

UNDP Funding Proposal to GCF: Building Climate Resilience of Vulnerable Agricultural Livelihoods in Southern Zimbabwe

Financial Analysis

Introduction: Financial analysis of the proposed 'Building climate resilience of vulnerable agricultural livelihoods in southern Zimbabwe' project was carried out in accordance with the 'Financial and Economic Analysis of Projects' guidelines of UNDP (2015). The project has three distinct outputs under its main component that aims to support the Government of Zimbabwe in strengthening the resilience of agricultural livelihoods of vulnerable communities in southern Zimbabwe to increasing climate risks and impacts:

- Output 1: Increased access to water for climate-resilient agriculture through climate-resilient irrigation systems and efficient water resource management
- Output 2: Scaled up climate-resilient agricultural production and diversification through increased access to climate-resilient inputs, practices, and markets
- Output 3: Increased access to weather, climate and hydrological information for improved water resource management and planning for climate-resilient agriculture

Output 1 activities are mainly focused on building irrigation infrastructure in target locations based on climate-proofed system designs, as well as the efficient operation and maintenance of irrigation infrastructure and efficient, planned and climate risk-informed water management for both irrigated and rain fed lands. The incremental income to the farmers in target areas is estimated to be due to an additional cropping season that is made possible due to irrigation infrastructure proposed to be built under this project. Given that this output has direct incremental revenues to the project's intended beneficiaries (farmers) which can be quantified, activities/investments under this output have been included in financial analysis.

Output 2 activities are mainly focused on setting up climate-resilient cropping systems and enabling farmers in the target locations to adopt livestock and resource management practices that are crucial to enhancing crop/livestock productivity for both rain-fed and irrigated systems, as well as gain access to market linkages and partnerships to sustain adaptation to climate change. The activities under this output are aimed at motivating farmers to diversify production, adopt practices that reduce their vulnerability to climate change, and operate and maintain irrigation infrastructure and equipment well. The incremental income to the farmers in target areas is estimated to be due to some increment in their income from an additional cropping season that is made possible due to irrigation infrastructure (proposed to be built under output 1) and/or activities under this output 2. Given that this output has direct incremental revenues to the project's intended beneficiaries (farmers) which can be quantified, activities/investments under this output have been included in financial analysis.

Output 3 activities are mainly focused on making available climate information, weather forecasting and early warning information to farmers in the target location, and the understanding and application of this information, along with weather and agricultural advisories that allow smallholder farmers to make climate-informed planning and management decisions for on-going adaptation to climate change. Although farmers in target areas are likely to experience incremental income or reduced costs (due to disaster preparedness or planned sowing based on weather forecast, for example) due to the information and advisories that will be made available under this output, direct incremental revenues to the project's intended beneficiaries under this output is difficult to be quantified, and hence, activities/investments under this output have not been included in financial analysis.

Financial Analysis Methodology and Inputs/Assumptions

This financial analysis methodology involves cash flow projections for project costs and increased revenues to farmers due to installation of irrigation infrastructure (output 1) and climate resilient

inputs/methods and market linkages (output 2). The resultant financial internal rate of return (FIRR) is compared with the weighted average cost of capital (WACC). The key input values and assumptions used in this analysis are

- (i) A total of 1786 Hectares of agricultural land in the project's target area is assumed to be benefited from this project's activities, as shown below.

Irrigation Location	Hectares
Mzingwane River Basin	151
Runde River Basin	939
Save River Basin	696
Total Targeted Agricultural Land	1,786

- (ii) It is assumed that without irrigation, farmers will only plant in one season while with irrigation, they can plant in at least two seasons (dry and wet seasons)
- (iii) Maize, sugar beans, and tomatoes are the key crops planted in the project's target locations. Among these, it is assumed that the investments and activities under outputs 1 and 2 will generate incremental income to farmers due to additional cropping season for these crops. Per season income per hectare for these crops are as shown below (field data collected by UNDP). The proposed irrigation intervention under Output 1 is estimated to start generating benefits to 39% of total targeted agricultural land by the year 2021, 67% by 2022, 80% by 2023, 88% by 2024, 95% by 2025 and 100% of 1,786 hectares of land from 2026 onwards. This ramp up of irrigated land is inline with the estimated budget ramp up for this output.

Crop	Gross income per season (USD)	Variable cost per season (USD)	Net income per season (USD)
Maize	2,340	373	1,967
Sugar Beans	4,350	1,949	2,401
Tomatoes	15,000	6,428	8,572

- (iv) Improved productivity during rainy season due to irrigation has not been included for this analysis due to lack of data to estimate the incremental income; hence, this revenue assumption presents a conservative estimate of incremental incomes to farmers in the target areas of the project, since availability of irrigation facilities during the raining season can help supplement any uncertainty in rainfall.
- (v) With regards to output 2, estimated increment in farmer's income due to climate resilient agricultural inputs, training, and market linkages. An estimate from Davis et al (2012)¹ to provide evidence on production impact of a farmer field school (FFS) project in East Africa that provided similar inputs, training and market linkages to farmers. FFSs were shown to have positive impact on production and income among women, low-literacy, and medium land size farmers with the middle land area terciles showing significant increase in agricultural income for all countries combined (24%). Given that the farmers in this proposed project in Zimbabwe will be small and medium scale farmers with similar characteristics as those in the East Africa project, an estimated 24% increment in farmer's income is used for estimating incremental revenues under output 2. Nonetheless, to be conservative, it is estimated that only 45% of the farmers will adopt climate resilient inputs, training and market linkage benefits proposed to be provided under Output 2.
- (vi) Total estimated capital expenditure for activities under output 1, output 2 and project management is USD 42.16 Million, which includes GCF grants of USD 21.69 Million.

¹ Davis, K., Nkonya, E., Kato, E., Mekonnen, D. A., Odendo, M., Miiro, R., & Nkuba, J. (2012). Impact of farmer field schools on agricultural productivity and poverty in East Africa. World Development, 40(2), 402-413

- Proposed capital expenditure for output 3 is not included, since direct revenues from proposed activities under output 3 are not quantifiable (as explained earlier), and hence not included in financial analysis.
- (vii) This capital expenditure (to be financed from GCF grants and government co-financing) will be invested in the following manner (phased implementation): 6.6% in year 1, 26.5% in year 2, 30.1% in year 3, 12.7% in year 4, 8.7% in year 5, 10.1% in year 6 and 5.2% in year 7 of the project's implementation period.
 - (viii) O&M costs specific to irrigation and other O&M costs – to be provided by both farmers and this proposed project, have been built into the financial model as per O&M costs estimation provided in the budget sheet. Irrigation O&M costs have also been ramped up in a similar manner as ramp up of irrigation intervention under Output 1 as explained earlier.

Financial analysis over a 25-year period results in a positive Financial Net Present Value (FNPV) of USD 162 Million and a positive Financial Internal Rate of Return (FIRR) of 22.4%, which is higher than WACC/hurdle rate (which is 0% in this case due to GCF grants). Hence, investments proposed to be made under outputs 1 and 2 are computed to be financially viable and sustainable for the long-term.

Sensitivity analysis of financial returns computed above was performed primarily to assess the impact of lower than assumed revenues or higher than estimated costs. The financial returns are still positive if revenues decrease by 20% or costs increase by 20%.

One of the important aspects of this project is the grant funds being requested from GCF to finance the project's capital costs. Given that public funding from sources such GCF are scarce and need to be used only if they bring additionality to the project, an assessment was conducted to compute the financial returns under outputs 1 and 2 in the absence of proposed GCF funds. In the absence of GCF grants, which form nearly 51% of the total capital expenditure estimated under these two outputs, the only alternative to these smallholder farmers is to borrow from local Banks or Microfinance Institutions (MFIs) for investing in irrigation infrastructure and climate resilient inputs and market linkages. Micro-loans in Zimbabwe carry very high interest rates, at times as high as 20% per month, as reported by studies. In 2016, Zimbabwe's Central Bank, the Reserve Bank of Zimbabwe (RBZ), issued a directive to Banks/MFIs to restrict interest rates on micro-loans to a maximum of 10% per month, which still works out to 120% interest rate per annum. To be on a conservative basis, we use a micro-loan interest rate of 60% per annum (for local currency-denominated loans) and loan tenors are typically for 2 years.² Under these financing terms for capital costs of outputs 1 and 2, FNPV value is negative, and FIRR is way lower than WACC/hurdle rate (which is now computed using micro-loan interest rate of 60% and government co-financing which is assumed to be a grant to farmers), indicating that proposed activities under output 1 and 2 are not financially viable if they are financed by microfinance loans. Hence, GCF funding brings additionality to investments under these proposed outputs 1 and 2.

² RBZ, information from Bank/MFI websites, news articles