considered adequate and satisfy the World Bank's minimum FM requirements under World Bank Policy and Directive for IPF.

100. The PIU, the AIMU, to be established under the MASA will have overall fiduciary responsibilities for project implementation. The project FM specialist, working under the AIMU, and supported by two accountants will have overall responsibility for project FM matters. The appointment of a qualified and experienced project FM specialist is a condition of effectiveness, and two experienced and qualified accountants will be appointed within the timeline as further detailed in the PIM. The project funds, expenditures, and resources will be accounted for using the Government's integrated financial management information system (IFMIS), the e-SISTAFE, and complemented by an automated accounting software to be purchased and installed within the time set to be set in the PIM (condition of effectiveness). The basis of accounting will be Financial Reporting under Cash Basis. The implementing agency will make use of Report-Based Disbursement procedures and the following disbursement methods may be used under the grant: (a) reimbursement; (b) advances; (c) direct payments; and (d) special commitments. The project implementing agency will prepare quarterly unaudited IFRs and provide such reports to the World Bank within 45 days of the end of each calendar quarter. The project financial statements will be audited annually and the audit report will be submitted to the World Bank no later than six months after the end of each financial year.

D. Procurement

101. **Procurement procedures.** The borrower will carry out procurement under the proposed program in accordance with the World Bank's 'Procurement Regulations for IPF Borrowers' (Procurement Regulations), dated July 2016 and revised in November 2017, under the 'New Procurement Framework (NPF)', and the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated July 1, 2016.

102. **Procurement arrangements.** The MASA will be responsible for implementation of the proposed program. Within the MASA, INIR, the Directorate of Agriculture Services and Forestry (Planted Forestry), National Directorate of Extension Services, and IIAM will be the lead agencies responsible for implementing this program. Other agencies, provincial departments of agriculture, and district-level institutions as well as other partners will also play a role. The AIMU, which will be the PIU, is yet to be created and the MASA is yet to become familiar with the World Bank's NPF. The AIMU will include procurement responsibilities and will comprise a senior international procurement specialist supported by a procurement assistant if needed.

103. **Procurement capacity assessment.** The World Bank will conduct the Procurement Capacity Assessment as soon as the AIMU is established and the risk will be redefined and appropriate mitigating measures to strengthen the capacity will be established.

104. **Procurement risk.** The procurement risk associated with the project in view of the absence of implementation units (AIMU) and staff indicated above is High.

105. **Project Procurement Strategy for Development (PPSD).** Because the project will follow the World Bank's New Procurement Policy and the NPF), the borrower prepared a PPSD. The World Bank procurement team provided the necessary support and guidance to the borrower in preparing such document. Based on the existing information, a simplified PPSD was used for this project. The PPSD set out market approaches and selection methods to be followed during project implementation, as well as procurement risks and mitigation measures and a Procurement Plan for the next 18 months was prepared.

106. Considering that: (a) national procurement systems have been assessed by the World Bank and found acceptable subject to minor modifications; and (b) there is sufficient number of qualified contractors on the local market, procurement of contractors for irrigation schemes construction will be conducted through a national approach but open to qualified foreign contractors without limitations if they wish and the procedure will be Request for Bids. This approach will be used for all construction contracts with the value below US$5,000,000.

107. On the other hand, the capacity of local design consultant's market is not sufficient to ensure required quality of designs; therefore, an international approach under Quality and Cost-Based Selection (QCBS) method will be used for the procurement of consulting firms (one for each of the four provinces in the project location). These companies will conduct studies, prepare designs, and supervise the construction.

108. For the selection of consulting companies, which will be providing irrigation schemes management and training (Subcomponents 2.2 and 3.1 of the project), an international approach will be used with the short lists limited to NGOs.

109. For the three critical positions in the AIMU (project manager, procurement specialist and FM specialist) procurement method will be the one prescribed by Sub-clause 7.38 of the World Bank's Procurement Regulations.

110. For smaller-value low-risk procurement of goods and services for the AIMU and PPIUs, shopping, Selection Based on the Consultants' Qualifications, and international consulting services (ICS) will be used.

111. The proposed procurement approaches are fit for purpose and will provide value for money, through ensuring that designs and construction of irrigation schemes are delivered in a cost-efficient and timely manner and are of high quality.

112. The following (table 2) major procurement risks were identified and mitigation measures proposed.

Table 2. Procurement Risks and Mitigation Measures

Risk Description	Description of Mitigation
The PIU is yet to be created and the MASA is not familiar with the World Bank's NPF.	The AIMU will be established and fully staffed with dedicated and qualified procurement personnel before the effectiveness.
Delays/poor quality of procurement work due to inadequate organizational arrangements and technical staffing	Adequate technical and safeguards personnel will be hired through the duration of the project.

Poor quality/untimely delivery of designs by consultants	(a) Contracts will be initially signed for two years with extension based on the performance. (b) Fully staffed AIMU will closely monitor performance of consultants
Delays in construction schemes resulting in missing dry season	Procurement will be carefully scheduled and contracts will be closely monitored by the AIMU.
Lack of sufficient interest in participation in bidding among qualified contractors and consultants resulting in weak competition and higher prices	The AIMU and the PPIUs in cooperation with the World Bank will engage market through business outreach workshop.

E. Social (including Safeguards)

113. **The project will largely generate positive social impacts.** The social benefits expected from the project result from its focus on rural poverty reduction. The project will provide additional sources of income for poor rural households, thus contributing to reducing poverty and vulnerability. Irrigation and the associated technical know-how (water management and crop husbandry) will also contribute to reducing weather-related vulnerability in project areas. This is particularly true for reducing the risk as well as impact of droughts on agriculture productivity and production. The frequency, severity, and impact of droughts is increasing over time due to climate change.

114. **However, it is expected that some of the project interventions may result in unintended negative social impacts.** The social impacts of the project are assessed as moderate and any negative impacts are likely to be localized and manageable. Potential negative social impacts will largely be associated with civil works during the construction phase of the project. Some of the schemes rehabilitation/expansion works (such as construction of canals, access roads, and water reservoirs) and equipment installation (power lines) will be along the cultivated fields. Although the works will primarily occur along the edges of the fields, some works may disrupt farmers activities. It is not anticipated that the project will lead to significant land acquisition or significant restrictions on access to sources of livelihood. However, as the exact nature and specific location of the project interventions (in Manica, Nampula, Sofala, and Zambezia provinces) will be determined during implementation and because the project will finance activities such as civil works for irrigation schemes, OP 4.12 has been triggered. Consequently, the MASA has updated the RPF of PROIRRI. The RPF adequately addresses issues of land acquisition resulting in physical impacts on people and/or loss of assets, means of livelihoods, or resources. Potential social impacts from IRRIGA are moderate. However, as MASA's capacity to implement sound safeguard management procedures is low, the social risk assessment to the overall project, including the capacity to perform adequate project safeguard management and procedures, is substantial.

115. **The RPF sets forth the principle and procedures for managing issues of land acquisition requiring compensation and/or the physical displacement of persons/households.** The RPF has been consulted and disclosed both in-country and by the World Bank before appraisal. The RPF includes specific guidance for screening subprojects for resettlement and livelihood impacts and for the preparation (before subproject approval) and subsequent implementation of site-specific RAPs and/or Abbreviated Resettlement Plans. The ESMF includes provisions for stakeholder engagement, grievance redress mechanism, management of impacts on other users and potential conflicts, (for example, water users up and down stream), and provisions to address vulnerability and gender-related issues, including gender-

based violence. The RPF and ESMF have been publicly consulted in five provinces (the project targeted provinces of Manica, Sofala, Zambezia and Nampula) and Maputo city, and disclosed both in-country on May 15, 2018, and by the World Bank on May 17, 2018.

116. **The project is also triggering OP 4.11 on Physical Cultural Resources as it will involve civil works.** These activities will require proper screening to avoid or minimize any effect on physical cultural resources. The screening process to implement a chance finds procedure and provide guidelines for measures to be taken when specific activities are likely to trigger this policy, such as preparing a Physical Cultural Resources Management Plan is outlined and detailed in the ESMF.

F. Environment (including Safeguards)

117. **The project is classified as Category B because the negative impacts will be small scale and temporary in nature and can be easily and cost-effectively mitigated.** The proposed project activities in Components 2 (Smallholder Irrigation Development and Management), and Component 3 (Agriculture Intensification and Market Linkages), are likely to raise some environmental and social concerns that would require due safeguards attention. The potential adverse environmental and social impacts of the project are expected to be moderate, reversible and temporary resulting mainly from the rehabilitation and expansion of existing irrigation systems. However, as MASA capacity to implement sound safeguard management procedures is low, but improving, the environmental risk assessment to the overall project, including its capacity to perform adequate project safeguard management and procedures, is substantial. Project activities will also involve waterways diversions to beneficiaries, which in turn may lead to impacts, such as reduced water availability for downstream users. Nonetheless, sound environmental and social management measures, procedures and instruments are expected to adequately manage likely impacts resulting from the project which will mostly lead to soil and vegetation loss or degradation, reduced water quality and quantity, land and water rights conflicts, and pose risks to the health and safety of the communities and contractors' workers. At river basin level, as reflected in Table A1.2 of Annex 2, current water needs plus IRRIGA water demand (to irrigate additional 5,000 ha) are minimal comparing to mean annual runoff of the selected river basins (Lúrio, Meluli, Licungo, Zambeze, Pungoe, Buzi) to develop IRRIGA sub-projects. Cumulative future water demand (current uses plus IRRIGA demand) ranges from 0.16 to 4.1 percent of these river basins' mean annual runoff. Nevertheless, at sub-project level (and tributary level), adequate assessment and measures will be made to ensure water availability to downstream users and an environmental flow for ecological purposes.

118. **Environmental risks will be mitigated through application of safeguard instruments.** The project triggers World Bank safeguard policies on Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Physical Cultural Resources (OP/BP 4.11), Pest Management (OP/BP 4.09) and Safety of Dams (OP/BP 4.37). Although the exact locations and specific details of the interventions are not yet known, the type of technical solutions to be implemented take into consideration the need to avoid or minimize any impacts with sensitive habitats or areas of ecological or cultural importance. To address the likely adverse and social impacts, OP 4.01 on Environmental Assessment was triggered and an Environmental and Social Management Framework (ESMF) was prepared, consulted upon and publicly disclosed on May 15, 2018. The ESMF contains an environmental and social screening form (ESSF) and a detailed guidance for subsequent ESIA/ESMP preparation which will include provisions in a form of code of conduct and Environmental and Social Clauses (ESC) for contractors and supervisors to reduce the

impacts related with natural habitat conservation, pest management, labor influx in rural communities, harassment and gender-based violence. The ESMF includes budget provisions for project's supervision, a capacity building program as well as specific guidance for stakeholder engagement and grievance redress mechanisms. To address OP/BP 4.04, the ESMF and further environmental assessments (ESMP, simplified ESIA) will include screening checklists, natural habitat surveys/assessments and mitigation hierarchy to ensure low impacts on natural habitats. A stand-alone Pest Management Plan (PMP) was developed by the borrower to adequately deal with pest management risks in compliance with OP/BP 4.09 requirements both at farmer and natural resources levels. As for OP/BP 4.37, sub-project weirs, embankments or small dams, the ESMF includes generic dam safety measures to be followed by contractors and reviewed by qualified engineers. IRRIGA builds on lessons learned from previous irrigation project PROIRRI, taking into consideration adequate human resources, capacity building and budget to ensure sound environmental and social management. The final instruments (ESMF, PMP and RPF) have been consulted upon and were publicly disclosed in-country and at the World Bank, prior to appraisal.

119. **Safeguard indicators to assess safeguard performance will be part of the project and monitoring system of the project.** Indicators will include number of implemented ESMPs approved on time, number of environmental permits issued, number of farmers (men and women) trained on pest management control, water management, stakeholder engagement (number of committees, number of meetings held, number of complaints and average time of response, beneficiary satisfaction survey results).

120. **The project design has considered climate and disaster risks.** Mozambique is among the most exposed countries to climate shocks in Southern Africa. The climate and geophysical hazards are expected to experience high intensity, frequency, or duration in future. Climate risks that are relevant to the project include extreme temperature and droughts, extreme precipitation and floods. Extreme droughts will lead to a reduction in the amount of water available for irrigation, while extreme precipitation and floods causes high flow volume in the river, which may result in inundation of the intake, hydraulic structures, irrigation equipment, and farmers' fields with potential loss of crops. Climate change adaptation and mitigation measures have been incorporated in the project design to moderate the impact and to ensure continuation of agriculture activities for both Components 2 and 3. The project has considered water scarcity/drought and floods in the planning and design of all critical irrigation infrastructure. The project will use flood-resilient materials/design for canals and pipelines. The project will also include watershed management activities for erosion control and climate-smart agriculture practices (conservation agriculture, drought- and flood-tolerant varieties). The project also involves institutional capacity strengthening in the areas of agriculture services and irrigation at both institutional and farmer level—all of which are critical for building agriculture investments resilience to climate risks.

121. **Greenhouse gas (GHG) accounting analysis found that the project will result in carbon emissions savings**. The net carbon balance quantifies GHGs emitted or sequestered because of the project compared to the without-project scenario. Over the project duration of 20 years, the project is expected to result in carbon emission savings of a total of 238,344 tCO_2-eq, equivalent to 11,917 tCO_2-eq additionally sequestered per year. Land use changes will contribute the most to the reduction in carbon emissions while infrastructure investments are slightly emissive and the project will explore measures to address this issue as part of the feasibility study and design of upgrades for the irrigation schemes. Annex 4 presents a summary of the GHG accounting analyses.

G. Other Safeguard Policies

122. **The project triggers the World Bank policy related to Projects on International Waterways (OP 7.50).** This is because the project-financed schemes rely on sources of water that are potentially interconnected with the Zambezi River, Pungwe River, and Buzi River. The Zambezi river basin which is shared between Angola, Botswana, Namibia, Zambia, Zimbabwe, Tanzania, Malawi, and Mozambique, is considered an 'international waterway' for the purposes of this policy. In addition, the Buzi River and Pungoe River are similarly considered 'international waterways' because both flow from Zimbabwe into Mozambique and discharge into the Indian Ocean in Sofala Province. The project will support the construction and rehabilitation of irrigation schemes. Activities supported by the project have an extremely low likelihood of interference in international watersheds, given the downstream location of the areas of the project interventions relative to riparian countries where the project finances additions or alterations that require rehabilitation, construction, or other changes. Thus, the project will not adversely affect the quality of water flow to the other riparians. The MASA has sought exemption for the requirement for notification of riparian states. The exemption to notification of the requirements under the OP 7.50 Project on International Waterways was approved by the Africa Vice Presidency of the World Bank on May 7, 2018.

123. **The project also triggers the World Bank policy on Safety of Dams (OP 4.37) given that the project relies on the performance of existing dams and may involve rehabilitation of small weirs and other hydraulic structures.** The project will not involve any large dams. The ESMF contains guidelines on how to address environmental impacts from rehabilitation of small dams and to ensure that the design and construction of small dams are duly reviewed by qualified engineers in fulfillment of OP 4.37 basic requirements.

H. Citizen Engagement and Gender

124. **The project will promote communication platforms for interaction between the farmers (the primary beneficiaries of the project) and the MASA, including respective provincial and district departments.** The focus will be on effective engagement mechanisms targeting a wide range of stakeholders, and which can be sustained beyond the project life. Civil society and consumers in Mozambique are increasingly demanding information and transparency from project implementation agencies on targeting and project delivery mechanisms. The project will therefore support proactive information sharing, awareness creation, and feedback from key stakeholders before, during, and after the project period. Key stakeholders identified include farmers and their respective households, media, Government ministries and agencies, members of parliament, local government leaders; civic society organizations/NGOs; and development partners. Representation in the project areas is through community leadership and elected farmers association management committee. Local leadership is through elected provincial and national members of parliament. Local NGOs and community-based organizations (CBOs) are active on various social activities. NGO activities include outreach to farmers and producer groups to promote improved agriculture practices and local entrepreneurs. As part of project preparation, extensive consultation meetings and field visits were held, involving local authorities and NGOs.

125. **A communication strategy will be developed in the first three months of project implementation.** The AIMU will hire a communication specialist whose role is to develop a well-structured communication strategy, based on further analyses of the key stakeholders' concerns and suitable communications tools and channels. The strategic objectives of the strategy will be to: (a) inform various stakeholders about the project—its activities and outcomes toward improving access to irrigated agriculture services; (b) create demand for various products and services offered under the project; (c) empower key stakeholders with relevant information to execute their roles and responsibilities in helping implement and sustain the project interventions and results; and (d) facilitate information sharing within project teams and create synergies with other projects in Mozambique and under the MASA. Implementation of the communication strategy will be funded through the project.

126. **The project will aim to close specific gender gaps identified to ensure women will fully benefit from the project interventions**. In addition to tracking project beneficiaries using gender-disaggregated data, the project will also focus on two distinct gender gaps: (a) women farmers' more limited access to productive assets hinders their ability to lift themselves and their families out of poverty (78 percent of the Mozambican workforce are active in the agriculture sector); and (b) women's lower education and skills negatively impact their ability to find work in the formal sector and their potential as entrepreneurs. The project will address those gaps in four complementary ways: First, women will be encouraged to participate in the producer groups to access project financing through Component 3. Second, the management committee for the WUAs will have at least 50 percent women with at least one woman in a decision-making role (president or secretary) in the association. Third, training activities for both trainers and farmers on agriculture services will prioritize women in a proportion of 60 percent. Fourth, under Component 2, project contractors will be encouraged to engage women and youths in project design and during the construction phase and provide them with training opportunities in the engineering field. Additionally, a Stakeholder Engagement Plan, which will be undertaken at the project's early stages will also focus on this issue to ensure women will fully benefit from IRRIGA activities. Two intermediate results indicators have been included in the project RF to monitor the success of these actions. These are number of female farmers adopting improved agriculture technology and in the management committees of WUGs and WUAs.

I. World Bank Grievance Redress

127. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, because 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.

128. In addition to the World Bank's GRS, the project will set up a Grievance Redress Mechanism (GRM) building on both traditional conflict-resolution mechanisms as well as project-based steps to ensure community members and all stakeholders have an opportunity and means to raise their concerns or to provide suggestions regarding project-related activities. From the community to the national level, there will be focal persons to receive, record, and address grievances, queries, and suggestions. A reporting line of received (and addressed) grievances will also be clearly defined, so that AIMU will have a full set of data. Complaints will be categorized and recorded at provincial and central level by AIMU and consolidated periodically. The database will also be an effective management tool to monitor progress and detect potential obstacles in the project implementation. The project's GRM rules and communication steps will be explained so that all stakeholders are aware and encouraged to use the mechanism for transparency and better project implementation. To better inform stakeholders, the project will prepare materials in local languages to be displayed in public areas, as part of the communication activities. More detailed plans on the GRM will be explained in both the RPF and the PIM.

129. Project Affected People with grievances or suggestions should be able to present these to trusted leaders who can act as linkages as necessary to others who may be needed to resolve the problems. Grievances can initially be presented in a local language for local redress to (1) WUA/Farmers Associations or (2) local influence leader or the local Resettlement Committee. More detailed plans on the GRM are developed in the RPF and will be further detailed in the PIM. The AIMU Safeguards Specialists will elaborate a strategy of implementation of the GRM and monitoring of submitted grievances and proposed resolution of grievances prior to the approval of subprojects.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

Project Development Objective(s)

The proposed Project Development Objective (PDO) is to improve smallholder agriculture productivity and market access in the project areas developed with irrigation and provide immediate and effective response to an eligible crisis or emergency.

The Program objective of the Series of Projects (SOP) is to increase farmers' productivity and improve rural livelihoods through increased access to irrigation and markets.

PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	End Target
Measure the productivity of selected commodities under smallholder irrigated production systems					
Average crop yield of selected commodities in irrigated production systems			Metric tons/year	0.00	0.00
Rice			Metric tons/year	1.00	4.00
Onion			Metric tons/year	10.00	20.00
Cabbage			Metric tons/year	12.00	32.00
To measure the proportion of total agricultural production marketed for selected commodities					
Proportion of total agricultural production marketed for selected			Percentage	0.00	0.00

PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	End Target
commodities					
Rice farming system			Percentage	0.00	75.00
Cabbage			Percentage	0.00	80.00
Onion			Percentage	0.00	80.00
Farmers reached with agricultural assets or services					
Farmers reached with agricultural assets or services		Yes	Number	3,000.00	9,000.00
Farmers reached with agricultural assets or services - Female		Yes	Number	1,700.00	4,500.00
Beneficiaries of the project (disagregated by gender)					
Project beneficiaries			Number	0.00	45,300.00
Project beneficiaries - Female			Number	0.00	22,650.00

Intermediate Results Indicators by Components	DLI	CRI	Unit of Measure	Baseline	End Target
Institutional Capacity Building					
Improved irrigation related policies, standards and regulations and in place			Number	0.00	5.00

Agricuture Investment Management Unit (AIMU) established and is performing satisfactorily			Yes/No	N	Y
National Irrigation Water Use Monitoring System (NIWUMS)			Yes/No	N	Y
Satelite-based irrigation monitoring system developed			Yes/No	N	Y
Smallholder Irrigation Development and Management					
Area completed with detailed design			Hectare(Ha)	0.00	5,000.00
Area provided with new/improved irrigation or drainage services		Yes	Hectare(Ha)	3,000.00	6,000.00
Area provided with improved irrigation or drainage services		Yes	Hectare(Ha)	0.00	3,000.00
WUGs and WUAs with women in the management committees			Percentage	0.00	90.00
Beneficiaries satisfied with the quality of services and technical assistance provided by the project			Percentage	0.00	70.00
Agriculture Intensification and Market Linkages					
Farmers adopting improved agricultural technology		Yes	Number	3,000.00	9,000.00
Farmers adopting improved agricultural technology - Female		Yes	Number	1,700.00	4,500.00
Average crop intensity			Number	0.00	0.00
Rice System			Number	1.00	1.50
Vegetable system			Number	1.00	3.00
Farmers graduating from farmer field schools and adopting the practices learnt (Disagregated by gender)			Number	0.00	6,000.00

Female farmers graduating from Farmer Field Schools and adopting the practices learned			Number	0.00	3,000.00
Total area under irrigated agriculture production during the most recent dry season			Hectare(Ha)	0.00	6,000.00

Monitoring & Evaluation Plan: PDO Indicators	
Indicator Name	Average crop yield of selected commodities in irrigated production systems
Definition/Description	Average crop yield per year in tons per hectare. This will measure the quantity of crop harvested (tons) per year of the selected crop.
Frequency	Annual
Data Source	Surveys on the beneficiary farms
Methodology for Data Collection	Surveys and data from production reports
Responsibility for Data Collection	AIMU

Indicator Name	Rice
Definition/Description	This indicator is to monitor the rice yield increase of farmers in areas developed with irrigation and who received training and investment support.
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from SDAEs
Responsibility for Data Collection	AIMU

Indicator Name	Onion
Definition/Description	This indicator is to monitor the onion yield increase of farmers in areas developed with irrigation and who received training and investment support.
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from local SDAEs
Responsibility for Data Collection	AIMU

Indicator Name	Cabbage
Definition/Description	This indicator is to monitor the cabbage yield increase of farmers in areas developed with irrigation and that received training and investment support.
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from local SADEs
Responsibility for Data Collection	AIMU

Indicator Name	Proportion of total agricultural production marketed for selected commodities
Definition/Description	This indicator is designed to measure the average quantity of the production marketed compared to the total produced in selected commodities
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from local SDAEs
Responsibility for Data Collection	AIMU

Indicator Name	Rice farming system
Definition/Description	Quantity of the harvest sold over the quantity harvested in tons per year
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Farmers survey
Responsibility for Data Collection	AIMU

Indicator Name	Cabbage
Definition/Description	Quantity harvest and sold over the quantity produced or harvested
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from local SDAEs
Responsibility for Data Collection	AIMU

Indicator Name	Onion
Definition/Description	Quantity harvested and sold over the quantity produced
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from local SDAEs
Responsibility for Data Collection	AIMU

Indicator Name	Farmers reached with agricultural assets or services
Definition/Description	
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from local SDAEs
Responsibility for Data Collection	AIMU

Indicator Name	Farmers reached with agricultural assets or services - Female
Definition/Description	
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys and data from local SDAEs
Responsibility for Data Collection	AIMU

Indicator Name	Project beneficiaries
Definition/Description	Project beneficiaries it is the SUM of: (a) the farmers reach with assets and service AND the members of their respective households; (b) government staff and service provider staff benefiting from training funded by the project
Frequency	Annual
Data Source	Membership list of active of WUA/WUG in irrigation schemes supported by the project; Completion reports of training events and participants lists Local population statistics
Methodology for Data Collection	Extract from membership registration in the WUG/WUA, Annual report; collection of most recent average household size in the target area from local puplations statistics, simple count of participants in training event (avoid double counting of Trainees participating in two or more events)
Responsibility for Data Collection	AIMU

Indicator Name	Project beneficiaries - Female
Definition/Description	
Frequency	
Data Source	
Methodology for Data Collection	
Responsibility for Data Collection	

Monitoring & Evaluation Plan: Intermediate Results Indicators	
Indicator Name	Improved irrigation related policies, standards and regulations and in place
Definition/Description	This indicator measures the total new area of land provided with irrigation and drainage infrastructure.
Frequency	Annual
Data Source	Service provider and contractors
Methodology for Data Collection	Field measurements and data from contractors and construction supervision
Responsibility for Data Collection	National Irrigation Institute
Indicator Name	Agricuture Investment Management Unit (AIMU) established and is performing satisfactorily
Definition/Description	This indicator is to ensure the implementation unit (AIMU) is established as agreed
Frequency	Annual
Data Source	Annual reports to the PCC
Methodology for Data Collection	Information from the PCC reports
Responsibility for Data Collection	Council of directors

Indicator Name	National Irrigation Water Use Monitoring System (NIWUMS)
Definition/Description	To measure the water flows in the irrigation infrastructure rehabilitated by the project throughout the year
Frequency	Annual
Data Source	Reports generated by data base
Methodology for Data Collection	Data from irrigation schemes
Responsibility for Data Collection	AIMU

Indicator Name	Satelite-based irrigation monitoring system developed
Definition/Description	Monitor the use of land developed with irrigation infrastructure using satellite systems
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Satellite monitoring system
Responsibility for Data Collection	AIMU

Indicator Name	Area completed with detailed design
Definition/Description	Monitor the area in hectares that has been completed with detailed designs ready for procurement for construction
Frequency	Annual
Data Source	Services providers reports and AIMU
Methodology for Data Collection	service providers reports
Responsibility for Data Collection	AIMU

Indicator Name	Area provided with new/improved irrigation or drainage services
Definition/Description	
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	
Responsibility for Data Collection	AIMU

Indicator Name	Area provided with improved irrigation or drainage services
Definition/Description	
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	
Responsibility for Data Collection	PIU

Indicator Name	WUGs and WUAs with women in the management committees
Definition/Description	Number of schemes with project assistance that includes women in the management committees as proportion of the total schemes in the project area assisted by the project
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	
Responsibility for Data Collection	AIMU

Indicator Name	Beneficiaries satisfied with the quality of services and technical assistance provided by the project
Definition/Description	Measures the satisfaction of project beneficiaries with the technical assistance and services provided by the project.
Frequency	Annually
Data Source	
Methodology for Data Collection	Surveys
Responsibility for Data Collection	AIMU

Indicator Name	Farmers adopting improved agricultural technology
Definition/Description	
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	
Responsibility for Data Collection	AIMU

Indicator Name	Farmers adopting improved agricultural technology - Female
Definition/Description	
Frequency	
Data Source	Project reports
Methodology for Data Collection	
Responsibility for Data Collection	AIMU

Indicator Name	Average crop intensity
Definition/Description	Number of harvest per year. Under rice is expected that total area is cultivated with rice on the rain season and 1/2 during the dry season
Frequency	Annual
Data Source	Surveys and project reports
Methodology for Data Collection	SDAE reports
Responsibility for Data Collection	AIMU

Indicator Name	Rice System
Definition/Description	Under rice based system it is expected that the total area developed with irrigation is fully utilized during the rainy season and during the dry season only half to achieve the crop intensity of 1.5
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	
Responsibility for Data Collection	AIMU

Indicator Name	Vegetable system
Definition/Description	It is expected that under vegetable based systems on areas developed with irrigation three harvests per year
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Project reports
Responsibility for Data Collection	AIMU

Indicator Name	Farmers graduating from farmer field schools and adopting the practices learnt (Disagregated by gender)
Definition/Description	Number of farmers that completed the full training circle under the farmers field schools
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	surveys and data from SDAE
Responsibility for Data Collection	AIMU

Indicator Name	Female farmers graduating from Farmer Field Schools and adopting the practices learned
Definition/Description	
Frequency	
Data Source	
Methodology for Data Collection	
Responsibility for Data Collection	

Indicator Name	Total area under irrigated agriculture production during the most recent dry season
Definition/Description	Monitor the use of area developed with irrigation infrastructure during the dry season (April to October)
Frequency	Annual
Data Source	Project reports
Methodology for Data Collection	Surveys
Responsibility for Data Collection	AIMU

ANNEX 1: DETAILED PROJECT DESCRIPTION

Mozambique Smallholder Irrigated Agriculture and Market Access Project

Project Overview

1. The PDO is to improve smallholder agriculture productivity and market access in the project areas developed with irrigation and provide immediate and effective response to an eligible crisis or emergency.

2. The project will expand the irrigated area and improve agriculture intensification and market linkages for smallholder farmers cultivating 6,000 ha (of which 3,000 developed under PROIRRI) in 40 districts in Manica, Nampula, Sofala and Zambezia Provinces. The main criteria for selecting the target provinces were: (a) significant agricultural and market potential; (b) water availability for irrigation; (c) complementarity with other World Bank funded operations; (d) large share of rural population involved in agriculture for their livelihood; (e) high levels of poverty; and (f) potential for linkages with the private agribusiness.

3. The project will be financed through an SOP and will support rehabilitation of a combined amount of 8,000 ha (the Program) benefiting 12,000 smallholder farmers with a potential US$80 million IDA contribution for the whole SOP. The project description in the following paragraphs and appraisal details refer to the first project (SOP1). The first phase (SOP1) is expected to benefit 9,000 smallholder farmers (3,000 under PROIRRI and 6,000 under IRRIGA), 200 government staff, and 100 service providers, including NGOs, input providers, and agribusiness operators at the local level. The project scope consists of five components as described in the following paragraphs.

Theory of Change

4. The Theory of Change (ToC) describes and illustrates (figure 1) how and why the achievement of the PDO—that is, increased productivity and improved market access—is expected to come about through the project. In the context of the project, the long-term goal is to contribute to: (a) reducing poverty; (b) improving food security; and (c) strengthening resilience to climate change in the target area. The contribution will be in the form of increased production of farm households from their newly irrigated land and the production surplus that can be marketed (for example, to processors and ultimate consumers). It will be a result of, and can be attributed to: (a) agricultural productivity through increased intensification; and (b) improved functioning market linkages between producers and buyers (that is, market access).

5. **Agricultural productivity** will be achieved through: (a) more conducive policies, regulations, and practice standards (that is, the enabling conditions); (b) irrigation infrastructure development; (c) more effective water use monitoring, management, and operation of the rehabilitated irrigation schemes; and (d) improved agricultural production technologies and practices (for example, improved seeds, CSA, IPM).

6. **Market access**, that is, better functioning business linkages between producers and buyers that will facilitate the profitable sale of the (processed) produce on the end market depend on many factors

(for example, rural infrastructure, access to inputs, collective action of producers, post-harvest and business management and marketing skills). The project will address: (a) access to inputs and finance assets for post-harvest management; (b) behavioral change toward stronger collective action for leveraging efficiency gains in marketing; and (c) the development of knowledge about improved practices (for example, business management, post-harvest management). Other determining factors, such as rural roads and transport, are being addressed through complementary investment projects (Rural Feeder Roads Project, SUSTENTA).

7. The description in the following paragraphs refers to the first phase.

Component 1: Institutional Capacity Building SDR 5.57 million (US$8 million equivalent of IDA grant)

8. The objective of this component is to strengthen institutions and enhance beneficiaries' capacity for sustainable development and management of irrigated agriculture. In response to a request from the MASA, the project will strengthen the MASA's capacity for investment planning, implementation, coordination, and management of all donor funding for the agriculture sector development in the country. This component will finance three activities: (a) capacity strengthening for irrigation institutions, (b) strengthening of agricultural institutional capacity and market linkages, and (c) the establishment of the AIMU;

9. **Subcomponent 1.1: Strengthening Irrigation Institutional Capacity.** This sub-component will finance technical assistance to support INIR to improve the enabling environment in the irrigation subsector and develop regulatory tools and the professional code of conduct to improve irrigation services delivery. The project will finance studies and training on institutional and regulatory framework for the irrigation sector and equipment and incremental operating costs to establish a national irrigation water monitoring system that will collect data at watershed and irrigation perimeter level. These regulatory tools and processes are broadly identified in the PNI and include preparation and adoption of the PPP regulations; development of regulations and contract models for partnerships in irrigation and guidelines for licensing irrigation development in the country; and partnerships with formal education systems in the country (for example, University Eduardo Mondlane, Universidade Instituto Superior Politecnico de Manica, among others), including provision of at least 10 internships for irrigation engineering and irrigation economics graduates for up to 12 months of field work.

10. INIR was established in 2012 with support from PROIRRI and is the Government institute responsible for promoting the development of irrigation in the country. INIR is also responsible for implementing the PNI approved by the Council of Ministers in December 2016. The PNI aims to add 212,500 ha new area under irrigation in the next 25 years. INIR's current institutional and technical capacity is inadequate to fulfil its mandate. The institutional analysis conducted under the PNI identified three key challenges that are holding back INIR's capacity development. First, INIR's inability to hire new and qualified staff due to the dependency on limited State Budget. Although INIR is administratively autonomous, it has no financial autonomy and enjoys only limited managerial autonomy. INIR's Board of Directors and General Director are unable to make important managerial and operational decisions (such as those relating to budget, staff recruitment, salary and incentives, and organizational restructuring) without the approval from the MASA (the parent ministry) or the Ministry of Finance. Second, the

establishment of INIR was not accompanied by a sound implementation plan with defined steps and processes to establish the required institutional and technical capacity. The current staff was inherited from the former department of agricultural hydraulics, with very limited capacity to implement the required transformational processes for irrigation planning and development. Third, there are gaps on both legal and technical processes, norms, and procedures for all the phases of irrigation design and operation. This was evident under the implementation of PROIRRI where serious gaps were identified on quality assurance for engineering design and construction. These aspects were left to external and costly service providers with very limited supervision capacity within INIR.

11. The technical assistance financed by IIRIGA will encompass four main activities: (a) preparation and adoption of the PPP regulations; (b) development of relevant guidelines, norms, and sample contracts for irrigation partnerships, as proposed in the PNI; (c) development of regulations for irrigation licensing; and (d) partnerships with formal education systems (University Eduardo Mondlane, Universidade Instituto Superior Politecnico de Manica, among others), including provision of at least 10 internships for irrigation engineering and irrigation economics graduates for up to 12 months of field work.

12. In addition, the project will finance equipment and incremental operating costs for the establishment of the national irrigation water monitoring system that will collect data at the scheme and river basin levels. The system will assist INIR in monitoring water use and distribution efficiency at the scheme level and water abstraction for irrigation at the basin level to support the Regional Water Administrations on water allocation planning and management.

13. **Subcomponent 1.2: Strengthening Agriculture Institutional Capacity and Market Linkages.** This subcomponent will finance capacity building of institutions involved in the development of irrigated agriculture, technical and market information, and complementary services needed for improved farm level investments. This subcomponent will specifically finance: (a) the national DPCI at the MASA to strengthen its agriculture market information systems to collect, process, and disseminate market and price information in the country; strength the statistics, and provide selected training to staff; (b) the national DNEA and the IIAM to increase their capacity for dissemination of technologies in the project areas developed with irrigation; and (c) the national DINAS to establish a satellite monitoring system to monitor the use of all areas developed with irrigation in the country. This subcomponent will establish an 'agricultural observatory' to generate reports for decision making for relevant institutions involved in the agriculture development. These reports will support relevant departments at the MASA, including agricultural research and extension, MITADER, Ministry of Public Works, and the MIC, including input suppliers, traders, and private agribusiness operators to improve their planning to support the development of the agriculture sector.

14. **Subcomponent 1.3: Agriculture Investment Management Unit.** This subcomponent will finance technical assistance and incremental operating costs for the establishment of the AIMU to lead agriculture sector investment planning and implementation at the MASA. The AIMU will report to the Technical Committee, comprising the National and General Directors of the MASA (DPCI, INIR, DINAS, IIAM, and Extension) and headed by the Permanent Secretary. The AIMU will initially manage and implement IRRIGA under strategic guidance of INIR and then gradually evolve into the MASA operational unit for agriculture programs implementation, thus hosting all the MASA's investment operations in close linkage with the

Policy Unit of MASA, in charge of the PEDSA and PNISA. Under IRRIGA, the unit will be responsible for the design of irrigation schemes and assurance of technical quality in all phases of the development of the irrigation schemes. The final approval of irrigation schemes will be done by the Technical Committee. The goal is to create a strong, long-term operational capacity within the MASA and achieve economies of scale while reducing the burden to other functional areas tasked with regulatory and policy functions.

15. Under IRRIGA, the AIMU will lead the planning, engineering design, and supervision of all consultancy services and works, including: (a) conducting quality assurance and technical due diligence for engineering design and construction of the irrigation schemes; (b) updating and developing new irrigation design and construction norms, methodology for hydrological data collection, guidelines for Bill of Quantities and irrigation schemes construction pricing, guidelines for O&M of irrigation infrastructure, and technical specifications for irrigation system construction works; (c) preparing TORs for approval of preliminary and final designs and procedures for provisional and final handover of works and transfer of developed irrigation systems to operating organizations (including smallholders); (d) assisting in water licensing for existing and new irrigation schemes, monitoring the compliance with the water licenses and water use regulations, as well as improved agricultural practices to prevent erosion and salinization; (e) developing guidelines for asset management and promote its adoption nationwide; and (f) promoting skill development in areas related to procurement, economic and financial analysis, FM for irrigated agriculture, agronomic and improved management practices, and crop budget preparation.

16. AIMU will initially consist of five teams, supervised by a project coordinator. The teams are FMT, PT, SMT, MET, and TDST. The unit staff will be supplemented by qualified consultants with unique and relevant skills. The following key staff will be the minimum required to manage IRRIGA: the Program Coordination/manager (1 coordinator/manager, 1 administrative assistant, and 1 communication specialist); FMT (1 FM specialist and 1 accountant); PT (1 procurement specialist and 1 procurement assistant); SMT (1 social safeguards specialist and 1 environmental safeguards specialist); MET (1 M&E specialist); TDST (1 institutional development specialist/lawyer, 1 lead irrigation/civil engineer with international experience, 1 local engineer, 1 lead agronomist, 1 agriculture economist/value chain/market specialist, and 1 hydrologist). All staff will be hired competitively based on clear TORs.

Component 2: Smallholder Irrigation Development and Management SDR 19.50 million (US$28 million equivalent of IDA grant)

17. This component will finance engineering designs of 5,000 ha for irrigation development; and construction supervision, equipment, and civil and hydraulic works for 3,000 ha of irrigated land in the project areas to improve water availability and resilience of irrigation services. About 40 potential districts have been identified in the four beneficiary provinces based on Government strategies for agriculture development, market needs and existing agro-climatic conditions, land and water availability, and existing markets. The location of the potential districts is presented in MAP 1. Out of the 3,000 ha, 500 ha have already been assessed (feasibility) under PROIRRI and 2,500 ha additional schemes will be further assessed in the first eight months of project implementation to determine the exact scope of irrigation works to be financed by the project. The timeline for project implementation is presented in Table 1.7.

18. **Subcomponent 2.1: Irrigation Infrastructure Development.** This sub-component will finance technical assistance for detailed engineering designs for 5,000 ha irrigated land, of which 3,000 ha will be rehabilitated and modernized under SOP1 and 2,000 in SOP2. The identification, pre-feasibility, and feasibility studies of the irrigation schemes will be led by the AIMU. The development of irrigation schemes will be based on clearly articulated investment proposal and commitment from the beneficiaries to contribute toward partial recovery of the O&M cost. The irrigation schemes will be assessed by the AIMU's technical team before investment is considered to ensure social (including gender, employment generation, and involvement of youth), economic, financial, and environmental feasibility of the investments. In addition, no infrastructure investment will be made before critical issues such as land user rights and water rights have been fully secured. The project will support mainly large gravity-fed canal systems as the O&M costs are low. Pumping will be considered, if at all, only for high-value crops and under exceptional cases. Eligibility criteria for the development of irrigation schemes is indicated in the table 1.1.

Table 1.1. Eligibility Criteria for Irrigation Development Phases

Study Stage	Eligibility, Selection, and Appraisal Criteria - Indicators
Accept/reject at any time - **Identification**	• Indicative prefeasibility (that is, financial, economic, environmental and social (including farmers interest and cohesion) - study reports • Acceptable quantity and quality of water for large irrigable land (soils, topography) - preliminary technical report • Potential to secure land and water rights - certificates • Accessibility - existing maps and site observation • Gravity irrigable (except for exceptional pilot schemes) - site observation • Access to market and potential demand for output – study reports
Pre-feasibility	• Beneficiaries commitment to contribute part of the O&M costs - signed application by beneficiaries and binding performance agreement • Women members among beneficiaries - study report • High organization and social capital and potential to become a formal WUA - study report • Large number of direct beneficiaries per scheme - study reports • Preliminary technical and economic/financial analysis[a] - study report • Environmental and social safeguards management - study reports
Feasibility (final appraisal)	• Technical feasibility and O&M simplicity[a]- study report • Economic and financial viability[a] IRR and NPV - study report • Secured market (captures accessibility) - contract agreement • Safeguards management plans including ESMP/evidence of land tenure with no conflicts/evidence of local consultation/indicators

Note: a. These criteria will capture environmental issues and impact of sunk cost (benefit of rehabilitation), topographic factors, and unit cost per ha.

19. All the four selected provinces have large irrigation potential, according to the inventory and assessment carried out under the PNI. There are about five major river basins (Lurio, Licungo, Zambezi, Pungwe, and Buzi) with mean annual flow above 4,000 million m^3. These five basins account for 45.2 percent of the total irrigation potential in the country. Besides, these provinces cover four of the six national development corridors which facilitates access to markets. Smallholder farmers have historically

been engaged in irrigated agriculture in the four provinces, and about 2,050 ha is currently operational, mainly cultivating rice, sugarcane, horticulture, beans, and baby corn. However, the schemes are not being used to full capacity as most of the infrastructure is dilapidated and poorly maintained, and farmers are mostly using tradition irrigation methods (figure 1.1) to cultivate their land during the dry season. Observation from the field and a review of a number of assessments of the irrigation sector in Mozambique point to the following issues as key bottlenecks for irrigation development: (a) limited public investments on the construction, modernization, rehabilitation, and expansion of irrigation schemes; (b) limited experience of the users on the O&M of the schemes; (c) limited access to markets and extension services, including technical support on O&M; (d) high operational costs, particularly for pumping schemes; and (e) limited resilience to flooding along the lower Licungo, Zambezi, Pungwe, and Buzi Rivers. The project will therefore combine infrastructure investments with training for the farmers, WUAs, and extension agents on irrigation O&M.

Figure 1.1. Existing Irrigation Systems/Practices in the Project Areas

(a) Irrigation Canal in Malema, Nampula

(b) Hydraulic Structures in Sofala

(c) Intake in Namacurra, Zambezia

(d) Weir and Intake in Ribaue, Nampula

20. About 130 schemes with 15,000 ha of potential areas for irrigation modernization, rehabilitation, and expansion have been identified in the four provinces (table 1.2). These include 500 ha assessed (feasibility) under PROIRRI and 4,500 ha additional schemes which will be further assessed in the first eight months of project implementation to determine the exact scope of works to be financed and procure the contractors. Irrigation infrastructure investments under the project consists of: (a) upgrade of the water intake and transmission main; (b) rehabilitation, modernization, and expansion of water collection and storage structures; (c) upgrade of the distribution system; (d) installation of water distribution and control structures; and (e) rehabilitation and protection of the catchment area and embankments for conservation and erosion control. In places where the installation of buried pipes is feasible, hand-dug earthen canals may be substituted by pipes, if water losses warrant this. Considering the higher unit cost of installing gravity-buried pipe systems, the costs and benefits of this option will be evaluated and discussed with the beneficiaries before installation of any such costly and difficult-to-maintain irrigation systems.

Table 1.2. Potential Areas for Irrigation Development in the Project Areas

River Basin	Mean Annual Runoff (million m^3)	Cumulative water abstraction (million m^3)[a]	Province	Potential Area (ha)				Key Issues
				Total	Rice	Horti-culture	Sugar cane	
Lurio	9,630	51	Nampula	770		770		Limited storage capacity; Systems are primarily traditional irrigation canals.
			Zambezia	115		115		Hydraulic structures dilapidated. Traditional irrigation canals with high water losses

River Basin	Mean Annual Runoff (million m^3)	Cumulative water abstraction (million m^3)[a]	Province	Potential Area (ha)				Key Issues
				Total	Rice	Horti-culture	Sugar cane	
Meluli	2,539	6.9	Nampula	540		540		System operating but require expansion for full utilization of irrigation potential
Licungo	9,630	14.9	Zambezia	3,165	3,000	165		Systems dilapidated and partially operational. No major rehabilitation done and repairs mostly done locally
Zambezi	100,422	382	Zambezia	1,035	600	435		Systems dilapidated, partial rehabilitation, difficult access. High operational costs due to energy inefficiencies.
			Sofala	370	370			Systems dilapidated and partially operational. Small repairs done locally.
Pungwe	4,272	179	Manica	1,921		1,921		Systems operating below capacity and hydraulic structures require rehabilitation. Very good agroclimatic conditions for horticulture.
			Sofala	1,301		1,001	300	Systems dilapidated and partially operational. No major rehabilitation done, except for some sugar cane schemes and repairs mostly done locally.
Buzi	7,982	152	Sofala	5,657	657		5,000	Systems dilapidated, partial rehabilitation, difficult access. High operational costs due to energy inefficiencies.
Total				**14,874**	**4,627**	**4,947**	**5,300**	

Source: PNI, Lurio and Zambezi River basin plans, ARA Centro, ARA Zambezi, and ARA Centro-Norte estimates.
Note: a. Includes current and IRRIGA estimated abstractions.

21. **Subcomponent 2.2: Irrigation Infrastructure Management.** This subcomponent is designed to support the establishment and capacity strengthening for the WUGs and WUAs in all irrigation schemes in the project areas to manage, operate, and maintain the irrigation and drainage systems that are operational. Specifically, the project will finance technical and logistical support to establish WUGs and WUAs, develop manuals and associated learning materials and media products, and deliver trainings on

O&M of the schemes. The project will also finance incremental operating costs for transitional O&M and investment costs for WUAs operational offices and equipment.

22. The Water User Associations Law, of December 31, 2015, defines the legal base for the establishment and operationalization of the WUAs in Mozambique. Among the key functions of the WUAs is ensuring sustainable use and management of water and adequate O&M of the scheme. Key functions of the WUGs and WUAs include the following: (a) ensure equitable water allocation among the scheme users; (b) safeguard the efficient use of water in the scheme; (c) oversee the O&M of the scheme, including all the relevant hydraulic, mechanical, and civil structures; and (d) manage the financial resources of the association. However, progress on the establishment of the WUAs has been relatively slow and those established lack the knowledge and financial resources to fully operate the schemes. The project will therefore provide technical assistance and relevant training to support the smallholder farmers in establishing and operationalizing their association, to ensure the sustainability of the irrigation infrastructure and services financed under the project.

23. The expected outputs from this subcomponent would be (a) the establishment of WUGs and WUAs in all areas developed with irrigation infrastructure to manage, operate, and maintain the irrigation and drainage systems at turnout and tertiary levels and (b) improvement of the level of bulk water service delivered to the WUAs. Expected benefits include (a) improved maintenance of irrigation systems, (b) improved water distribution, (c) increased level of water fee collection, and (d) enhanced transparency and accountability.

Component 3: Agriculture Intensification and Market Linkages SDR 10.46 million (US$13 million equivalent of IDA grant and US$2 million from beneficiaries)

24. This component is designed to improve productivity, production, cropping intensity, and market linkages for 9,000 smallholder farmers cultivating 6,000 ha of irrigated land in the project area. This component builds on and scales up successful intervention models in the country and in the region. It will finance training, technical assistance, equipment, and cost-sharing grants to provide capacity building for smallholder farmers and groups of farmers and investment support to enhance agriculture production, linkage to markets, and value addition. This component will finance three main activities: capacity building to smallholder farmers and support institutions, investment support to enhance smallholder production (vouchers), and matching grants for market-led production and value chain development. The specific eligibility criteria will be further developed in the PIM to ensure equity and avoid double dipping with PROIRRI beneficiaries.

25. Eligible beneficiaries will be trained under this project or other similar programs before receiving investment support under the project. Beneficiaries can be individuals or organized into groups (WUGs, WUAs, associations, cooperatives, or common interest groups). The project will also provide technical assistance and training to government agricultural extension agents, IIAM, agricultural service providers, and NGOs covering different topics of agriculture development, including value chains. It is expected that up to 200 Government staff and several local service providers will benefit from the project support.

26. All the activities under this component will be implemented by the provincial directorates of agriculture and district offices of economic activities (SDAEs) with the support from service providers hired through the project. SDAEs will receive technical and FM support from the AIMU and the Provincial Design and Supervision Teams (PDSTs). They will also interface with service centers/agribusiness hubs led by the MASA. Each service provider will have a clearly defined mandate and actions to be carried out and their work will be monitored during project implementation.

27. **Subcomponent 3.1: Capacity Building for Smallholder Framers.** Under this subcomponent, the project will support training and organization of farmers into producer groups and association and provide training through FFSs and the Integrated Program for the Transfer of Agricultural Technologies (PITTA), methodologies currently used by the MASA. The project will also support training to staff from the local government institutions and service providers, including local NGOs, to provide technical assistance to the project's smallholder farmer beneficiaries to prepare business plans.

28. Initial engagement with the farmers will take place at the identification scheme and further developed through the feasibility design, construction, and handover phases. Since irrigation schemes typically take up to 18 months to complete after the completion of the final design, this is a good opportunity to work with farmers on various training topics. Training will ensure that once the irrigation scheme is completed, the beneficiaries will have organizational structures at the farm level to receive, operate, and maintain the irrigation scheme and efficiently use irrigation water to increase cropping intensity and agriculture productivity. For each province, a single service provider, with extensive experience in training smallholder farmer groups and associations, participatory methods, and agricultural marketing would be engaged to provide training, manage the development of training material, and organize networks through which these materials will be effectively delivered to target beneficiaries.

29. Additional support will enhance the capacity of Farmers Associations. This consists of training and logistical support for: (a) strengthening the knowledge of farmers related to improved agricultural practices, technology, inputs, and marketing; (b) strengthening the functional literacy and numeracy of farmers; (c) improving household nutrition; (d) improving soil fertility and integrated nutrient management; (e) promoting conservation agriculture; and (f) establishing demonstration trials to promote improved agriculture practices and technology for the benefit of farmers

30. **Strengthening of the MASA and other local government institutions.** The project will finance technical assistance, training equipment, and incremental operating costs to: (a) build the technical capacity at district level to strengthen linkages between agriculture research and extension services; (b) support the multiplication of improved crop seeds at the farm level; (c) develop packages of improved technologies and management practices for selected crops; (d) establish demonstration trials to promote improved agriculture practices and technology for the benefit of farmers; (e) improve soil diagnostic services and fertility management practices; and (f) increase field testing and demonstration of improved technologies. The focus will be on project crops, that is, rice, cabbage, onion, potatoes, and tomatoes.

31. **Subcomponent 3.2: Investment Support to Enhance Smallholder Agricultural Production.** This subcomponent will finance vouchers for eligible farmers to allow access to improved farm technologies. These would include, but not be limited to, seeds; mechanization services such as those using draft

animals, power tillers, and tractors; and simple hardware for individual farmers or farmer groups/WUAs. The mechanism will enable access to agricultural inputs and services and improve the capacity of suppliers to plan and deliver quality inputs and services. The vouchers will serve as a financial credit for the purchase of inputs and services and will be cofinanced by the beneficiary. This approach builds on and expands a model promoted in the country and in other neighboring countries with FAO support, which proved successful in equipping farmers and promoting local input providers.[9]

32. Subject to adjustment based on experience, the voucher scheme will target two groups of beneficiaries with two packages, A and B, for two years: (a) subsistence farmers[10] and (b) small emerging farmers,[11] with special attention to rural women and women heads of families. As an example, package A would target subsistence farmers with an approximate value of US$35 for the purchase of open pollinated seeds of maize (maize will not be supported by project) and beans and post-harvest insecticides. The farmer's contribution would be approximately 30 percent of the value of the package (reduced to 25 percent during the second year); Package B would target emerging farmers with an approximate value of US$130 for the purchase of seeds of maize (hybrid or open pollinated seeds), beans, oleaginous, fertilizers, and so on, with a farmer's contribution of 50 percent of the value of the package (reduced to 40 percent during the second year). The Project Operational Manual will specify the details and the sliding scale.

Table 1.3. Example of Packages A and B

Package	Description	Unit	Value of Subsidy (MZN)	Beneficiary co-payment (MZN)	Total e-Voucher (MZN)
			1,500	**500**	**2000**
A	Maize OPV	kg			
	Beans Nhemba	kg			
	Beans Vulgar	kg			
	Beans Boer	kg			
	Soybean	kg			
	Inoculant	200gr			
	Insect. post-harvest	200 gr (bottle)			
	Field Insect.	250/500 ml or 1 l			
B			**4,000**	**3,000**	**7,000**
	Maize OPV	**kg**			
	Maize Hybrid	**kg**			
	Beans Nhemba	**kg**			
	Beans Vulgar	**kg**			
	Beans Boer	**kg**			
	Soybean	**kg**			
	Urea	**50 kg**			
	NPK	**50 kg**			
	Insect. post-harvest	**200 gr (bottle)**			
	Field Insect.	**250/500 ml or 1 l**			
	Inoculant	**200 gr**			

[9] An e-voucher scheme has been developed by FAO and tested in Manica Province during the agricultural campaign 2015–2016 and is currently used in Manica, Zambezia, Nampula, and Sofala Provinces.

[10] Subsistence Farming: agriculture designed primarily to provide food for direct consumption by the farmer and the farmer's family. Farming area between <0.5 ha up to 2 ha using traditional technologies and with an average cash income of US$30 per person per year.

33. The main steps in the e-voucher process are: (a) selection of beneficiaries: a Local Committee, based on the criteria agreed for the selection of beneficiaries, selects and compiles a list of beneficiaries for the different packages (A or B); (b) registration process and distribution of e-cards: the extension worker collects and enters all the information about beneficiaries (geographic location, age, gender, and so on) in the cloud system though a tablet; and (c) co-payment and purchase of inputs: the beneficiaries make the co-payment at the agro-dealer shops. Once the co-payment is complete, the e-card is activated and can be used for the purchase of inputs.

34. The core element in the process is the agro-dealers through which the e-voucher card holders would be able to buy their inputs. Agro-dealers submit their candidatures for selection. Selection criteria included adequate capacity to store and display inputs, approval from the SDAE office, registered commercial entities with experience in the selling of agricultural inputs, and capacity to establish and manage demonstration plots.

35. **Subcomponent 3.3: Matching Grants for Market-led Production and Value Chain Development.** This subcomponent will provide matching grants to finance eligible business plans for production, post-harvest, and value addition activities, including equipment, storage and marketing facilities to improve value chain linkages, and market access. Grants will finance two types of business plans: the first type of business plan would involve matching grants for producer groups. The second type of business plan would involve matching grants to SMEs' for processing and value addition, typically to improve some existing business benefitting producers in the project area by purchasing production, grading, packaging, and so on. Typical investments would include technical assistance and equipment to clean, sort, grade, wash, weigh, package, and store or any other area to add value to high-value crops, cash crops, and so on.

36. The matching grant structure will be similar to that implemented under the Agriculture and Natural Resources Landscape Management Project (P149620), known in Mozambique as SUSTENTA. - Window 1 will typically be up to US$100,000, of which 50 percent will be grant, 40 percent credit from a commercial bank to be repaid by the beneficiaries, and 10 percent beneficiaries' own contribution. Window 2 projects would be above US$100,000 and up to US$1 million. The details of the matching grants schemes will be further detailed in the PIM and MGM.

37. The eligibility criteria (see table 1.4) will take into consideration the capacity level of the farmer's organization, including the availability of a business/investment plan, agronomic skills and experience, and alignment with project-supported value chains. The implementation arrangements and grant delivery structure will be reflected in the PIM and harmonized with similar programs under implementation by the Government of Mozambique.

Table 1.4. Eligibility Criteria for Subproject Proposals under IRRIGA (matching grants)

Criteria for smallholders and value	• Producer group/association participating in IRRIGA activities • Beneficiaries trained by PROIRRI or IRRIGA in simplified procurement methods • Groups to be formally registered as WUAs or Producer Associations

chain enterprises	• Clear management arrangements for the goods purchased • Technical and financial soundness of the proposal • Large number of potential direct beneficiaries (in particular, women) and low average cost per beneficiary
Additional criteria for smallholders and value chain enterprises	• Business plans proposed to be implemented in the IRRIGA intervention area • For value chain enterprises: agricultural value chains supported by IRRIGA • For value chain enterprises: economic and financial viability of the subproject • For value chain enterprises: clear linkages with IRRIGA producer groups/associations

38. A menu of possible investments is provided in table 1.5 and will be further developed in the PIM. Any proposed business plan will go through a complete appraisal process to determine its financial and economic feasibility and sustainability as well as its environmental and social impacts.

Table 1.5. Menu of Investments

Example of Eligible Investments	Noneligible Investments
(a) Fruit and vegetable dryers (b) Rural market/farmers' market facilities (c) Small-scale storage equipment and facilities for commodities (d) Transport equipment (ox cart, trailers, and motor trailers) (e) Spot improvement of feeder roads (f) River crossing points with small bridges (g) Manual/mechanical weighing equipment (for example, scales) (h) Packaging equipment and storage and marketing facilities (i) Bags, boxes, and other containers (j) Mechanization equipment, tools, and machinery	(a) Regular operating expenses not directly associated with the irrigation scheme (b) Salaries of public employees (c) Land acquisition (d) Large civil works such as the construction of new buildings that are not productive assets (e) Retroactive payments for expenditures before the date on which the matching grant agreement is signed (f) Financial participation in a firm's equity

Component 4: Project Management and Monitoring and Evaluation SDR 4.18 million (US$6 million equivalent of IDA grant)

39. The objectives of this component are to manage the project effectively; ensure the use of resources in accordance with the project's objectives, procedures, and fiduciary guidelines; and monitor the status and performance of project implementation and achievement of project objectives. The project will finance (a) incremental operating costs for IRRIGA implementation at the national level led by the AIMU and the provincial levels led by PPIUs, related to FM and procurement, environmental and social safeguard compliance, audits, and reporting; (b) technical assistance and incremental operating costs for irrigation systems planning, design, construction supervision, and training; and (c) the establishment of an MIS for irrigated agriculture and the project M&E system.

40. **Project management support.** The project will cover all the costs related to project management support, including technical assistance, and incremental operating costs for the AIMU and PPIUs to ensure coordination; adequate FM and procurement; and environmental and social safeguard compliance, audits, and reporting. At the provincial level, the PPIUs will comprise an irrigation engineer who will act as a PPC, supported by an agronomist, a safeguards specialist, and an M&E assistant.

41. The project will finance the AIMU operational cost, including salaries of externally hired staff, limited technical assistance and training, office equipment and vehicles, project M&E costs, and any other operational costs. The project will also finance the cost of periodic financial audits, both internal and external. The project will also finance the development and implementation of a communication strategy to stimulate demand for project support and increased participation by farmers' organizations and vulnerable groups in the project. The project will make use of affordable mass media such as community radio to disseminate key messages on agricultural best practices and technologies, nutrition, gender, and other social issues as well as CSA and other environmental good practices. The communication strategy will be updated annually on a regular basis.

42. **Project M&E.** The project will finance the establishment and implementation of an M&E system for the project, including establishment of a PRIMS**.** The M&E system and the PRIMS will regularly monitor progress in project implementation in line with the PDOs and the RF indicators. The M&E focuses on data collection and reporting on key performance input, output, and impact indicators, including targeted data collection, surveys, participatory assessments, baseline data, and midterm and final evaluations. Relevant data related to beneficiaries will be gender disaggregated and special attention will be given to social inclusion. The MET unit will be set up within the AIMU, according to World Bank guidelines. Two evaluations of project output and impact indicators will be commissioned, at midterm and at project completion. The project will finance M&E costs, as well as costs associated with the midterm review (MTR) and project completion review (PCR), including preparation of the ICR.

Component 5: Contingency Emergency Response

43. This component will provide immediate response in the event of an eligible crisis or emergency in the country. This will be a 'zero-dollar' Contingency Emergency Response Component. In the case of an adverse event that causes a major disaster in the country, the Government of Mozambique may request the World Bank to channel some resources from this project. If agreed by the World Bank, part of the project resources will be reallocated to this component to finance emergency response activities.

Detailed Breakdown of Project Costs and Implementation Schedule

44. A breakdown of project costs is provided in table 1.6 and implementation schedule in table 1.7.

Table 1.6. Detailed Breakdown of Project Costs (IDA contribution)

Project Component	Millions (US$)	Percentage (%)
1. Institutional Capacity Building	**8.0**	**15**
1.1 Irrigation institutions	2.6	5
1.2 Agriculture institutions	2.2	4

1.3 Agriculture investment management unit	3.2	6
2. Smallholder Irrigation Development and Management	**28.0**	**51**
2.1. Irrigation Infrastructure Investment		
Design and construction supervision	2.0	4
Construction works/civil works	24.0	44
Safeguards	1.3	2
2.2. Irrigation Infrastructure Management		
Development of training material, establishment/strengthening of WUGs/WUAs for operation and management of schemes, delivery of the training	0.7	1
3. Agriculture Intensification and Market Linkages	**13.0**	**24**
3.1 Training	2.0	4
3.2 Vouchers	7.0	13
3.3 Post-harvest and value addition	4.0	7
4. Project Management and Monitoring and Evaluation	**6.0**	**11**
Total	**55.0**	**100**

Table 1.7. Project Implementation Schedule

Activity	Project Implementation Period																							
	Y0	Y1				Y2				Y3				Y4				Y5				Y6			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Institutional Capacity Building																									
1.1 Strengthening Irrigation Institutional Capacity																									
1.1.1 Development of PPP regulation for irrigation																									
1.1.2 Development of irrigation design and construction norms																									
1.1.3 water measurement for the irrigation schemes																									
1.1.4 Review of INIR structure and mandate																									
1.1.5 Internships for irrigation engineers																									
1.2 Strengthening Agriculture Institutional Capacity and Market Linkages																									
1.2.1 Enhancing the Agriculture Monitoring System																									
1.2.2 Development of an agrometeorological decision support system																									
1.2.3 Logistical support for technology dissemination																									
1.3 Agriculture Investment Management Unit																									
1.3.1 Development of ToRs for the key unit staff																									
1.3.2 Recruitment of key unit staff																									
1.3.3 Recruitment of technical staff																									
1.3.3 Complete the Development of ToRs for the unit																									
1.3.4 Development of the unit's Estrategic Plan																									
1.3.5 Hiring the full structure of the unit																									
2.Smallholder Irrigation Development and Management																									
2.1 Irrigation Infrastructure Investment																									
2.1.1 Engineering Design and tender																									
2.1.1.0 Development of ToRs																									
2.1.1.1 Procurement of design consultants																									
2.1.1.2 Feasibility asssessment																									
2.1.1.3 Detailed engineering design and tender documents																									
2.1.1.4 Construction tender																									
2.2.1 Scheme Construction																									
2.2.1.1 Civil and hydraulic works																									
2.2.1.2 defects liability period																									
2.2.1.3 final handover																									
2.2 Irrigation Infrastructure Management																									
2.2.1 Training of farmer groups and associations																									
2.2.2 Technical assistance to the farmer groups on schemes O&M																									

Activity	Project Implementation Period																							
	Y0	Y1				Y2				Y3				Y4				Y5				Y6			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3. Agriculture Intensification and Market Linkages																									
3.1 Capacity Building for Smallholder Farmers																									
3.1.0 ToRs for the agriculture service providers																									
3.1.1 Procurement of service providers																									
3.1.2 Value chain and market assessment																									
3.1.3 Establishment of the farmers field schools																									
3.1.4 Establishment of the Water Users Associations																									
3.1.5 Training of agri-dealers																									
3.2 Investment Support to Enhance Smallholder Agricultural Production																									
3.2.1.1Development of production plans																									
3.2.1.2 Establishment and operation of the e-voucher systems																									
3.3 Matching Grants for Market-led Production and Value Chain Development																									
3.3.1 Development of the business plans																									
3.3.2 Selection of the financial institution																									
3.3.3 Implementation of the grants																									
4. Project Management Support																									
4.1 Development of the ToRs for the provincial implementation units																									
4.2 Recruitment of the provincial key and technical staff																									
4.3 Development of operations manual for matching grants																									
4.4 Development of the project implementation manual																									
4.5 Financial audits																									
4.6 Baseline assessment																									
4.7 MTR evaluation																									
4.8 Endline Evaluation																									
4.9 Periodic project reporting																									

ANNEX 2: IMPLEMENTATION ARRANGEMENTS

Mozambique Smallholder Irrigated Agriculture and Market Access Project

Project Institutional and Implementation Arrangements

1. The project will be implemented at three levels, that is, national, provincial, and district levels.

2. **At the national level.** The MASA will be responsible for the overall implementation of the project, in consultation with the other relevant ministries that are involved at the national level, to ensure that the project activities are consistent with national policies.

3. A Project Coordination Committee (PCC), chaired by the minister (or—by delegation—by the vice minister), will have the overall decision-making responsibility regarding the management of the project, including approval of work plans, budgets, annual reports and will suggest project adjustments based on the intermediate indicators in the RF, providing necessary policy guidance to the AIMU, addressing any emerging problems that are likely to affect project implementation, and providing oversight during project implementation. The PCC will meet annually and will include representatives from the Ministry of Trade and Industry (MIC), MOPH, MITADER, National Directors of MASA and the Provincial Directors of the four beneficiary provinces, and other relevant Government entities.

4. **AIMU.** The MASA will establish an AIMU at the national level that will (a) be responsible for the project coordination and management of fiduciary issues in conformity with the standards and requirements agreed with the World Bank and (b) manage the project in accordance with the Financing Agreement and other project documents such as the PAD and the PIM.

5. The AIMU Coordinator (within the MASA) will be the operational head responsible for project management under strategic guidance of the Technical Committee comprising the National and General Directors of DPCI, INIR, DINAS, IIAM, and DNEA under the leadership of the Permanent Secretary of the MASA. The unit will initially consist of five teams, supervised by a project coordinator. The teams are FMT, PT, SMT, MET, and TDST.

6. The TDST will be responsible for planning, designing, and monitoring the project implementation, including action plan and compliance with safeguards. It will comprise one institutional development specialist/lawyer, one lead irrigation/civil engineer, one lead agronomist, one agriculture economist/value chain/market specialist, and one hydrologist. The team will also be assisted by the other AIMU teams on project fiduciary aspects.

7. **At the provincial level.** Each beneficiary province will have a PPIU with a minimum of five staff including provincial coordinator, irrigation engineers, and safeguard team and will collaborate with beneficiary districts to facilitate the project implementation.

8. The Provincial Directorate of Agriculture will be responsible for implementation of the project in coordination with the provincial government directorates and district governments. A PPCC, chaired by the Provincial Governor, will oversee project implementation, including monitoring project progress at

the provincial level and making decisions in line with the objectives and institutional arrangements that are consistent with the project document and Legal Agreements. The PPCC will approve the project activities and monitor implementation progress of all project activities at the provincial level. It will comprise the Provincial Director of Agriculture, the Provincial Directorate of MITADER, MOPH, and Regional Water Boards (ARAs), *Fundo de Desenvolvimento Agrario, Gabinete de Desenvolvimento do Vale do Zambeze.*

9. The Provincial Director of Agriculture (within the provincial government) will be responsible for strategic direction of the project at the provincial level with support from the PPIU headed by a PPC that will be responsible for day-to-day management of the project. This team will be responsible for approving subprojects for funds under Component 3.

10. **At the district level.** Agricultural activities and marketing take place at the district level. Given that the capacity is in most cases weak, the project will provide capacity building and targeted technical assistance. The SDAE will be responsible for project implementation at the district level, in coordination with District Services for Planning and Infrastructures and in consultation with the District Administration. The SDAE will be actively involved in site identification and general oversight of the irrigation infrastructure development at the district level and identification and selection of subproject proposals for matching grants with the administrator's guidance. The preparation and implementation of subprojects for matching grants is at the level of irrigation scheme and smallholder farmer groups and associations. To effectively participate in the implementation of the project, local SDAEs will have to carry out their work in accordance with their usual functions (training, extension, technical advice, among others), but they will require capacity building. To facilitate this process, the project will (a) assist in capacity building, (b) provide technical assistance, and (c) engage service providers to assist local SDAEs. The farmers will also be involved in the design and construction works for the irrigation schemes and will be fully responsible for O&M of the schemes

Project Implementation Arrangements

11. **Project Implementation Agency.** At the Government level, the MASA is the project implementer. The MASA will be accountable to the Government of Mozambique and to the World Bank for the management and oversight of the project to achieve its objectives. This will include the management of resources in a transparent and effective manner. Within the MASA, the project will be implemented by the AIMU, and the unit manager will report to a council of MASA National Director and General Directors.

12. **PCC.** The PCC, chaired by the Minister of Agriculture and Food Security (or by the vice minister to whom he or she delegates this task), will: (a) provide strategic guidance; (b) promote inter-ministerial coordination; (c) review and approve the annual plan and budget prepared by the PIU; (d) review and approve the annual reports of the project and decide on corrective measures to solve problems and issues; (e) review decisions made by the Project Technical Team and PPCCs; and (f) issue directives to guide future project interventions, methods, and criteria. The AIMU Manager will also attend the NPCC.

13. **Investment management unit.** The AIMU will be responsible for: (a) project coordination and management of fiduciary issues in conformity with the standards and requirements agreed upon with the World Bank; and (b) management of the project in accordance with the PAD and the Legal Agreements.

It will consist of a central implementation agency (AIMU) and four PPIUs. The AIMU will also be responsible for design and supervision of irrigation schemes in coordination with INIR and PPIUs.

14. AIMU will also set up a small executive committee to: (a) speed up decisions and procedures at the national level; (b) approve subprojects under Component 3 (agricultural intensification and market linkages) that require central-level decision making (based on the feasibility studies prepared by the PIU); (c) propose the agenda for the PCC meetings and prepare the support documents; (d) propose the annual plan and budget to the PCC for analysis and decision; and (e) submit the annual report of the project. The TDST will, in addition, invite a representative of an NGO or civil society and a representative of the private sector for the review and approval of the subprojects.

15. The **PPIU** will: (a) speed up decisions and procedures at the provincial level; (b) approve subprojects under Component 3 that require provincial-level decision making (based on the feasibility studies); (c) recommend for approval to the central level those subprojects that require central-level decision making; and (d) prepare a provincial-level annual plan, budget, and report to be reviewed and approved by the PCC. The PPIU will, in addition, invite a representative of civil society or an NGO and a representative of the private sector for review and approval of the subprojects.

16. **SDAEs.** The agricultural activities and marketing take place on the farms and in the villages, at the district level. Given the nature of the project, implementation at the field level is the most important. However, the administrative and technical capacities at these levels are generally weak to very weak. It is for this reason that the project will provide both capacity building and targeted technical assistance. To make the project work, the local SDAEs must carry out their work in accordance with their usual functions (training, extension, technical advice, and so on) with support from a technical adviser. However, many or most SDAEs will require substantial capacity building before they are capable to do so. To speed up and facilitate this process, the project will: (a) assist in capacity building of the SDAEs; (b) put technical assistance at the disposal of the SDAEs; and (c) where necessary or desirable, engage services providers (including NGOs) to assist the SDEAs in their work.

Subproject Cycle Management and Implementation Arrangements

17. Component 3 will provide financial assistance in the form of cost-sharing matching grants to increase farm-level investment to: (a) support acquisition of improved inputs (seeds, fertilizer, equipment and machinery) aimed at increasing agricultural productivity and production; (b) support emerging commercial farmers through matching grants to increase the area under irrigation and/or increase water storage capacity for irrigation; (c) support post-harvest activities, including value addition, storage, and marketing facilities to improve the market access; and (d) pilot at least one partnership arrangement with private sector agribusiness operators for construction of horticulture processing plant in Manica province that deals with cleaning, washing, weighing, packaging, and storage vegetables.

18. **Eligible to receive support to finance agricultural subprojects.** Smallholders farmer groups or associations will be eligible for support, if they are either registered or informally recognized by the local community and authorities. They should have a democratic structure, with elected president, secretary, and treasurer, as well as regular meetings, and should be able to keep records. The subproject proposals should result from a facilitated participatory planning exercise in which all (or almost all) members of the group participate.

19. **The following are not eligible for project supports:**

(a) **NGOs.** They can facilitate a participatory planning exercise at group or community level, and they can be contracted by these communities to provide services and assistance, but they do not themselves qualify for funding support of subprojects.

(b) Groups that include in their list of members, staff or members of: (a) the PCCs at all levels; (b) the AIMU, INIR, Provincial Directorates of Agriculture and Food Security (DPASAs), and SDAEs; and (c) local government (administrators, assistant administrators, and so on).

20. **The subproject cycle includes the following steps and elements:**

(a) **Identification.** It originates at the beneficiary level, through a facilitated participatory development planning exercise, resulting in an identified subproject proposal. The subprojects would be initiated upon request by the smallholder farmer groups and would be prepared with the assistance of service providers, either SDA extension workers or NGOs/CBOs that have been trained for this task under Subcomponent 3.1. Subcomponent 3.1 will also support the formation and capacity building of smallholder farmer groups and associations to meet eligibility criteria and qualify for subproject support. The subproject proposals are submitted to the local SDAEs.

(b) **Appraisal.** SDEAs prepare, in coordination with the district administration, the subproject documentation for submission. It will obtain the district consent for any subproject proposal before forwarding it to the provincial level. The SDAEs can mobilize technical assistance from the PPIU to assist in the subproject preparation. All subprojects are screened for technical, financial, social, and environmental feasibility. Subprojects prepared with the assistance of NGOs and/or CBOs should be in compliance with the PIM and should be channeled through the SDAEs. The submission would include references to the expected technical, social, financial, economic, and environmental aspects of the subproject proposals.

(c) **Evaluation.** All subproject proposals are evaluated by the AIMU. This includes verification of all eligibility and feasibility criteria. Based on the total project cost, projects will be referred to different levels of approval, as described below.

(d) **Approval.** Depending on the project cost, the subprojects are approved by the AIMU. The role of the PPIUs in the approval of projects will be described in the Operational Manual.

(e) **Implementation.** Depending on the classification of the subprojects, either the AIMU or the PPIU will be responsible for the administrative procedures (financial and procurement) of subproject implementation. Whenever possible and justifiable, procurement will be done with the full involvement of the beneficiaries. Categories of subprojects are defined as follows:

(i) Production;

(ii) Irrigation schemes for emerging farmers;

(iii) Value chain addition;

(iv) Seed multiplication, multiplication of vegetative planting material (tomato, cabbage, and onion), fruit tree nurseries, and orchards, and so on;

(v) Agricultural production equipment such as tractors and animal traction equipment (ploughs, disc harrows, rippers, and so on), sprayers, pumps;

(vi) Agricultural post-harvest treatment and value adding processing equipment such as rice mills, hullers and huskers, fruit/vegetable dryers; and

(vii) Agricultural marketing equipment such as transport equipment (ox cart, trailer).

(f) **Negative list.** The Operational Manual of the project will include a negative list of activities that will not qualify for funding support. This would include the following:

(i) Subprojects that would disturb or distort the market and its development;

(ii) Subprojects that have a negative impact on the environment and/or do not comply with the Environmental Safeguards such as any subproject not screened for environmental or social impacts; subprojects with any activities inside protected areas; dams more than 10 m high; subprojects requiring the use of agrochemicals in World Health Organization categories IA, IB, or H; subprojects that would damage nonreplicable cultural property; subprojects involving logging in natural forests or processing of timber other than from plantations; and subprojects that require the use of water from international rivers;

(iii) Subprojects for private or non-agriculture related use such as houses, schools, health centers; and

(iv) Subprojects in which the beneficiaries are members or staff of the PCCs at all levels; the PIU, INIR, and SDAEs; local government (administrators, assistant administrators, and so on).

Financial Management

21. An FM assessment was carried out in accordance with Directives and Policy for Investment Project Financing (IPF) and the Financial Management Manual for World Bank Investment Project Financing Operations issued on February 10, 2010, and last revised on February 10, 2017.

22. The objective of this assessment was to determine whether the proposed implementing agency, MASA, has acceptable FM arrangements for the implementation of the proposed Institutional Capacity Building Project. The arrangements are considered acceptable if the entity's planning, budgeting, accounting, internal controls, funds flow, financial reporting, and auditing arrangements: (a) are capable of correctly and completely recording all transactions and balances related to the project; (b) facilitate the

preparation of regular, timely, and reliable financial statements; (c) safeguard the project's assets; and (d) are subject to auditing arrangements acceptable to the World Bank.

Budgeting

23. Budgeting, budgetary control, and budget revisions will follow national procedures requiring that the project budget is inserted as part of MASA's budget and approved by Parliament. The Procedures Manual will need to detail the procedures for the timely reporting on the budget execution. In coordination with all project stakeholders, and provincial delegations covered by the project, approved activities in annual work plans and budgets will be prepared following the budget preparation cycle of the Government of Mozambique. These annual work plans will need to be approved by the MASA and subsequently by IDA no later than November 30 each year. The project would also need to be registered with the National Directorate of Budget soon after signing of the Financing Agreement but before effectiveness and IRRIGA would also need to report on its execution to the National Directorate of Public Accounting.

Internal Control and Accounting Procedures

24. Internal controls and accounting procedures at the central and provincial levels will similarly be based on national procedures on day-to-day operations, defined in the *Manual de Administração Financeira* and the PIM. At the central level, the *Inspeção Geral de Finanças* (IGF) and the *Inspeção Geral de Agricultura e Segurança Alimentar* (IGASA) will be responsible for conducting independent, objective internal control/inspections and sharing the respective result with the World Bank at least twice per year. For provincial delegations, the *Direcções de Administração e Finanças* (DAF) will ensure compliance with internal control systems. In addition, the IGASA will also perform inspections in each provincial delegation to ensure that the procedures set out in the project instruments are working in accordance with Government procedures and the World Bank minimum requirements. However, the project activities may not be subject to internal audit review by the IGF and the IGASA due to constraints in their work program. For this project, alternatives measures such as regular supervision through desk review and field visits (that include expenditures and asset reviews) should be carried out by the World Bank to ensure that the implementing agency is maintaining adequate systems of internal controls and key procedures are complied with.

25. The finance and administrative procedures for the project will be documented in the PIM. The project FM Manual to be prepared by the project will be an annex to the PIM, and should be prepared by effectiveness. This manual will cover at least the following aspects: institutional arrangements, budget and budgetary control, disbursement procedures and banking arrangements, receipt of goods and payment of invoices, internal control procedures, accounting system and transaction records, reporting requirements, and audit arrangements.

Staffing

26. The project implementing agency, the AIMU, to be established under the MASA will be responsible for fiduciary aspects of the project. The PIU FM capacity will comprise a project FM specialist and two project accountants. The overall responsibility of project FM matters rests with the project FM specialist. The appointment of a project FM specialist is a condition of effectiveness. The PIM will establish

the timing of the recruitment of staffing including two project accountants. The fees of the project FM specialist and the two project accountants will be funded by the project proceeds. The AIMU FM capacity will be assessed throughout project implementation and adjusted as necessary.

27. DPASA will be responsible for the handling of all FM-related aspects for IRRIGA activities during project implementation at the provincial level. To successfully administer the FM responsibilities, the MASA will recruit/appoint four administrative assistants, one for each provincial delegation with basic accounting capabilities, and the FM specialist will provide on-the-job training for each one in their daily activities.

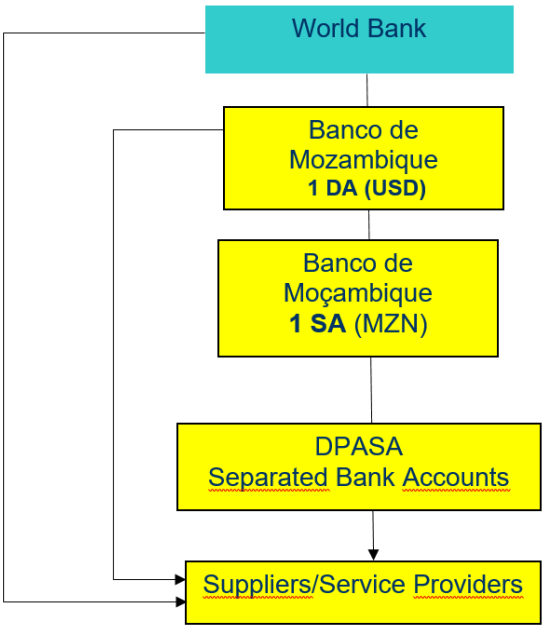
Accounting System

28. The MASA is already connected by the Government's own IFMIS, the e-SISTAFE, and single treasury account, (*Conta Unica do Tesouro* - CUT,) but it will continue to follow the same procedures as the previous project. The AIMU will implement an automated accounting system to complement the e-SISTAFE to summarize and report on the project activities and the preparation of the accounting information for the four implementing entities which will be on cash basis in accordance with Mozambique Government's requirements, which are in alignment with the International Public-Sector Accounting Standards (IPSAS). The automated accounting software to be installed will allow for classification of expenditures by activity/component and produce financial reports required to monitor and manage effectively progress of the project. The project funds to be advanced to the DPASAs will not be considered expenditures until the AIMU at the central level has received sufficient and reasonable evidence that funds were used to finance eligible project expenditures.

Funds Flow

29. IRRIGA will operate one Designated Account (DA) in U.S. dollars with *Banco de Moçambique*, independently managed by the AIMU at the central level. Once the project submits its quarterly withdrawal applications and IFRs to the World Bank, funds will be advanced to the DA in the *Banco de Moçambique*. At the provincial level, the funds will flow through subsidiary accounts opened by each implementing entity. The subsidiary account in Meticais (MT) will be used to transfer funds to the DPASA's, and these provincial accounts may also not be co-mingled with funds from other sources. Payments for goods and services will be paid directly using the account, as illustrated in figure 2.1.

Figure 2.1. Funds Flow



30. The project implementing agency will make use of Report-Based Disbursement procedures through the advance disbursement method, to allow them to have sufficient funds to implement activities in a timely manner. These disbursement procedures allow the World Bank to disburse funds based on forecast for the following six months, and therefore the planning and forecasting should be realistic to ensure there are sufficient funds. The project may also make use of other disbursement methods such as (a) reimbursement disbursement method, whereby the World Bank reimburses the borrower for eligible expenditures pre-financed from its own resources; (b) direct payment method, by which at the borrower's request, the World Bank makes direct payments to suppliers and contractors from the credit account; (c) the special commitment method, whereby the World Bank will issue special commitment to commercial banks for payment of eligible expenditures. The World Bank will issue the 'Disbursement Letter and Financial Information, which will specify the additional instructions for withdrawal of the proceeds of the credit.

31. Upon submission of withdrawal applications and respective funds, the AIMU will advance funds to the DPASAs also based on the detailed, agreed, and approved forecast of payments expected to be made. These expenditures will be posted directly into the system in use, enabling the project finance managers to collate expenditure information and produce the necessary regular reports.

Reporting

32. The AIMU will prepare and submit to the World Bank quarterly IFRs in form and substance acceptable to the World Bank. The IFRs will be quarterly reports and include the following:

- Sources and uses of funds;
- Summary payments not subject to World Bank's prior review;

- Detailed use of funds schedule by project component/disbursement categories, comparison with budgets, and short-term forecasts of expenditure;
- Summary statements of DA expenditures subject to prior review; and
- A narrative description of implementation highlights and challenges for the quarter which help the readers understand the financial statements with more clarity.

33. The AIMU would submit the audited annual financial statements together with the management letter to the World Bank within six months of the end of the fiscal year. These audits will cover all funds related to the project, which will be conducted by the *Tribunal Administrativo* (TA) in accordance with International Standards on Auditing. The annual financial statements for the project will incorporate all activities and is prepared in accordance with cash basis IPSAS and specifically include, among others,

- A consolidated source and uses of funds;
- A statement of sources and uses of funds by financier, showing funds from IDA and how they were applied;
- The supporting notes with respect to significant accounting policies and accounting standards adopted by management; and
- DA activity for the year showing deposits and replenishments received, payments substantiated by withdrawal applications, interest that may be earned on the account, and the balance at the end of the fiscal year.

External Auditing

34. The TA is constitutionally mandated to audit all Government funds, including projects financed by external sources. Therefore, the TA will have overall responsibility for the audits of the project. The audits may be subcontracted to a private audit firm, with/or without the participation of TA staff in the actual audit. Any audit private firm subcontracted by the TA to carry out the audit will have to meet IDA's requirements in terms of independence, qualifications, and experience, which are designed to provide assurance on whether the annual financial statements fairly present the financial transactions and balances associated with the project. The project will need to set aside some funds to cover the TA's reasonable incremental costs of carrying out the audits, which may include travel, per diem, accommodation, stationery and others, to cover the audit which will be transferred to the TA once a year.

35. The audited financial statements, along with the auditor's report and management letter (incorporating management's comments) covering identified internal control and accounting system weaknesses will be submitted to IDA within six months of the end of each fiscal year. A single audit opinion will be issued and will cover all project receipts and payments and DAs. Tables 2.1 and 2.2 present the audit compliance requirements and the proposed FM action plan.

Table 2.1. Audit Compliance Requirements

Action	Submission Date	By Whom
Submission of annual work plan and budget	November 30, each year	AIMU
Submit annual audited financial statements together with the management letter	Annually by June 30	AIMU

Table 2.2. FM Action Plan

Action	Responsibility	Completion Date
Appointments of qualified and experienced project FM specialist	MASA	By effectiveness
Appointment of two qualified and experienced accountants	MASA	Within the time line established in the PIM
Prepare and adopt project FM Manual	MASA	By effectiveness as part of the PIM
Purchase and install a project automated accounting software	MASA	Within the timeline established in the PIM

36. **Effectiveness condition.** Appointment of qualified and experienced project FM Specialist.

37. The project implementing agency should: (a) appoint two qualified and experienced project accountants within the timeline to be established in the PIM, (b) prepare and adopt the project FM Manual as part of the PIM by effectiveness, and (c) purchase and install automated accounting software for the project once the project FM has been hired.

38. **Implementation support plan.** The project will be supervised on a risk-based approach. The FM supervision will be carried out by the World Bank FM specialist. These supervisions will focus on the status of the FM system to verify whether the MASA/AIMU continue to maintain acceptable project FM arrangements and provide support where needed. The initial implementation support mission will focus on review of the status of the agreed FM action plan. The FM implementation support will also include a review of quarterly progress reports and audit reports and follow up on material accountability issues by engaging with the task team leader, client, and/or auditors. Based on the assessment, the FM risk rating is Substantial and field visit supervision will be twice during the fiscal year and adjusted when the need arises.

Procurement

39. **Applicable procedures.** Procurement for the proposed operation will be carried out in accordance with the World Bank Procurement Regulations for Borrowers under Investment Project Financing, dated July 1, 2016 and the provisions stipulated in the Financing Agreement. Further, the Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, dated October 15, 2006, and revised in January 2011, will apply.

40. Open competition using the QCBS method will be the approach for almost all selection of consulting firms, for instance (a) studies/design/supervision of construction for irrigation schemes for Manica, Nampula, Sofala, and Zambezia (estimated at US$2,000,000); (b) Irrigation Infrastructure Management (Subcomponent 2.2) and Training (Subcomponent 3.1) for Manica, Sofala, Zambezia, and

Nampula (estimated at US$2,700,000); among others. The selection of auditors will be through open competition using the least cost selection method. The project will require several individual consultants for the PIU and other activities will be selected through the individual consultant selection method.

41. **Procedures for goods, non-consulting services, and works.** Works for (a) construction and rehabilitation of irrigation schemes in Manica and Zambezia (estimated at total of US$5,700,000) will be procured using open competition through national market approach. Procurement of goods (IT equipment, communication, furniture, accounting software, and other office supplies), estimated to cost less than US$100,000 per contract, will be procured through the request for quotations method. The purchase of vehicles and motorcycles for the project, estimated at US$650,000, will be procured using open competition through national market approach.

42. **Procurement Plan.** One of the results of the PPSD is the Procurement Plan covering the first 18 months of the project. The Procurement Plan includes the selection methods, market approach, and arrangements to be followed by the borrower for procurement of goods, works, non-consulting services, and consulting services. The Procurement Plan was submitted and cleared by the World Bank on May 18, 2018, and will be updated, subject to the World Bank's no-objection at least every 12 months, or as required, to reflect the actual project implementation needs.

43. **Review by the World Bank of procurement decisions.** Table 2.3 indicates the initial values for prior review by the World Bank. All activities estimated to cost below these amounts shall be treated as post review and will be reviewed by the World Bank during the implementation support mission under a post-procurement review exercise. Direct contracting/single source selection will be subject to prior review only for contracts estimated to cost more than the amounts indicated in table 2.3. The World Bank may, from time to time, review the amounts based on the performance of the implementing agencies.

Table 2.3. Prior Review Thresholds

Procurement Type	Prior Review (US$)
Works	5,000,000
Goods and non-consulting services	1,500,000
Consultants (firms)	500,000
Individual consultants	200,000

44. **Assessment of national procedures.** The Mozambique Procurement Regulation, Decree 5/2016 of March 8, has been assessed as required under the World Bank's Procurement Framework. The assessment indicated that the country's regulations are generally consistent with international best practices for the following reasons: (a) there is adequate advertising in national media; (b) the procurement is generally open to eligible firms from any country; (c) contracts documents have an appropriate allocation of responsibilities, risks, and liabilities; (d) there is publication of contract award information in local newspapers of wide circulation; (e) the national regulations do not preclude the World Bank from its rights to review procurement documentation and activities under the financing; (f) there is an acceptable complaints mechanism; and (g) records of the procurement process are maintained.

45. However, the request for bids/request for proposals document shall require that bidders/proposers submitting bids/proposals present a signed acceptance at the time of bidding, to be incorporated in any resulting contracts, confirming application of, and compliance with, the World Bank's Anticorruption Guidelines, including without limitation the World Bank's right to sanction and the World Bank's inspection and audit rights.

46. With the incorporation of the above provision, the Mozambique Procurement Regulation will be acceptable to be used under those procurements not subject to the World Bank's prior review, as the thresholds indicated in table 2.3, or any updates indicated by the World Bank in the Procurement Plan.

Environmental and Social (including safeguards)

47. Project implementation arrangements related to the environmental and social safeguard requirements, national legislation, and World Bank policies, will be under the responsibility of the AIMU. The AIMU will have in its task team one social safeguard specialist and one environmental safeguards specialist to assess, approve, monitor, and report on safeguards compliance for each activity to be financed under the project that could potentially generate environmental and social impacts on natural resources or/and communities as well as to train and assist safeguards colleagues at the provincial and district level.

48. The social safeguards specialists of the AIMU will (a) provide social development expertise including providing inputs for project documents and reports and participating in project-related meetings and implementation support missions; (b) improve the social development outcomes of the project by facilitating the citizen engagement and public participation processes and ensuring that the gender and youth aspects included in the project design are adequately addressed during implementation; and (c) build long-term capacity in the MASA in the preparation and supervision of social safeguards measures and instruments. The social specialist will work closely with the environmental specialist.

49. The environmental specialist will be responsible for the following: (a) providing environmental management expertise to the AIMU which will include providing inputs to project documents, subprojects screening, monitoring and reports and participating in project-related meetings and implementation support missions; (b) strengthening the PIU capacity in the implementation of the environmental safeguards polices and applicable national regulations and ensuring that the project's likely environmental impacts are well managed during implementation; and (c) building long-term capacity in the MASA in the preparation and supervision of environmental safeguards measures and instruments.

50. At the provincial level, the PDST task team will hire a safeguards specialist (environmental and social) for each province. This safeguards specialist will cover both social and environmental project implementation requirements, under assistance of the safeguards specialists at the AIMU.

51. At the local level, a focal point will be appointed to allow more permanent and closer data collection, monitoring, and follow-up of financed activities. The focal point will be appointed among the SDAE and/or another local district administration officer must be appointed.

52. Safeguards specialists will liaise with ARA and MITADER to ensure that PROIRRI IRRIGA meets national legislation requirements such as environmental permits, water permits, and approve ESIAs of

activities eligible under the Environmental Impact Assessment Law require close communication with ARA and MITADER, the national authorities for water and environmental matters.

53. The AIMU and the PPIUs will be trained by the World Bank and will be supported by service providers for certain environmental safeguards, to support the preparation and supervision of social tools of environmental and social measures and instruments to be prepared (for example, ESMF, RPF, ESMP, and RAP). Also training and capacity-building service providers, most likely from the agricultural and irrigation field, may need to receive inputs to better adjust their content and modules on environmental and social safeguard good practices to be taught to farmers or other institutional departments (in DPAs, INIR).

54. The PIM will include detailed TORs for the AIMU and PDST safeguards specialists' positions. The total cost associated with the elaboration, implementation of safeguards (including human resources, capacity building, travel costs, and so on) applicable to IRRIGA is US$2.52 million.

Monitoring and Evaluation

55. The project will have an M&E system, including establishment of the PRIMS. The M&E system and the PRIMS will regularly monitor progress in project implementation in line with the PDOs and the RF indicators for project inputs, output, and impact.

ANNEX 3: IMPLEMENTATION SUPPORT PLAN

Mozambique Smallholder Irrigated Agriculture and Market Access Project

Strategy and Approach for Implementation Support

1. The implementation support for the proposed project was developed based on lessons learned from PROIRRI and with the aim of providing timely assistance to the client. The World Bank team will monitor implementation progress through (a) the project's RF and M&E and project reports against the key performance indicators, (b) surveys undertaken by the project, (c) verification of project activities during the implementation support missions, (d) fiduciary management of all activities implemented by the project, and (e) monitoring of key legal covenants. The implementation support will be reviewed at least once a year and revised as required to ensure that it continues to meet the implementation support needs of the project.

2. Project implementation will be supported by the task team based in the World Bank office in Maputo. Selected international staff and consultants will provide additional support out of Washington, DC, on a needs basis. The implementation support envisages two implementation support missions per year, but during the first year, the team will undertake three missions.

Implementation Support Plan and Resource Requirements

3. The task team will conduct two annual implementation support missions and field visits to the target provinces. In principle, the missions will be in March and September of every year. In September, the mission will support the project to prepare the annual plan for the following year and in March the mission will assess the progress in annual activities. The Government will be required to prepare and share the formal documents for the mission's consideration at least one month before the mission takes place.

4. The World Bank's procurement, FM, and safeguards (both social and environment) specialists will provide regular, timely implementation support and technical assistance to the counterpart teams during project implementation. These team members will also identify capacity-building needs to strengthen procurement, FM, and safeguard capacity of the AIMU and the PDSTs.

- **Procurement.** In addition to carrying out an annual post review of procurement that falls below the prior review thresholds, the procurement specialist will provide focused procurement support, including (a) reviewing procurement documents and providing timely feedback to the counterparts, (b) providing detailed advice and guidance on the application of the World Bank's Procurement Guidelines, and (c) monitoring procurement progress against the Procurement Plan.

- **FM.** The FM implementation support plan will be risk based and will include review of the project's FM system, including but not limited to, accounting, reporting, and internal controls and coordination between the DPASAs and the AIMU at the central level. It will also include an in-depth FM review of transactions under the provinces on a sample basis to different locations within the country, including provincial delegations; reviews of quarterly

reports, review of annual audited financial statements and management letter as well as timely follow-up of issues arising; and participation in project supervision missions as appropriate.

Table 3.1. FM Implementation Support Plan

Time	Focus	Skills Needed	Resource Estimate (weeks)	Partner Role
First two months	Verify if the risk mitigating measures implemented by project effectiveness are still functioning as intended. Identification of any potential problems early in the life of the project	FM	2	n.a.
12–48 months	Review the continuing adequacy of the FM arrangements	FM	8	n.a.
Other				

Table 3.2. Staff Skill Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
FM specialist	10	Fields trips as required	n.a.

Table 3.3. FM Risks and Mitigation Measures

Risk	Mitigation measures	Completion date	Responsibility
Inadequate filing system	Establish proper records and filling system	Done	MASA/INIR
FM procedures not properly applied	Prepare/update a manual of FM procedures for IRRIGA to be included in the PIM	Effectiveness condition	MASA/INIR
Inadequate FM monitoring system	Monitoring system established	Done	MASA/INIR

- **Environment and social safeguards.** Semiannual inputs from the environmental and social safeguards specialists will be required throughout the project to ensure compliance with project safeguards requirements. The safeguards specialists will closely monitor that the ESMF, RPF, and Integrated Pest Management framework (IPMF) are implemented in accordance with the World Bank's operational safeguards policies, both through support missions and routine field visits, and will advise on corrective measures, as needed.

5. Tables 3.4 and 3.5 indicate the level of inputs that will be needed from the World Bank to provide appropriate and adequate implementation support for the proposed project during implementation.

Table 3.4. Implementation Support Plan

Time Year	Focus	Primary Skills Needed	Number of Trips	Estimated Budget (US$)
Year 1	• Project launch • Initialization of project components • FM systems functioning effectively • Procurement practices following World Bank norms • ESMF in place	• Team lead • FM, procurement • Environmental specialist • Social safeguards specialist • Irrigation specialists • Value chain specialist • Agricultural economist • M&E specialist	3	150,000
Year 2	• Monitor implementation of project activities • FM, procurement, safeguards	• Team lead • FM, procurement • Environmental specialist • Social safeguards specialist • Irrigation specialist • Value chain specialist • Agricultural economist • M&E specialist	2	100,000
Year 3	• Monitor implementation of project activities • FM, procurement, safeguards • MTR	• Team lead • FM, procurement • Environmental specialist • Social safeguards specialist • Irrigation specialists • Value chain specialist • Agricultural economist • M&E specialist	2	100,000
Year 4	• Monitor implementation of project activities • FM, procurement, safeguards	• Team lead • FM, procurement • Environmental specialist • Social safeguards specialist • Irrigation specialists • Value chain specialist • Agricultural economist • M&E specialist	2	100,000
Year 5	• Monitor implementation of project activities • FM, procurement, safeguards	• Team lead • FM, procurement • Environment specialist • Social safeguards specialist • Irrigation specialist • Value chain specialist • Agricultural economist	2	100,000

Time Year	Focus	Primary Skills Needed	Number of Trips	Estimated Budget (US$)
		• M&E specialist		
Year 6	• Project withdrawal and closure • ICR	• Team lead • FM, procurement • Environmental specialist • Social safeguards specialist • Irrigation specialists • Value chain specialist • Agricultural economist • M&E specialist	2	100,000

Table 3.5. Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Task team leader	50	13	Mozambique country office based
FM specialist	17	8	Country office based
Procurement specialist	17	8	Country office based
Environmental specialist	17	8	Country office based
Social safeguards specialist	17	8	Country office based
Irrigation specialist	17	8	Washington, DC
M&E specialist	17	8	Washington, DC
Value chain specialist	17	8	Washington, DC
Agricultural economist	17	8	Country office based

ANNEX 4: GHG ACCOUNTING AND CLIMATE CO-BENEFITS

Mozambique Smallholder Irrigated Agriculture and Market Access Project

GHG Accounting

1. The World Bank adopted, in its 2012 Environment Strategy, a corporate mandate to conduct GHG emissions accounting for investment lending in relevant sectors. The ex-ante quantification of GHG emissions is an important step in managing and ultimately reducing GHG emission, and it is becoming a common practice for many international financial institutions.

2. **Methodology.** To estimate the impact of agricultural investment lending on GHG emission and carbon sequestration, the World Bank has adopted the Ex-Ante Carbon-balance Tool (EX-ACT), developed by FAO in 2010. EX-ACT allows the assessment of a project's net carbon balance, defined as the net balance of CO_2 equivalent GHG emitted or sequestered as a result of project implementation compared to a without-project scenario. EX-ACT estimates the carbon stock changes (emissions or sinks), expressed in equivalent tons of CO_2 per hectare and year.

3. **Project boundary and key assumptions**

(a) Cropping areas of vegetables and out-growers and flooded-rice systems' technical management and mitigation options will change substantially during project implementation. Table 4.1 presents the details.

Table 4.1. Annual, Perennial, and Flooded Rice Systems

Cropland	Area (ha)			Key Assumptions
	Start	Without	With	
Rice	1,649	1,649	2,399--	120-day cultivation period, continuously flooded during season, non-flooded pre-season >180 days, straw incorporated shortly (<30days) before cultivation
Out-Growers	526	526	1,226	Improved agronomic practices, nutrient management, water management, manure application, residue retention (mostly sugarcane, but possibly avocados, litchis, bananas and other high value fruits and vegetables)
Horticulture	817	817	-2,367	Improved agronomic practices, nutrient management, water management, manure application, residue retention

(b) Inputs into agricultural production are largely limited to fertilizers, pesticides and diesel fuel. Fertilizers predominantly consist of urea, which has a nitrogen content of 46.7 percent and NPK. The most commonly used NPK fertilizer for blanket application in Mozambique appears to have a 12-24-12 formula, as such as 12 percent nitrogen content, 24 percent phosphorus

content and 12 percent potassium. Fuel consumption varies by crop but is calculated by cubic meter per ha per annum.[11]

(c) The input values for rice are known and will be the same as under the PROIRRI project. Consumption per hectare per year will be 200kg urea, 100kg NPK, 5 liters of herbicide and 75 liters of Diesel fuel. Input use for the remaining crops will be approximated; the remaining crops, both horticulture and out-growers, have not yet been decided and will be those that maximize output and incomes to beneficiaries. Currently, these crops are tomatoes, potatoes, onion and cabbage, all of which require slightly different inputs. As approximation, an average for all those crops is taken: 125kg of urea, 275kg of NPK, 1.75 liters of insecticide, 2.75 liters of fungicide and 168.75 liters of Diesel fuel per hectare per year, respectively.

(d) Annually the project is expected to consume 990 metric tons of fertilizers, and 28 tons of pesticides (insecticides, herbicides, and fungicides) and 786 cubic meters of diesel fuel. Table 4.2 presents the details.

Table 4.2: Annual agricultural inputs (active ingredients) in tons per annum

Input Type	Start and Without Project	With project
Urea	232	428
N-fertilizer	44	119
N-Fertilizer for irrigated rice systems	20	29
Phosphorus	128	295
Potassium	75	119
Herbicides	8	12
Funcidices	2	6
Insecticide	4	10
Diesel (m3 per annum)[12]	350	786

(e) The PROIRRI irrigation consists of gravity fed irrigation, surface irrigation without IRRS, which will be expanded to the new IRRIGA project area, covering the total project area of 5,900 ha. Up to 100 ha are envisaged to be equipped with hand sprinkle irrigation.

[11] Sample calculations for rice in the without project scenario:
Urea: **0.467** [% content] *** 200** [kgs per hectare] *** 1,649** [hectares of rice] **/ 1000** [for conversion to metric tons] **= 232 tons** per hectare per year
NPK: nitrogen **0.12** [12% nitrogen content] *** 100** [kgs per hectare] *** 1,649** [hectares of rice] **/ 1000** [for conversion to metric tons] **= 44 tons** per hectare per year

Sample calculation for Diesel fuel in the without project scenario
(**75** [liters per hectare rice per year] ***** 1,**649** [hectares of rice] **+ 168.75** [liters per hectare other crops per year] *** (817+526)** [hectares for other crops]) **/ 1000** [for conversion to m3] **= 350.31 m3**

[12] The fuel usage is assumed at 75l diesel per ha of rice and 168.75 per ha of horticulture: the sample calculation for rice being 75l * [3,000 or 3,750] / 1000

(f) Inputs into agricultural production are largely limited to fertilizers, pesticides, and diesel fuel. Annually the project is expected to consume 1,469 metric tons of fertilizers, 41 tons of pesticides (insecticides, herbicides, and fungicides), and 746 m^3 of diesel fuel. Table 4.2 presents the details.

Table 4.2. Annual Agricultural Inputs (active ingredients) in Tons Per Year

Input Type	Before Project	Without Project	With Project
Urea	0	0	714
NPK	0	0	260
N-fertilizer for irrigated rice systems	0	0	495
Herbicides	0	0	25
Fungidices	0	0	9
Insecticide and arachnicide	0	0	7
Diesel (m^3 per year)			746

(g) The PROIRRI irrigation will be converted to gravity-fed irrigation, surface irrigation without IRRS, and expanded to the new IRRIGA area, covering the total project area of 8,000 ha.

Table 4.3: Infrastructure (irrigation) Investments

Irrigation Type	Start and Without Project	With project
Gravity fed surface without IRRS	3,000 ha	5,900 ha
Hand sprinklers	0	100 ha

4. **Data sources.** The primary data sources were technical notes of crops (*Fichas técnicas de culturas)*, IIAM/UEM 2010.

5. **Regional and project characteristics.** The project region (which is the entire national territory) has a tropical moist climate. The dominant soil type is low activity clay (LAC) soils. The project implementation phase is 6 years of actual implementation and the capitalization phase is assumed to be 14 years. The 20-year implementation period is common in the use of EX-ACT and identical with the project's economic and financial analysis.

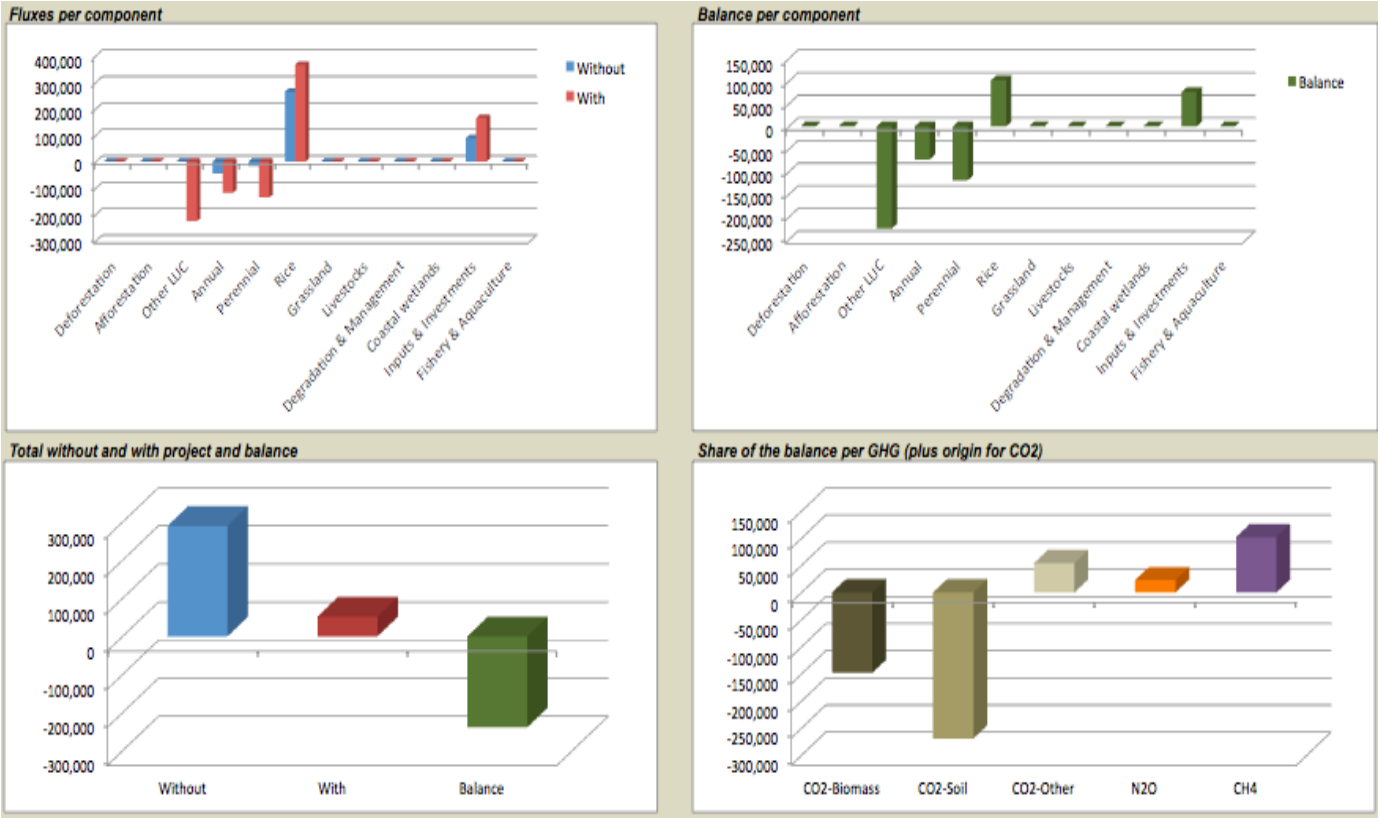
6. **Results.** The net carbon balance quantifies GHGs emitted or sequestered because of the project compared to the without-project scenario. Over the project duration of 20 years, the project is expected to result in carbon emission savings by a total of **238,344** tCO_2-eq, equivalent to **11,917** tCO_2-eq additionally sequestered per year. See Table 4.4 for a summary of these results.

Table 4.4. Results of the Ex Ante GHG Analysis

Project activities	Over the economic project lifetime (tCO_2 eq)			Annual average (tCO_2 eq/year)		
	GHG emissions of 'without project' scenario (1)	Gross emissions of 'with project' scenario (2)	Net GHG emissions (2 – 1)	GHG emissions of 'without project' scenario (3)	Gross emissions of 'with project' scenario (4)	Net GHG emissions (4 – 3)
Land Use Changes Other LUC	0	−348,421	−348,421	0	−17,421	−17,421
Agriculture						
Annual	−45,589	−185,860	−72,474	−-2,279	−-5,903	−-3,624
Perennial	−17,164	−135,604	-118,440	-858	-6,780	-5,922
Rice	263,902	440,744	102,024	13,195	18,296	5,101
Inputs and Investments	88,933	164,671	75,738	4,447	8,234	3,787
Total	**290,083**	**51,738**	-238,344	**14,504**	**2,587**	-11,917

7. **GHG emission and carbon sequestration in tCO2-eq**, as well as net carbon balance per project activity and the entire project as well as the share of emission sources and carbon sinks in tCO2-eq for the entire duration of the project in Figure 4.1 below.

Figure 4. 1: Results of the ex-ante GHG Analysis



Link between Climate Vulnerability and Project Interventions

8. Crop production within the target locations is highly sensitive to climate variabilities and falls short of expected yields. This is mainly occasioned by low productivity resulting from limited use of seeds of improved crop varieties (less than 3 percent of farmers); limited use of fertilizers (less than 5 percent of the farmers); inadequate agricultural support services, including extension (there are only 1,200 extension officers employed by the public sector in the country); small area under irrigation (2.5 percent of the cultivated area); limited access to agricultural credit; limited access to mechanization and animal traction services (less than 9.5 percent of farmers used animal traction in 2014); and low connectivity and limited access to markets for both inputs and outputs (road networks provide access to only about 33 percent of the rural population due to lack of extension services). On the other hand, dependence on rain-fed agriculture had further exposed households to climatic shocks such as droughts that lead to increasing reliance on other natural resources such as clearing land and forests for charcoal production. When there is adequate rainfall, floods have been known to wreak havoc, as recently as 2018. With women and children being the most vulnerable to extreme weather events, and Mozambique women taking the largest share of farmers per country in Africa, these extreme weather events disproportionally affect agricultural development in Mozambique.

9. The proposed potential adaptation activities planned to help address the above vulnerabilities include (a) investments in irrigation infrastructure; (b) increased investments in knowledge and capacities, at the national level, and in the incorporation of climate change and climate vulnerabilities in agricultural policies and in particular irrigated agriculture; (c) investments in improved agronomic and management practices and, applied research and technology development and dissemination; (d) increased investments in extension services—skills and personnel at the local level; (e) continued investments in irrigation infrastructure; (f) investments in weather and market information systems; and (g) investments in knowledge, skills and capacities among smallholders and providing matching grants to increase their production and productivity in tandem with facilitating market access. The detailed activities in the proposed project are in table 4.4.

Table 4.3. Planned Activities and the Expected Climate Co-benefits

Component	Level	Activity	Mitigation	Adaptation	% Financing
1	National	• Skills and capacity development for ministerial staff in agronomic and improved management practices and irrigation water management within national institutions		• Increases knowledge and incorporation of climate change and vulnerabilities to agriculture policies	8.7
1.1 and 1.2	National/provincial/local level	• Capacity building and skill training activities to ministerial staff that promote applied research and technology development and transfer for increased crop production, cropping intensity, CSA, crop diversification.	• Promotes and increases knowledge on water and soil fertility management and conservation practices • Promotes knowledge dissemination on crop intensification practices	• Increases access to seed varieties and management practices more resilient to climate change • Increases capacities and technical knowledge on climate change and climate vulnerabilities • Promotes crop diversification • Generates agrometeorological and market information and its	

Component	Level	Activity	Mitigation	Adaptation	% Financing
		• Supporting multiplication of improved seed varieties • Developing packages of improved technologies and management for selected crops and establishing demonstration plots • Improving soil diagnostics and fertility management services • Developing a digital market platform for proposed crops as well as using existing weather information services		timely dissemination to relevant stakeholders	
2	Farm level	• Constructing irrigation infrastructure using gravity-fed canals within irrigation schemes • Developing irrigation rice schemes • Developing out-grower schemes • Developing horticulture schemes	• Maximizes use of non-carbon based irrigating systems • Reduces land use changes from agricultural expansion • Residue retention • Nutrient and water management	• Crop diversification • Market facilitation • Improved seed variety	60.0

Component	Level	Activity	Mitigation	Adaptation	% Financing
3.1	Farm level	• Capacity strengthening for WUAs and smallholder famer associations on CSA	• Improves knowledge on soil and nutrient management through conservation agriculture, promoting and facilitating soil carbon sinks and reducing nitrogen losses	• Improves knowledge on crop diversification and reduces household risks due to climate change exposure • Strengthens scheme-level management capacities • Improves knowledge on risks from climate change and climate vulnerabilities	21.8
3.2	Farm level	• Matching grants	• Use of solar-powered small tube wells for small-scale irrigation • Use of intensified cropping and crop production and productivity practices • Cultivation of nitrogen fixing crops • Reforestation activities	• Access and use of improved seed varieties • Use of climate-smart post-harvest facilities • Investments in water storage systems	
Total co-benefit financing					49

ANNEX 5. ECONOMIC AND FINANCIAL ANALYSIS

Mozambique Smallholder Irrigated Agriculture and Market Access Project

Introduction

1. An economic and financial analysis of the project was undertaken to assess the economic soundness of the project and its likely impact of project interventions on beneficiaries. The financial analysis takes into account the estimated benefits from the point of view of individual farms, while the economic analysis takes into account the estimated incremental benefits and costs of the project investment to society.

Project Area and Beneficiaries

2. The project focuses on areas with good potential for gravity irrigation and agricultural growth. Target value chains are vegetables and rice. A minor area will address the development of sugarcane cultivation. IRRIGA intends to increase agricultural profitability in selected areas in Manica, Sofala, Zamebezia, and Nampula. The intervention will consist in rehabilitating irrigation schemes in areas that were previously irrigated. The target irrigation area to be rehabilitated is 3,000 ha.

3. In addition, the project will support the farmers that benefitted from irrigation investments under the previous PROIRRI projects. The irrigation schemes established under PROIRRI have an area of 2,985 ha, of which 1,649 ha is used for rice cultivation, 1,276 ha for vegetable production, and 60 ha for sugarcane.[13]

3. The total number of target beneficiary farmers is 9,000. Of these, 3,000 are beneficiaries of the irrigation schemes developed under the previous PROIRRI project. PROIRRI beneficiaries will benefit from technical assistance and training in agronomic aspects (through FFSs), integrated pest management, and better access to markets. In addition, they will have access to matching grants through an e-voucher system to buy agricultural inputs for one production cycle and small equipment. All these activities will allow PROIRRI beneficiary farmers to increase cropping intensity (that is, the number of harvests per year), the yields per unit of cultivated land, and to secure market outlets.

4. About 6,000 farmers will be beneficiaries of the IRRIGA rehabilitated irrigation schemes. The rehabilitated irrigation schemes will allow farmers to access a reliable source of water for vegetable and rice production and to switch to more profitable vegetable crops, which need more water (for example, by reducing the area cultivated with sweet potato and increasing the area cultivated with fresh vegetables such as tomato, onion, and cabbage). Like the PROIRRI beneficiaries, the beneficiaries of the newly established irrigation schemes will benefit from technical assistance and training through FFSs. They will also have access to matching grants through e-vouchers to buy small equipment and agricultural inputs for two production cycles.

5. The project has a second type of matching grant, which will also support associations of producers between farmers and agro-enterprises. These matching grants will fund part of the investment costs of

[13] *Source:* Projecto De Desenvolvimento de Irrigação Sustentável (PROIRRI). Relatório de Progresso Trimestral: Julho- Setembro 2017

small and medium agro-enterprises with the final purpose of improving access to markets for smallholders and providing agricultural services to project beneficiaries.

6. Other beneficiaries of the project are farmers organizations, WUAs, INIR, the National Directorate of Agriculture, and the National Extension Services. The project will support the implementation of the PNI developed by INIR and by the MASA.

Benefits and Impacts of the Project

7. **Tangible benefits.** The project is expected to include improved productivity and marketed production for farmers. This will be achieved by (a) improved access to irrigation water, (b) adoption of new technologies by farmers, (c) investments in value addition SMEs, (d) better technical assistance services, (e) reduced transaction costs, and (f) improved access to markets for farmers.

8. **Poverty reduction.** The increase in productivity in marketed production is expected to be translated in an increase in household incomes and a reduction in poverty. Table 5.1 shows household incomes per typology of farm and individual income (assumptions on cropping mixes and production are reported in the appendix of this annex). The table shows that for all farm typologies, after four years of enrollment in the project, the individual income will be above the global poverty line of US$1.9 (calculated at 2011 purchasing power parity). The same result is obtained by using the national poverty lines for the rural areas of the four target provinces.[14] About 9,000 households will have an income above the international poverty line and above the national poverty lines. Considering that on average each household has 5.9 members,[15] approximately 5,300 persons will raise their income above the mentioned poverty thresholds. The data on rural poverty included in the study of the Mozambican Ministry of the Economy[16] indicates that the reduction of the poverty headcount ratio of rural poverty at the national level caused by the project is 0.6 percent.

Table 5.1. Income Effect of the Project

	Household Income (MZN)			Per Capita Income per day (2011 purchasing power parity US$)		
Farm types[a]	Without project	With project		Without project	With project	
		Yr 1	Yr 4		Yr 1	Yr 4
Rice farms	2,018	5,955	10,097	0.9	2.8	4.7
Vegetable farm A	1,245	6,416	7,882	0.6	3.0	3.7
Vegetable farm B	494	4,982	4,971	0.2	2.3	2.3
Vegetable farm C	1,245	4,375	5,340	0.6	2.0	2.5
Sugarcane farm	161	−103	6,740	0.1	0.0	3.1

Note: a. Details on farm size and cropping intensity of a cropping mix are included in the appendix of this annex.

[14] A comparison between the international poverty line and national poverty lines is available in World Bank. 2018. “Strong but Not Broadly Shared Growth.” Mozambique Poverty Assessment. Poverty and Equity Global Practices.
[15] *Source:* PROIRRI baseline survey 2014.
[16] Ministerio da Economia e Finanças. 2016. *Pobreza e bem-estar em Moçambique: quarta avaliação nacional*. Inquérito ao Orçamento Familiar - IOF 2014/15.

9. **Access to market.** The project will also promote linkages between producer organizations or groups and private companies by partially funding business plans through matching grants to small and medium companies that will involve smallholders. This will promote investments in value addition. In addition, beneficiary companies are expected to provide new services to farmers and enlarge their sourcing base of farmers, who will then have greater market access opportunities.

10. **Food security.** The project will increase incomes and food availability for beneficiary households. Given the low-income level of beneficiary farmers, the increase in income is likely to be translated into higher purchase of food. If it is assumed that 25 percent of the land of the irrigation schemes rehabilitated by IRRIGA is cultivated with rice, the project will increase rice production in 750 ha, in addition to increasing rice production in the 1,649-ha rehabilitated by PROIRRI. The total additional rice production is estimated to be 6,450 tons per year.[17] The increase in food availability at the national level caused by the project and the improvement of incomes at the household level will contribute to improving food security.

11. **Savings in foreign exchange.** The increased output from the target areas will increase national production and thereby contribute to the growth of the GDP and to national food security. In addition, reduced food imports will result in foreign exchange savings. More specifically, the average price of imported rice in 2015 was US$205[18] per ton. With this price, and additional rice production of 6,450 tons per year, the project will result in foreign reserve savings of US$1.3 million per year.

12. **Nutrition.** Several studies show that higher incomes and higher food production lead to improved nutrition for beneficiary households. It is expected that part of the increased vegetable production will be consumed by beneficiary households, thus improving their micronutrient and vitamin intake. Also, it is expected that higher disposable incomes will be used to diversify diets.

13. **Climate resilience.** Access to irrigation water is key to build resilience to climate change. By improving access to water, beneficiary farmers will be better equipped to cope with climatic shocks, droughts, and variations in rainfall.

14. **Institutional benefits.** Institutional benefits expected from the project are the improvements of the capacities of the MASA and INIR. The INIR PNI includes three scenarios of irrigation development (moderate, medium, and high). According to the less ambitious irrigation development scenario, 125,000 ha of irrigation areas would be implemented by 2024. INIR has very weak capacity and such a scenario will not be achieved unless INIR's capacity is strongly improved. The project will support the establishment of an AIMU within the MASA with its planning design unit, construction management unit, and a WUA specialist. Regarding the regulatory framework, the project will support the development of a PPP regulation for irrigation and the development of irrigation design and construction norms. The project will also support the review of INIR's structure and mandate. In addition, the project plans to develop an

[17] These figures were assumed by using the following assumptions: yields of paddy with project 4.2 tons/ha, cropping intensity of paddy with project 1.5 (that is, one harvest during the wet season and half area planted during the dry season), yields of paddy without project 2.8 tons/ha (derived from PROIRRI reports), cropping intensity without project 1 (one harvest only during the rainy season); conversion factor paddy/milled rice 0.67.

[18] *Source:* Values and quantity of imported rice in Mozambique retrieved from Comtrade.

agrometeorological support system to contribute to enhancing the agricultural monitoring system and to providing logistical support to INIR and the MASA to facilitate technology dissemination.

15. **Price effects.** No significant price effects are expected. Even assuming 5 tons of paddy produced per harvest and two harvests per year, the incremental production of rice[19] that would be achieved through the project would be less than 2 percent of the 2012 imports, which is the year with the lowest import level[Error! Bookmark not defined.]. This suggests that the project will not cause a reduction in the rice farm g ate price.

Methodology and Assumptions

16. Incremental costs and benefits analysis was performed by using a 'with' and a 'without' project scenario. The without project scenario was formulated based on the existing actual cropping pattern, crop productivities, cropping intensities, input prices, and output prices observed in the project areas. The 'with project' situation reflects likely changes in the planned cropping pattern, crop yields, and cropping intensities following the project interventions.

17. A cash flow model was used to conduct an ex ante analysis of the project investment. Annual cash flows were estimated as the difference between without project and with project net benefits for direct beneficiaries.

18. The cost-benefit analysis is based on crop - and farm-level assumptions on yields, input requirements, prices, and costs in constant 2017 currency amounts for the 'with project' and 'without project' scenarios. For the economic analysis, the NPV was calculated using a discount rate of 5.5 percent. Following the 2016 World Bank Technical Note,[20] this was obtained by multiplying the forecasted real per capital GDP growth rate[21] by an elasticity of marginal utility of consumption of two. The EIRR was also calculated. Assumptions on land extension and yields were derived by using the data extracted from the 2015 MASA survey or by using data provided by the project formulation team.

19. Quantified benefits captured in the economic and financial model are the incremental net benefits of the beneficiary farms, which are due to the rehabilitation of irrigation schemes and to the improvement of agricultural practices. The project also supports SMEs and service providers by providing business advice and matching grants. The details of the value addition component will be defined through value chain studies that will be implemented during the project life. In addition, the value addition component will fund business plans that will be developed based on the requests of agro-processing companies. So, at this stage it is not possible to quantify the impact of the project support to agro-processing SMEs and the impact of service providers. The project provides capacity building and institutional support to the Ministry of Agriculture by supporting the implementation of the institutional development plan of INIR. The benefits of institutional development activities cannot be quantified. However, all project investments on value addition and institutional strengthening are necessary to

[19] Assumed extraction rate from paddy to husked rice: 67 percent.
[20] World Bank. 2016. "Discounting Costs and Benefits in Economic Analysis of World Bank Projects." Washington, DC.
[21] IMF.2018. "World Economic Outlook.'

achieve the net benefits captured at the farm level. All project costs are consequently included in the economic analysis, as well as the project management component.

20. The financial analysis was conducted at the farm level by using the market prices collected during the formulation mission (which took place in October 2017). At that time, the exchange rate was MZN 61 per U.S. dollar.

21. For the economic analysis, market prices were converted to shadow prices. The economic analysis ignores all transfer payments such as taxes, grants, interests, and principal repayment paid to or received from farmers. Conversion factors were calculated by using border parity prices and are reported in table 5.2.

Table 5.2. Conversion Factors

Item	Conversion Factor
Rice	0.79[a]
Maize	0.92[b]
Fertilizers, plant protection chemicals, and vegetable seeds	0.94
Gasoil	0.75
Agricultural mechanical operations	0.88
Irrigation works	1[c]
Standard conversion factor	0.99

Note: a. Derived by the MAFAP (FAO) nominal rate of protection at farm gate for rice in Mozambique.
b. Derived by the MAFAP (FAO) nominal rate of protection at farm gate for maize in Mozambique.
c. From 2017, irrigation works are expected from Value Added Tax (Law 13/2016).

22. Financial project costs were converted to economic costs by using COSTAB software program. Economic costs exclude taxes, duties, and price contingencies.

23. The cost of unskilled labor hired for an agricultural operation was valued by using the standard conversion factor. This is because agricultural labor is hired at pick work time, when the wage rate reflects the opportunity cost of labor. No allowance was made for family labor. This is because a whole farm budget approach was used. The family farm is the recipient of the incremental net benefit. Thus, the family remuneration is the net income stream. Including family labor as a cost would constitute double counting.[22] A standard conversion factor was used for all items not listed in table 5.2. The standard conversion factor is close to 1. This is in line with the 2016 Mozambique Country Fact Sheet on Food and Agriculture Policy Trend conducted by FAO, which emphasizes that Mozambique has one of the most liberalized trade regimes in the region.

24. The analysis is based on a 20-year period, during which the project will generate benefits, including a six-year project implementation period. There are no further investment costs after the sixth year of project implementation. However, annual O&M costs were included in the economic analysis until Year 20, as these costs will have to be incurred if the future benefits of the projects are to be sustained.

[22] See Gittinger, J. P. 1982. *Economic Analysis of Agricultural Projects*. World Bank Institute. Baltimore: John Hopkins University Press.

25. For the economic analysis, it was assumed that 25 percent of the land irrigated through the rehabilitated schemes is cultivated with rice, 10 percent is cultivated with sugarcane, and the rest with vegetables.

Financial Analysis

26. The main purpose of the financial analysis is to examine the viability of the main crops and farm models that will be supported by the project and to assess their potential increase in profitability as a result of project interventions.

27. The results of gross margin analyses are summarized in table 5.3, along with assumed yields (detailed assumptions on other technological coefficients and market prices are reported in the appendix of this annex). Vegetables are the most profitable crops, followed by sugarcane. The profitability of rice improves when rice is harvested twice per year (the table only reports yields per single production cycle). Maize and sweet potato have the lowest gross margins and are the crops for which the project will not provide support.

Table 5.3. Yield and Gross Margin Per Hectare Per Production Cycle

	Yields (Tons/ha)			Gross margin (US$/ha)		
Crop	Without project	With project		Without project	With project	
		Yr 1	Yr 4		Yr 1	Yr 4
Rice	2.4	2.8	4.3	344	377	400
Maize	1.0	1.8	1.8	5	51	51
Sweet potato	1.3	1.3	1.3	111	111	111
Cabbage	12.0	20.0	32.0	968	2,921	3,709
Tomato	10.0	20.0	25.0	1,173	3,464	3,727
Onion	10.0	16.0	20.0	351	1,657	1,335
Sugarcane	n.a.	0.0	50.0	n.a.	−16	1,072

28. The results of the financial analysis at the farm level are summarized in table 5.4. All farm types have a positive NPV.[23]

[23] The discount rate for the financial analysis is 27.5 percent, which is the interest rate yielded by Mozambique's three-year government bonds.

Table 5.4. Financial Analysis (US$)

Rice farm	Dry season	Wet season	Cropping intensity	Net benefit ($US)	
				Yr 1	Yr 4
With project	Cabbage (0.25Ha), tomato (0.25Ha), Rice (0.4Ha)	Rice (0.8 Ha)	1.70	1,438	2,433
Without project	Cabbage (0.25Ha), Sweet potato (0.25Ha)	Rice (0.6 Ha)	1.1	476	476
Incremental net benefit				962	1,957
NPV (@27.5% over 20 years)				5,994	

Vegetable farm - type A	Dry season	Wet season	Cropping intensity	Net benefit ($US)	
				Yr 1	Yr 4
With project	Cabbage (0.25Ha), Tomate (0.25Ha)	Maize (1 Ha)	1.5	1,607	1,916
Without project	Cabbage (0.25Ha), Sweet potato (0.25Ha)	Maize (1 Ha)	1.5	275	275
Incremental net benefit				1,332	1,641
NPV (@27.5% over 20 years)				5,871	

Vegetable farm - type B	Dry season	Wet season	Cropping intensity	Net benefit ($US)	
				Yr 1	Yr 4
With project	Onion (0.5Ha), Tomato (0.5Ha)	Maize (1 Ha)	1.5	1,277	1,274
Without project	Onion (0.25Ha), Sweet potato (0.25Ha)	Maize (1 Ha)	1.5	121	121
Incremental net benefit				1,156	1,153
NPV (@27.5% over 20 years)				4,314	

Vegetable farm - type C	Dry season	Wet season	Cropping intensity	Net benefit	
				Yr 1	Yr 5
With project	Onion (0.25Ha), Cabbage (0.25Ha)	Maize (1 Ha)	1.5	1,087	1,269
Without project	Cabbage (0.25Ha), Sweet potato (0.25Ha)	Maize (1 Ha)	1.5	275	275
Incremental net benefit				812	994
NPV (@27.5% over 20 years)				3,622	

Sugarcane farm (USD)	Dry season	Wet season	Cropping intensity	Net benefit	
				Yr 1	Yr 5
With project	Sugarcane (1.6 Ha)	Sugarcane (1.6 Ha)	1.00	-26	1,716
Without project	Sweet potato (0.25Ha)	Maize (1.35 Ha)	1.00	35	35
Incremental net benefit				-61	1,681
NPV (@27.5% over 20 years)				3,017	

Economic Analysis

29. The economic analysis provides a general framework through which costs and benefits are identified and assessed from society's perspective.

30. **Economic viability.** With a 20-year time horizon and using an estimated opportunity cost of capital of 5.5 percent, the economic analysis yields an NPV of US$44.9 million and an EIRR of 21 percent. The EIRR is much higher than the estimated opportunity cost of capital. These results indicate that the project is justified on economic grounds.

31. **Employment impacts**. Estimates suggest that the project also has an impact on employment creation. By Year 6 of the project, 333,950 man-days of incremental work will be needed to conduct

agricultural activities in the 3,000-ha rehabilitated by IRRIGA and in the 3,000-ha rehabilitated by PROIRRI. Assuming that a full-time job requires 230 working days, the project will create 1,450 full-time jobs in the agricultural sector. Additional jobs will be created in the construction sector to rehabilitate 3,000 ha of irrigation schemes. The recent results of the second census of companies in Mozambique[24] report the number of workers and turnover for the construction sector (among others). An employment coefficient was calculated for the construction sector,[25] and it was used to estimate the direct employment creation of the construction works of the project. The result is that the US$24 million investments in irrigation works budgeted in IRRIGA will generate 195 jobs for three years (this figure does not take into account indirect employment effects, which were not estimated due to the lack of input-output tables).

Sensitivity Analysis

32. A sensitivity analysis was carried out by introducing variations in cost increases, delays in the accruals of benefits, reduction of benefits, and uptake of practices by farmers. The result illustrates that the project is not sensitive to reasonable increases in costs and decreases in benefits.

33. As shown in table 5.5, the unlikely assumption of simultaneous drop of prices of all produce considered in the 'with project' scenario by 20 percent would result in an EIRR of 11.3 percent and an ENPV of US$16.5 The economic analysis was conducted by assuming an adoption rate of improved practices by 60 percent among project rice and vegetable farmer beneficiaries. In case the adoption rate of farmer beneficiaries was 40 percent, the EIRR would result to be 8.3 percent and the ENPV US$8.1. With an increase in the cost per hectare for rehabilitation works by 20 percent the EIRR would be 14.4 percent.

34. A change that would make the NPV negative is a reduction of the adoption rate to 30 percent among rice and vegetable farms.

35. The discount rate that makes the NPV negative is 21 percent. This indicates that the project economic viability will not be shaken by changes during its implementation.

Table 5.5. Results of Sensitivity Analysis

Scenarios	EIRR (%)	NPV at 5.5% (US$ millions)	NPV/beneficiary (US$)
Baseline scenario	20.9	44.9	4,984
20% lower output price for all crops include in WIP	11.3	16.5	1,831
25% lower output price for all crops include in WIP	8.9	9.4	1,043
30% lower output price for all crops include in WIP	6.3	2.3	255
Yield reduction for all crops in WIP by 15%	12.7	20.9	2,326
Yield reduction for all crops in WIP by 20%	10.1	13.0	1,441
Yield reduction for all crops in WIP by 30%	4.4	−3.0	−331
Adoption rate of 50% for rice and vegetable farmers	12.5	20.3	2,261
Adoption rate of 40% for rice and vegetable farmers	8.3	8.1	899
Adoption rate of 30% for rice and vegetable farmers	4.0	−4.2	−462

[24] Instituto Nacional De Estadística. 2017. *Empresas em Moçambique: resultados dos segundo censo nacional (2014–2015).*
[25] Estimated employment coefficient of the construction sector: US$24.366 million.

Scenarios	EIRR (%)	NPV at 5.5% (US$ millions)	NPV/beneficiary (US$)
20% increase in all inputs and mechanical operation costs	18.8	39.3	4,363
30% increase in all inputs and mechanical operation costs	17.8	36.5	4,051
Simultaneous increase of input and mechanical operations costs by 15% and reduction in yields by 15%	11.4	16.9	1,877
Benefits delayed by 1 year	16.1	36.6	4,063
Benefits delayed by 2 years	13.0	28.7	3,190
Increase of irrigation construction cost per ha by 20%	14.4	28.6	3.173

Note: WIP = With project; WOP = Without project.

Appendix A5.1. Assumptions on Cropping Intensity

Rice farm (Ha)

	Without Project		With Project	
Crop	Dry Season	Wet Season	Dry Season	Wet Season
Rice		0.6	0.4	0.8
Cabbage	0.25		0.25	
Tomate			0.25	
Sweet potato	0.25			
Total cultivated area	0.5	0.6	0.9	0.8
Total cropland	1.0		1.0	
Cropping intensity	1.1		1.7	

Vegetable farm A (Ha)

	Without Project		With Project	
Crop	Dry Season	Wet Season	Dry Season	Wet Season
Maize		1.0		1.0
Onion				
Tomate			0.25	
Cabbage	0.25		0.25	
Sweet potato	0.25			
Total cultivated area	0.5	1.0	0.5	1.0
Total cropland	1.0		1.0	
Cropping intensity	1.5		1.5	

Vegetable farm B (Ha)

	Without Project		With Project	
Crop	Dry Season	Wet Season	Dry Season	Wet Season
Maize		1.00		1.00
Onion	0.25		0.25	
Tomate			0.25	
Cabbage				
Sweet potato	0.25			
Total cultivated area	0.5	1.0	0.5	1.0
Total cropland	1.0		1.0	
Cropping intensity	1.5		1.5	

Vegetable farm C (Ha)

	Without Project		With Project	
Crop	Dry Season	Wet Season	Dry Season	Wet Season
Maize		1.0		1.0
Onion			0.25	
Tomate				
Cabbage	0.25		0.25	
Sweet potato	0.25			
Total cultivated area	0.5	1.0	0.5	1.0
Total cropland	1.0		1.0	
Cropping intensity	1.5		1.5	

Sugarcane farm C (Ha)

	Without Project		With Project	
Crop	Dry Season	Wet Season	Dry Season	Wet Season
Sugarcane				1.6
Maize		1.35		
Sweet potato	0.25			
Total cultivated area	0.3	1.4	0.0	1.6
Total cropland	1.6	0.0	1.6	0.0
Cropping intensity	1.0		1.0	

Appendix A5.2. Assumptions on Market Prices and Technical Coefficients Per Hectare Per Production Cycle

		Sweet potato			Maize			Paddy		
Yields and inputs	Unit	Unit price (MZN)	Quantity WOP	Quantity WIP Yr 4	Unit price (MZN)	Quantity WOP	Quantity WIP Yr 4	Unit price (MZN)	Quantity WOP	Quantity WIP Yr 4
Land preparation	ls	2,000	1	1	3500	1	1	8750	1	1
Cuts/seeds	Bunch/Kg	0	1	1	0	25	25	90	100	100
NPK	Kg	60	0	0	60	0	0	60	50	100
Urea	Kg	30	0	0	30	0	0	30	50	100
Pest./herbicides	Lt	880	0	0	880	0	0	313	0	11
Bags	Units	25	30	30	25	20	36	25	48	51
Transport	Kg	1	518	518	1	678	1,478	1	2,056	3,931
Water Fees	ls	0	0	0	0	1	1	1000	0	1
Hired labor	m/d	150	16	16	150	0	0	150	20	22.5
Family labor	m/d	0	25	25	0	24.1	24.1	0	68	68.5
Production	Kg	10	1,250	1,250	5	1,000	1,800	15	2,400	4,275

		Cabbage			Tomato			Onion		
Yields and inputs	Unit	Unit price (MZN)	Quantity WOP	Quantity WIP Yr 4	Unit price (MZN)	Quantity WOP	Quantity WIP Yr 4	Unit price (MZN)	Quantity WOP	Quantity WIP Yr 4
Land preparation	ls	19,250	1	1	19,250	1	1	19,250	1	1
Seeds	Kg	10,000	0	0.3	17,500	0	0.3	1,000	3	2.75
NPK	Kg	60	325	500	60	130	200	60	260	400
Urea	Kg	30	163	250	30	65	100	30	0	0
Mancozeb	Kg	700	3	5	700	2	2.5	700	7	10
Cypermetrina/Chlophirymphys	Kg	800	3	5	800	2	2.5	800	6	9.5
Boxes/bags	Unit	75	120	320	75	50	125	3	1,000	2,000
Transport	Kg	1	10,800	28,800	1	8,000	20,000	1	7,600	15,200
Water fees	ls	1,000	1	1	1,000	1	1	1,000	1	1
Hired labor	m/d	150	37	37	150	43	43	150	27	27
Family labor	m/d	0	91	133	0	146	193	0	87	87
Production	Kg	12	12,000	32,000	15	10,000	25,000	11	10,000	20,000

ANNEX 6. MAP OF PROJECT AREAS