

UNDP Funding Proposal to GCF: Strengthening the resilience of smallholder agriculture to climate change-induced water insecurity in the Central Highlands and South-Central Coast regions of Vietnam

Financial Analysis

I. Introduction

1. Vietnam is particularly vulnerable to climate change and is already impacted by more irregular and intense climate variability and change. Two of the region's most vulnerable to climate risks are the Central Highlands and South-Central Coast. Changes in precipitation are leading to increasing deficits in surface and ground water availability for agricultural production with longer periods of severe water scarcity during the dry season and increased frequency and intensity of droughts. Overall agricultural productivity is falling, with corresponding declines in yields and incomes particularly harmful to small-scale farmers vulnerable to reduced water availability on rain fed lands and within this group, poor and near poor, ethnic minority and women farmers.
2. Around 48% of the people in the South-Central Coast region of Vietnam rely on agriculture for their livelihoods, with ethnic minorities comprising from 5.7% of the population in Khanh Hoa province to 23.1% in Ninh Thuan. Sufficient, reliable water sources are particularly critical as the South-Central Coast is the driest area of the country with a long dry season, the lowest rainfall, and a relatively small river system. Only around 30% of agricultural land is irrigated, leaving many farmers reliant on rainfall. Agriculture and water resources are the foundation of the livelihoods of about 64% of the people in the Central Highlands of Vietnam, especially the ethnic minorities accounting for 36.4 – 39.1% of the region's population. The Central Highlands are susceptible to changes in water availability in the dry season when there is little rain and low river flow. Only about 27.8% of the region's agricultural land is irrigated, and farmers are forced to exploit groundwater for irrigation.
3. Consequently, the project aims to empower vulnerable smallholders in five provinces of the Central Highlands and South-Central Coast regions of Vietnam – particularly women and ethnic minority farmers - to manage increasing climate risks to agricultural production. To achieve its objective, the project will enable poor/near-poor smallholders to adapt to climate-driven rainfall variability and drought through implementation of two linked outputs using GCF and co-financing resources: 1) improved access to water for vulnerable smallholder farmers for climate-resilient agricultural production in the face of climate-induced rainfall variability and droughts, and 2) strengthened capacities of smallholder farmers to apply climate and market information, technologies, and practices for climate-resilient water and agricultural management.
4. While the project will target ethnic minority, women and other poor/near poor farmers, it will build the capacities of all farmers in climate vulnerable areas; as such the project will reach 699,860 direct beneficiaries in the five provinces of Dak Lak, DakNong, Binh Thuan, Ninh Thuan and Khanh Hoaaccess.

II. Approach and Methodology

5. As indicated in the Funding proposal, this project plans to deliver 2 outputs. These outputs are further divided into activities as shown in Table 1 below

Table 1 – Outputs and Activities

Outputs and Activities		Direct quantifiable financial savings / revenues?
Output 1 - Enhanced water security for agricultural production for vulnerable smallholder farmers in the face of climate-induced rainfall variability and droughts		YES
Activity 1.2	Establish last-mile connections between WEIDAP irrigation infrastructure and the poor and near poor farmer lands to help cope with increasing rainfall variability and drought	
Activity 1.3	Enhance supplementary irrigation for rain fed smallholders to cope with rainfall variability and drought	
Activity 1.4	Increase smallholder capacities to apply on-farm water efficient practices and technologies to maximize water productivity in coping with rainfall variability and drought	
Output 2: Increased resilience of smallholder farmer livelihoods through climate-resilient agriculture and access to climate information, finance, and markets		YES
Activity 2.1	Investments in inputs and capacities to scale up climate-resilient cropping systems and practices (soil, crop, land management) among smallholders through Farmer Field Schools	
Activity 2.2	Technical assistance for enhancing access to markets and credit for sustained climate-resilient agricultural investments by smallholders and value chain actors	
Activity 2.3	Co-development and use of localized agro-climate advisories by smallholders to enhance climate-resilient agricultural production	
Project Management		NO

6. This financial analysis has been carried out in accordance with the *Guidelines for the Financial Analysis of Projects of United Nations Development Program*. These guidelines clearly mandate that a financial analysis of project cash flows be computed and Financial Internal Rate of Return (FIRR) calculated only for those proposed project outputs that can clearly result in direct and quantifiable financial revenue generation (incremental earnings from baseline) or a direct and quantifiable financial savings potential to the project owners or to the project beneficiaries. These guidelines stand to ensure that GCF's minimum concession policy is always protected in the proposal.
7. In all, there are two outputs and six activities that constitute this proposed project. As can be seen from Table 1 above, both Output 1 and Output 2 qualifies as a project investment that derive direct and quantifiable benefits to the project beneficiaries. Hence Financial Analysis based on Financial Internal Rate of Return (FIRR) computation is carried out for the entire project.

III. Financial Analysis

8. **Output 1** – This output will help the beneficiaries overcome barriers to water security for climate-resilient production through investment in irrigation systems and technologies, including storage and linkages to water infrastructure. Modernization and expansion of irrigation systems will provide farmers access to water, allowing them to diversify and expand the area under climate-resilient cropping systems. Through this output, the project directly complements in its scope the loan provided by ADB to GoV to establish large-scale irrigation infrastructure, bringing water to eight

different farming areas across the two target regions. As part of this output, the grant resources will play a complementary role by financing the incremental costs of achieving last-mile connectivity for the targeted poor/near-poor smallholders under the WEIDAP command areas by linking their plots to the WEIDAP irrigation systems. In addition, for the targeted rain fed farmers beyond the reach of the WEIDAP irrigation trunk lines, this output will address water deficiencies due to climate change-induced rainfall variability and droughts by building supplementary irrigation from localized sources, as well as enable farmers to increase on-farm productivity with efficient technologies such as sprinklers and drip irrigation.

9. Activity 1.1 establishes large-scale irrigation infrastructure to bring irrigation water to eight farming areas across the target regions. Activity 1.1 is financed through a loan from ADB and co-financing from the GoV and the GCF resources are not part of the financing. However, Output 1.1 is part of the Funding proposal since ADB/GoV financing for WEIDAP constitutes co-financing for the GCF-funded portion (Activities 1.2 – 1.4 and Output 2). For this reason, we assume that the WEIDAP funded infrastructure is already in place and the financial analysis will be used to establish financial feasibility of the GCF funded project and to ensure minimum concessionality of GCF resources only. Hence, the financial analysis is only focused on Activities 1.2 – 1.4 and Output 2.
10. Output 2 – This output will enable poor/near-poor farmers to manage climate risk to their agro-ecosystems by applying climate-resilient soil and crop planning and management practices to reinforce the infrastructure investments made through Output 1. This output will enable smallholder farmers to acquire the skills to enhance the resiliency and productivity of their agro-ecosystems, as well as to understand how to access credit and markets. Through Farmer Field Schools (FFS) implemented at scale across the two regions, this output will facilitate widespread adoption of climate-resilient agricultural practices and technologies. This output will also facilitate value-chain and market linkages through innovative, multi-stakeholder Climate Innovation Platforms (CIPs). This output will also enable climate-risk informed agricultural planning and enhance the capacities of extension staff and the farmers in generation and use of agro-climate advisories.
11. Output 1 and Output 2 are designed with significant level of inter-dependencies but with an overall objective to strengthen the resilience of smallholder agriculture to climate change-induced water insecurity in the project area. The project will achieve its objective by ensuring reliable access to irrigated / stored water for agriculture in addition to skilling the project households on climate resilient agriculture technologies and practices through various technical assistance activities. Reliable access to water along with skill development will result in increased income for the project beneficiaries primarily through improvement in yield and supported by adoption of climate resilient crops, introduction of rotational and intercropping mechanisms and up gradation to high-yield and high-value crops. All these confirm as direct and quantifiable financial benefits to the project beneficiaries and hence a financial analysis based on Financial Internal rate of return (FIRR) has been conducted.
12. **Capex** – The project Capex includes the construction / provision of the following assets -
 - 4,765 last-mile connections to the WEIDAP water infrastructure spread across five provinces and identified as part of the during project preparation using demographic and socio-economic analysis
 - Construction of 490 new HH ponds and 185 new shared ponds with bioengineering solutions in addition to upgrading 484 existing ponds
 - Providing 8,621 HHs with CRA packages

In addition to building the above physical assets, the project will make investments in developing knowledge-based skilling and development platforms and assets such as Farmer Field Schools, Farmer trainings, Train the trainer program etc.

13. **O&M and Useful life of assets** – Since there are various physical assets built through different activities, the useful life of the asset varies with the asset type. The useful life of some of the key assets built is provided below -

Infrastructure type	Expected useful life
PVC pipeline	10 years
Valves	5 years
Pumps	5-10 years
Head of sprinkler	3-5 years
Head of drips	5-10 years
Pond embankment	10 years

However, the O&M is modeled in such a way that adequate replacement of asset happens as and when needed. For instance, at the end of year 5 from installation, the valve used in a last-mile connection will be replaced. Due to the existence of a visible O&M plan and a strong commitment to maintain the assets from the GoV and the community, the financial analysis model assumes 10 years of continued operations of the assets beyond the project period.

14. **Baseline earnings and HH income** – The General statistics of Viet Nam¹ contains the income distribution of households by quintile. Considering that the project beneficiaries are rural and considered very poor, the income per capita data of the lowest quintile is considered. To arrive at the average HH income, the per capita income is multiplied by the average household size of 3.8².
15. **Incremental earnings to project beneficiaries** – The project will generate the below mentioned direct and quantifiable financial benefits, which are in the form of incremental earnings to the project beneficiaries.
- 4,765 households that receive last-mile connections to the WEIDAP infrastructure are expected to witness a 10% incremental income generation per year. There is no reliable estimate of the quantum of incremental income generation. But, reflecting that the agricultural lands nearer to the WEIDAP infrastructure will witness the least impact and benchmarking with the incremental income generation from field studies for other activities, the financial analysis assumes a 10% increase in incremental income to the beneficiaries of last-mile connectivity.
 - Construction of 490 HH ponds and 185 shared ponds with bioengineering solutions in addition to upgrading 484 existing ponds will result in a 100% increase in farm income for the 16,463 beneficiary HHs. This income increase is based on the field studies conducted by the Economic Analysis (EA) team and their estimation methodology is as follows – The incremental earnings is generated by the enhanced crop yields and income due to increased and more reliable water during the dry season. With this project, loss of income from drought will be avoided. Climate change projection for the project site indicates that droughts with 40% less-than-normal rainfall such as in 2014/16 will increasingly occur and is categorized as a 1 in 25-year event. The

¹ <https://gso.gov.vn/default.aspx?tabid=512&idmid=5&ItemID=18531>

² http://www.un.org/en/development/desa/population/publications/pdf/ageing/household_size_and_composition_around_the_world_2017_data_booklet.pdf

benefit from increased availability of water is hence assumed to be 4% per annum based on avoiding a 100% loss of income to these households at the probability of 1/25 per annum.

- The 8,621 HHs that receive the CRA package and technical assistance will witness a 25-40% improvement in yields on average. The yield improvement is estimated through a CRA analysis table derived from field consultations. However, the expected income may not increase at similar rate as it depends also other many other factors that are beyond project interventions. In order to make the projections conservative, the financial analysis model will include a 20% incremental income generation.

The result of the financial analysis for the project is shown in Table 2 below.

Table 2 – Financial Analysis

Scenario	FIRR (%)	WACC (%)	NPV
Scenario 1 – Assuming availability, in the absence of participation from GCF, Development finance loans are arranged	-5.55%	2.75%	-(\$12,963,857)
Scenario 2 – GCF grants are availed	8.82%	0.51%	\$21,991,900

16. **Analysis and Recommendations** – Under scenario 1, in which the Grant participation of GCF is replaced with concessional debt funding from development finance institutions, it could be noticed that the project investment results in a NPV of \$ -(\$12,963,857), indicating financial unviability of the project. The negative NPV is also supported by a negative FIRR of 5.55%, which is less than the WACC of 2.75%. However, when the Development finance loans are replaced with the participation by the GCF in the form of Grants, the project achieves financial viability with an acceptable FIRR of 8.82%. In this case, the project investment results in a NPV of \$ 21,991,900 and the FIRR of 8.82% is higher than the Weighted Average Cost of Capital (WACC) of 0.51%.
17. **Sensitivity Analysis** – Sensitivity analysis was carried out to determine if an increase in the budgeted cost of the project or generating lesser than expected benefits from the investments could derail the financial viability of the project when funded by GCF. Table 3 below shows the results of sensitivity analysis on costs and Table 4 below shows the results of the sensitivity analysis on savings.

Table 3 – Output 3 Sensitivity Analysis on Costs

Sensitivity Analysis - Costs			
Investment	Scenario	FIRR	NPV
26,637,542	20% decrease	13.20%	28,731,363
29,967,235	10% decrease	10.87%	25,463,765
33,296,928	Base Case	8.90%	22,196,166
36,626,621	10% increase	7.21%	18,928,568
39,956,314	20% increase	5.73%	15,660,970

Table 4 – Output 3 Sensitivity Analysis on Savings

Sensitivity Analysis - Savings		
Scenario	FIRR	NPV
20% decrease	4.62%	10,051,415
10% decrease	6.84%	16,123,791
Base Case	8.90%	22,196,166
10% increase	10.85%	28,268,542
20% increase	12.70%	34,340,917

It can be seen from the above sensitivity analysis that an unexpected increase in the budget or a decrease in the expected savings does not significantly impact the FIRR to an extent that it makes the project unviable. So, the GCF grant contribution will be supported by sufficient project return to safeguard the investments from unexpected costing and benefit errors.

Based on the analysis as shown in Para 11 above and based on the results of the financial analysis and the sensitivity analysis, the following recommendations can be made –

- GCF participation in the form of grant is needed for achieving financial viability and the operational sustainability for the project.

IV. Recommendations and Conclusion –

18. The financial analysis has been carried out in accordance with the *Guidelines for the Financial Analysis of Projects of United Nations Development Program*. These guidelines clearly mandate that a financial analysis of project cash flows be computed and FIRR calculated only for those proposed project activities or outputs that can reliably result in direct and quantifiable financial revenue generation (incremental earnings from baseline) or a direct and quantifiable financial savings potential to the project owners or to the project beneficiaries. These guidelines stand to ensure that GCF's minimum concession policy is always protected in the proposal.
19. In all, there are two outputs and six activities that constitute this proposed project. As can be seen from Table 1, both Output 1 and Output 2 qualifies as a project investment that derive direct and quantifiable benefits to the project beneficiaries. Hence Financial Analysis based on Financial Internal Rate of Return (FIRR) computation is carried out for the entire project. It can be seen from the analysis above that with the participation of GCF in the form of Grants, the project achieves financial viability with an acceptable FIRR. In this case, the project investment results in an NPV of \$21,991,900 and the FIRR of 8.82% is higher than the Weighted Average Cost of Capital (WACC) of 0.51%. It can also be seen from the above sensitivity analysis that an unexpected increase in the budget or a decrease in the expected savings does not significantly impact the FIRR to an extent that it makes the project unviable. So, the GCF grant contribution will be supported by sufficient project return to safeguard the investments from unexpected costing and benefit errors. To summarize, this financial analysis clearly demonstrates that the GCF funding in the form of grant is much needed to achieve the financial viability of activities.