

Pilot Program for Climate Resilience

Program Approval Request

1. Country/Region:	<i>Mozambique</i>	2. CIF Project ID#:	(Trustee will assign ID)
3. Source of Funding:	<input type="checkbox"/> FIP	<input checked="" type="checkbox"/> PPCR	<input type="checkbox"/> SREP
4. Project/Program Title:	<i>Smallholder Irrigation Feasibility Project</i>		
5. Type of CIF Investment:	<input type="checkbox"/> Public	<input checked="" type="checkbox"/> Private	<input type="checkbox"/> Mixed
6. Funding Request in million USD equivalent:	<i>Grant: US\$ 575,000 (for advisory services only)</i>	<i>Non-Grant: n/a</i>	
7. Implementing MDB(s):	<i>IFC</i>		
8. National Implementing Agency:	<i>Private sector operation</i>		
9. MDB Focal Point and Project/Program Task Team Leader (TTL):	<i>Headquarters- Focal Point:</i> <i>PPCR Focal Point:</i> <i>Joyita Mukherjee and Laura Gaensly</i>	<i>TTL:</i> <i>Selcuk Tanatar</i>	
10. Program Description:			

I. Introduction

This Project Proposal corresponds to the IFC-managed Mozambique PPCR Program as indicated in Mozambique's Strategic Program for Climate Resilience (SPCR) endorsed by the PPCR Sub-Committee in June 2011.

IFC's program under the Mozambique's SPCR has an advisory services/technical assistance component (grants) and an investment component (concessional loans), and aims to address market barriers to financing adaptation measures in the forestry, agriculture and ecotourism sectors. During project preparation phase, two in-depth market studies of potential investments and opportunities to build climate resilience of rural communities were undertaken using PPCR grants resources¹. More than 50 private sector companies and banks were interviewed and analyzed during the course of the studies. NGOs and government agencies were also interviewed. Moreover, IFC has coordinated its activities with the PPCR focal point at the Ministry of Planning and Development, as well as with the

¹ The studies can be accessed through the following links (i) *Building Climate Resilience through Sustainable Forestry and Agricultural Management* - [Summary](#) and [full report](#); and (ii) *Credit Lines in Local Banks that Build Climate Resilience* - [Summary](#) and [full report](#).

World Bank and African development Bank (AfDB) teams working with PPCR projects in Mozambique.

Based on finding of the studies and overall analyses undertaken during the preparatory phase, IFC has initiated discussions with several private sector players (local and international, including banks) to narrow down and focus on the ideas that conform to the Mozambique PPCR's objectives and that are most likely to succeed and achieve impact.

The analysis undertaken in the preparatory phase has confirmed that there is a need to develop and implement advisory services projects to help set the stage for investments to follow. This sequencing is necessary because the risks for private sector investors in adaptation investments in the forestry, agriculture and ecotourism sectors in Mozambique were deemed to be high. Investors that were engaged in the preparatory phase highlighted the need for additional information and demonstrations to reduce risks prior to investing.

As a result, IFC is proposing to start implementation of an advisory services component, the proposed Smallholder Irrigation Feasibility Project (the Project), which is expected to demonstrate that a private sector-led, multi-purpose irrigation initiative can:

- build the climate resilience of local communities by diversifying crop production and extending the crop growing season into the dry season;
- successfully mitigate the environmental risks of an irrigation project; and
- be commercially viable and attractive for private sector investors.

By better understanding and developing mitigation strategies for technical and financial risks, it is anticipated that the Project will help identify demand for investments in irrigation projects that will build climate resilience for small scale farmers.

The objectives of the proposed Project are strongly aligned with two of the five SPCR priorities for Mozambique, namely: 1) lower climate-related water risks to local communities, agricultural production and infrastructure as a result of improved hydro-meteorological information and 2) improved production and livelihoods resulting from the introduction of climate-resilient approaches and private sector investment in agriculture and watershed management.

The Project will also look for synergies and complementarities with the World Bank PROIRRI project² that has an objective to increase agricultural production in new or improved irrigation schemes in the Provinces of Sofala, Manica and Zambezia. The primary target groups of PROIRRI are smallholder farmers (groups and associations) and individual emerging farmers.

A context for the sector, the market barriers, and the proposed Project are described below.

² <http://www.worldbank.org/projects/P107598/mz-proirri-sustainable-irrigation-development?lang=en&tab=overview>

II. Context

II.1 Country and sector contexts

Mozambique ranks 178 out of 187 countries in the United Nations 2014 Human Development Index, with over half of the population living in poverty, and large gaps in terms of infrastructure. Major problems faced in the country include negligible road access for goods and services, limited provision of basic services, low agricultural productivity, and low education rates³. Mozambique is also one of the most climate vulnerable countries in the world. Most of the population live in rural areas prone to weather and climate shocks, have low adaptive capacities to climatic shocks, and are heavily reliant on climate-sensitive sectors such as agriculture and livestock. The agriculture sector consists largely of subsistence farming in which 85% of rural households are engaged. The average size of cultivated land per household is less than 1.5 hectares⁴. Droughts, floods, and tropical cyclones pose a particular threat to coastal communities, transport infrastructure, and livelihoods dependent upon rain-fed agriculture⁵.

Precipitation variability in the central and south portions of Mozambique have increased between the 1990s and present time. Absolute rainfall deviations have had higher magnitude during these years especially in the southern and coastal regions of Mozambique also suggesting that variability may be increasing with time. There has also been an observed increase in annual rainfall in the northern portion of the country during the last two decades⁶.

Floods can prevail for several months, occurring most frequently in the central and southern regions, along river basins, in low-lying regions, and in areas with poor drainage systems. The flooding is linked not only to heavy rainfall, but also to water drainage from rivers in upstream neighboring countries: water from nine major river systems from vast areas of southeastern Africa flows to the Indian Ocean through Mozambique. Fifty per cent of the water in Mozambique's rivers originates from outside the country. In 2000, floods in Mozambique killed approximately 800 people, displaced around 540,000, and inflicted costs of about 10% of annual GDP. In 2014, floods in northern Mozambique caused 84 deaths significant loss of crops and cut through the national north-south highway.

Livelihoods in the Zambezia and Manica provinces are heavily dependent on subsistence agriculture, consisting of food grown and collected by households, and combined with limited cash income from a variety of sources such as production of charcoal, sale of firewood and other forest-based products (e.g. wild mushrooms/animals, woven baskets). In the Zambezia province 32% of households reported that they did not grow enough food to feed the household in at least one year of the past five years. In the Manica province, 30% of households reported being food insecure⁷.

In addition to acute episodes of food insecurity, chronic malnutrition continues to be a significant problem, with 45% of children under five in Zambezia province stunted (low height for age) and 42% in Manica province. Income is very low and a significant portion of the affected population has no

³ World Bank Group Country Partnership Strategy for Mozambique FY12-15

⁴ Agriculture Census (Instituto Nacional de Estatística, 2011)

⁵ Mozambique: Economics of Adaptation to Climate Change (World Bank, 2010)

⁶ Ibidem

⁷ Environment and Social Impact Assessment Report (2014) conducted by an IFC client operating in the region.

cash income at all, particularly in Zambezia province. The average annual income in the Zambezia province is USD73 per household of five people, while in the Manica province it is USD 336. Nearly all families in both areas have a household income of less than USD1 per day.

According to the National Agricultural Census of 2010, only 1.3% of smallholders in Zambezia province and 10% in Manica province use any form of irrigation. However, as the methods of irrigation are rudimentary based on drawing on water by buckets from seasonal streams, this does protect farmers from changes in climate and precipitation patterns.

II.2 Project context

The Government of Mozambique has provided a private company (an existing IFC client) with concessions (Land Use Rights or DUATs in Portuguese). The company is developing this land using a mosaic approach, with blocks of tree plantation interspersed by houses, agricultural fields and high value conservation areas. Of the total DUAT area, about two thirds is targeted for tree planting, with the balance remaining for community uses. An estimated 25,000 households live within the DUATs⁸.

Although the company's forestry investments will create economic opportunities for the local population, making the agro-forestry mosaic approach work in the Mozambique context will be critical for long-term sustainable development of the communities. During 2014, IFC assisted the company to design a community development program utilizing their own resources to improve the livelihoods of households living with the DUAT areas. The company's Community Development Program (CDP) has three objectives: (i) preserve and improve livelihoods through supporting smallholder farmers to adopt better seeds, improved agriculture practices, and diversification of agriculture (from maize only, to food and cash crops plus livestock); (ii) develop opportunities for economic growth through support to develop commercial agri- and non-agri micro and small enterprises; and (iii) support improvement for the quality of life through improving access to better education, health services and clean water and sanitation. These objectives are enabled by a cross-cutting objective to improve community governance and land use planning.

Although IFC and the company considered including various irrigation technologies as part of the CDP, this was excluded due to three main factors. First, investing in irrigation requires significant upfront investments and becomes financially feasible only when the presence and strong commitment of cash crop off-takers is secured. Second, smallholder farmer skills and abilities are well below the level needed to operate and maintain irrigation equipment. Finally, the sustainability of adopting modern irrigation technologies needs a well-structured financing system, and an installation, maintenance and servicing supply chain. None of these factors are currently available in Mozambique.

For its forestry operations, the company plans to create basic water reservoirs for firefighting and to meet water needs for production of tree seedlings. This will encompass the construction of smaller

⁸ Developing, managing and harvesting the plantations will create a significant demand for labor that will be provided by the households living within the DUATs. This demand is estimated at roughly 8,000-10,000 part-time jobs for the first seven years and more than 5,000 full time jobs once the plantations are fully established within the next 7-10 years.

rainwater catchments across the area of operation and two water reservoirs – one in each province. During the development of the Community Development Program, IFC and the company identified an opportunity for potentially transforming the planned water reservoirs into multi-purpose reservoirs serving the needs of both the firm and the communities. If designed correctly, the smaller catchments could potentially provide water for gardening and livestock, while the reservoirs could potentially irrigate agricultural blocks, providing cash income for thousands of farmers. Moreover, the reservoirs could be used for small/micro-scale hydropower generation, providing clean energy to households. As climate change is expected to increase drought and fires in the Project area, constructing water reservoirs to be used for irrigation and for fire-fighting operations would increase the climate resilience of the company's operations and the livelihoods of the local communities.

The company has expressed interest to explore the technical and financial feasibility of the catchments and water reservoirs to be used for multiple purposes, and understand the incremental investment needs to realize this opportunity. It is contributing towards the Project costs and, will consider investing in incremental investment needs, based on the outcomes of the feasibility studies.

III. Market barriers

The main barriers to increasing the use of irrigation by smallholder farmers in Mozambique are:

- *High cost of water impoundment and irrigation equipment, and limited access to finance for irrigation equipment:* Constructing water reservoirs and water catchments requires specific equipment (such as bulldozers), which are expensive to operate and maintain in Mozambique. The purchase of irrigation equipment is a capital investment and although it may be recouped in less than five years, many smallholder farmers are unable to amass the initial capital investment upfront. Local banks are reluctant to provide financing for agriculture in Mozambique mainly because they perceive it as too risky.
- *Limited awareness of the benefits of improved irrigation and minimal capacity to operate the equipment:* Current existing and previous irrigation development programs have focused on constructing water transportation canals to specific geographical areas (irrigated perimeters). Although they have demonstrated immediate benefits to farmers, little effort has been invested in developing farmer training and capacity building maintain and use these structures, which has resulted in lack of sustainability and no uptake of the practice.
- *Limited private sector participation in irrigation schemes:* Most of the irrigation schemes in Mozambique targeted to smallholder farmers have been established through public sector interventions and are not sustainable once donor-sponsored projects end. Private irrigation schemes are typically for large plantations or intensive commercial crop-agriculture. As a result, there is little private sector investment in modern and improved irrigation systems for smallholder farmers.

IV. Objectives

The overall objective of the Smallholder Irrigation Feasibility Project is to promote private sector investments in irrigation in Mozambique and consequently increase smallholder farmers agricultural productivity and strengthen farmer's resilience to climate change. The Project aims to demonstrate the

technical and financial viability of multi-purpose irrigation schemes that will benefit smallholder farmers.

This objective will be pursued through working with and leveraging the investment of a leading agroforestry firm operating in Mozambique and a current IFC client. Once the technical and financial viability of multi-purpose irrigation schemes is demonstrated under this Project, the client will explore the possibility to invest in the construction of appropriate infrastructure for irrigation to scale up Project impact and scope.

The specific objectives of the Project are:

1. Identify most appropriate locations for water reservoirs and small water catchments such that these facilities can meet the company's operational requirement, while maximizing the number of smallholders that can benefit from the impounded water for crop, vegetable and livestock production.
2. Prepare feasibility and pre-engineering studies for model water reservoirs and water catchments.
3. Determine the technical and economic feasibility of: (i) irrigating the agricultural blocks for field crops, vegetables and tree crops; and (ii) developing strategies to mitigate potential environmental risks
4. Determine how resources from the World Bank projects (e.g. PROIRRI and Mozambique Second Agriculture Development Policy Operation) could complement PPCR resources in terms of co-financing the irrigation investments.

V. Project description

The Project will conduct feasibility and pre-engineering studies for model water reservoirs and rainwater catchments, with the goal of developing multi-purpose facilities that meet the operational needs of the company, while improving the livelihoods and climate resilience of communities living near the company's operations. In addition, the technical and economic feasibility of irrigating agricultural blocks using drip technology will be evaluated.

This Project consists of three components described below. IFC will issue a request for proposals (RFP) to conduct these related studies. Information will be collected through literature reviews and field work.

COMPONENT 1. DETERMINING OPTIMAL LOCATIONS FOR WATER RESERVOIRS AND CATCHMENTS

IFC will tender for and contract a consulting firm with expertise in civil engineering and hydrology and with experience in southern Africa to carry out assessment and studies. The optimal location for the water reservoirs and water catchments will depend on a variety of factors including:

- Topography
- Hydrology
- Cost of construction
- Access for construction and crop marketing
- Current land uses
- Effects on hydrology and ecosystem functioning

- Rainfall patterns, including projections based on climate change forecasts
- Water requirements for firefighting, irrigation and livestock
- Potential for hydropower generation
- Proximity to forestry plantations
- Proximity to smallholder farmers (number of farmers based on irrigation potential)
- Proximity to off-takers for high value crops
- Opportunities for collaboration with and/or financing by the World Bank PROIRRI program
- Lessons of what has been tried in Mozambique as well as regional and global lessons.

The consulting firm will weigh these variables and recommend sites for the reservoirs and smaller water catchments. In addition, the studies will identify the potential number of beneficiaries for each water use and volumes required for each group of users.

COMPONENT 2. PRE-ENGINEERING STUDIES FOR WATER RESERVOIRS

Once the company and other interested institutions (IFC, PROIRRI, among others) have agreed on the final locations for the water reservoirs, the consulting firm will produce pre-engineering studies for each reservoirs. These studies will provide:

- Cost estimates
- Construction techniques
- Source of required construction materials
- Equipment and manual labor requirements
- Time required for construction
- Time required to fill water reservoirs
- Recommendations for construction firms
- Develop mitigation strategies to mitigate potential environmental risks

COMPONENT 3. FEASIBILITY OF IRRIGATION FOR AGRICULTURAL BLOCKS

The company will allocate blocks of land for cash crop production by farmers living within the DUATs. These areas will average 30 hectares – providing approximately 0.25 hectares to each household – and will complement the approximate 2.9 hectares that will be allocated per household for preserving livelihood farming. IFC will engage consultants, or utilize staff resources, to study the technical and economic feasibility of irrigating some (or all) of these agricultural blocks. Potential water sources could include small water reservoirs or boreholes. Irrigation technologies could include solar pumps, gravity or manual devices. The following factors will be considered:

- Cost
- Potential sources of financing
- Hydrology (ground and surface water)
- Potential for support from off-takers for various crops
- Potential for collaboration with PROIRRI
- Recommendations for community management of the irrigation systems
- Lessons of what has been tried in Mozambique as well as regional and global lessons.

11. Consistency with Investment Criteria:

The IFC-PPCR Smallholder Irrigation Feasibility Project is consistent with the PPCR investment criteria in the following ways:

Mozambique has ample water resources. However, almost no water is stored. Seasonal rivers often flood during the rainy season, but are dry the remainder of the year. Therefore, farmers can only produce one crop per year and remain dependent on rain-fed agriculture. This contributes to extremely low productivity and lack of food security. With climate change, the timing and intensity of rainfall has become unpredictable, leading to alternating cycles of more severe drought and flooding.

Increased access to improved irrigation technology will make Mozambique's agricultural sector more resilient to changes in climate and will contribute to food security for the country. Improved irrigation will lead to the efficient use of the country's water resources and result in increased productivity. It will also enable Mozambican farmers to protect their crops and livelihoods in the face of increasing unpredictable weather patterns.

Moreover, the Project's outcomes will help inform initiatives to break the vicious cycle preventing the development of commercial agriculture. This includes *inter alia*: (i) farmers not producing sufficient quantity and quality of produce because of insufficient access to fertilizers, pesticides, irrigation and equipment; (ii) lack of large buyers because of insufficient production; and (iii) insufficient financing available because of high risks, no commercial transactions and limited collateral of farmers. Irrigation made available through an incremental investment enabled through the PPCR will increase agricultural production and the economic added-value of the smallholders. It will help (i) mobilize buyers and inputs suppliers in agri-business in Mozambique to establish in the Project region, and (ii) develop financing opportunities for the local banks who will have greater leverage to finance climate-resilient farming technologies.

12. Stakeholder Engagement:

The development of the Project interventions was built on the initial work by the IFC and its client company to consult communities about their development needs. In total, more than 15,000 residents of the DUAT areas attended these consultations. Based on these consultations, IFC has supported the company to complete a detailed Environmental and Social Impact Assessment, Stakeholder Engagement Plan and Community Development Plan. Numerous interviews were also conducted with other agribusinesses, farmer organizations, government and NGOs. This Project has also been within the scope of Mozambique's SPCR and PPCR preparatory activities (as described in section I).

This Project will continue to actively engage with key stakeholders at the governmental, private sector and community levels. Furthermore, the IFC will work closely with other development agencies and PPCR partners to leverage their best-practices and network.

Governmental Level

The IFC team has been in dialogue and working in coordination with the Government of Mozambique (GoM) during the PPCR project preparation phase as well as during the development of the Stakeholder Engagement and Community Development Plans. Moreover, the IFC team is committed to continue cooperation with the GoM during Project implementation.

Private Sector Level

During the Project preparation, the IFC and the company teams engaged with banks, off-takers, agri-input distributors and large international agri-input suppliers. The Project will continue to engage with various private sector players throughout its implementation. Moreover, it is expected that during the Project implementation phase, the client may work closely with other agribusinesses, banks, DFIs, aggregators, export agencies and other potential off-takers.

Community Level

Producer organizations (POs) are common in Mozambique. POs help smallholder farmers to access funds, inputs, technical support and other resources. These groups are aggregated into farmers' federations at the district level. The client will actively work with POs for crop marketing and management of irrigation systems. In addition, a key part of the PCDP is support for Natural Resource Management Committees at village level. These committees will manage the agricultural blocks.

The IFC's Performance Standards will be applied to the Project and consequently stakeholder engagement will continue as the basis for building strong, constructive and responsive relationships. Such relationships are essential for the successful management of the program⁹.

⁹ For information on the IFC's Performance Standards see: www.ifc.org/sustainabilityframework

13. Gender considerations:

In Mozambique, more women (83%) participate in the active labor force than men (72%). The great majority of women (89%) are occupied in the agriculture sector while only 5.5% work in commerce and 3.3% in the service sector¹⁰. Women tend to work in the agricultural, informal sectors and low-paid occupations while men move to pursue higher earnings in other sectors. Improving the productivity of women in agriculture would boost economic growth and reduce poverty. However, a country study found that women are less likely than men to grow tradable crops because they concentrate on basic foods to feed their family. Yet the study also reported that women with education do move into commercial agriculture¹¹.

The Environmental and Social Impact Assessment conducted by the company in 2014 found that 26% of households in Manica Province and 20% in Zambezia Province are headed by women. An additional 5% of households are headed by people over 65 or include sick and disabled members. Because these households typically have one or no able-bodied adults, they face labor constraints that may lead to food insecurity.

The assessments and studies to be carried out by the Project will have a strong focus on identifying ways to empower women during the development of an irrigated agricultural economy. Early assessments have identified that increasing access to irrigation will directly benefit female-headed households in several ways, including:

- providing nearby sources of water during the dry season for livestock;
- providing irrigation for fruit trees and vegetable gardens, improving nutrition and generating income; and
- increasing the value of agricultural blocks, while reducing the labor needed for land cultivation

14. Indicators and Targets (consistent with results framework):

Indicator	Target
a) Number of technical, environmental and financial assessments and studies.	3 studies (1 study for determining optimal locations for water reservoirs and catchment; 1 feasibility and pre-engineering studies for model water reservoirs and water catchments; and 1 study to determine the technical and economic feasibility of: (i) irrigating the agricultural blocks for field crops, vegetables and tree crops; and (ii) developing strategies to mitigate potential environmental risks.

15. Indicative Budget:

Expenditures	PPCR Amount (US\$) – estimates
Feasibility and pre-engineering studies	US\$ 520,000

¹⁰ Gender Policies and Feminization of Poverty in Mozambique (Tvedten, Inge & M. Paulo, G. Montserrat, 2008).

¹¹ Trade Reform and Gender in Mozambique (Arndt & Tarp, 2006).

Project management	US\$ 55,000	
Total Cost US\$ 575,000		
Co-Financing:	<i>Amount:</i>	<i>Type of contribution:</i>
• Private Sector	200,000	Estimated cash and in-kind contribution from private sector client
Co-Financing Total Up to 200,000		
TOTAL 775,000		
16. Project/Program Timeframe:		
Expected Board/MDB Management Approval Date: May 2015 Expected Mid-Term Review Date: September 2015 Expected Project closure Date: February 2016		
17. Other:		
n/a		