Regreening Africa 2023 (Ghana & Rwanda)

COST-EFFICIENCY ANALYSIS, MARCH 2023

Photo credit: Kelvin Trautman/Regreening Africa

Summary

This case study summarizes an analysis conducted by Catholic Relief Services (CRS) with support from World Vision (WVI), World Agroforestry (ICRAF), and International Refugee Committee (IRC) using the Dioptra tool to assess the cost-efficiency of the Regreening Africa program, which addresses agricultural land degradation by decreasing soil erosion, increasing soil organic carbon, and improving total farm income of farmers engaged in the restoration actions. In Ghana, Farmer Managed Natural Regeneration (FMNR) was implemented, complemented by tree growing through planting and grafting. In Rwanda, the program promoted the practice of agroforestry with complementary soil and water conservation measures. Value chain and policy options were also pursued to create incentives and an enabling environment for practice change. The analysis revealed the following findings[1]:

- **The adoption of land restoration practices in Ghana cost $66 per household and $58 per hectare, while in Rwanda it cost $201 per household and $1,387 per hectare.**
- **Farmer Managed Natural Regeneration (FMNR) in Ghana cost less per household than tree-planting agroforestry in Rwanda where the average land size per household is much more limited. Saturating coverage within a geographic zone maximized the reach per spend.**
- **Higher cost-efficiency was possible where there were existing and established relationships with local leaders and officials, community urgency for land restoration in that ecological area, and higher population density that maximized the number of households reached and minimized travel costs.**
- **There is a need to reconsider the current approach in Rwanda and similar contexts with limited land availability, such as low-cost incentives for farmers to restore land and purchase seedlings or to improve assessments carried out in similar contexts to determine whether the long-term gains justify the investment.**
- **The Regreening Africa program may be more effective at achieving environmental sustainability outcomes than short-term income generation outcomes, so other measures to support short-term income generation and incentivize land restoration practices would be required.**
- **Using the Dioptra tool for cost-efficiency analysis enabled country program staff to focus on providing crucial estimates of how different resources were used across activities within a program, which are not captured in any current data system, instead of having to learn a complex costing methodology and assemble data manually in spreadsheets.**

[1] Thanks to **ICRAF** (Mieke Bourne, Karl Hughs, Hilda Kegode, Jacquelyne Ndagwa, Tesfaye Woldeyohanes); **IRC** (Lucian Lee), **WVI Rwanda** (Anonciata Mukaburanga, Felix Mulindangabo) **WVI Ghana** (Edward Anaba Akunyagra, Edward Juwah), **CRS** (Ghana: George Akubia, Tontie Kpiasi Binado, Aminu Mahama; HQ: Olaf Westermann)

Introduction

Phase 1 of the Regreening Africa initiative was designed to respond to the extreme degradation of more than half of Africa's agricultural land, which impacts its life-sustaining ecosystem services such as the provisioning of food, fresh water, fiber, and the regulation of climate, natural disasters, and pests. This program is part of a larger global and regional effort funded in part by the European Union to reverse and halt land degradation. This phase was implemented in eight African countries: Ethiopia, Ghana, Kenya, Mali, Niger, Rwanda, Senegal, and Somalia. It was led by World Agroforestry (ICRAF), in partnership with five international non-governmental organizations (NGOs)—World Vision, Oxfam, Care International, Catholic Relief Services, and Sahel Eco. It sought to (a) directly reverse land degradation across one million hectares of agricultural land in eight countries in Sub-Saharan Africa to benefit 500,000 households; and (b) catalyze a much larger scaling effort to restore tens of millions of hectares of degraded land across the continent (Figure 1).

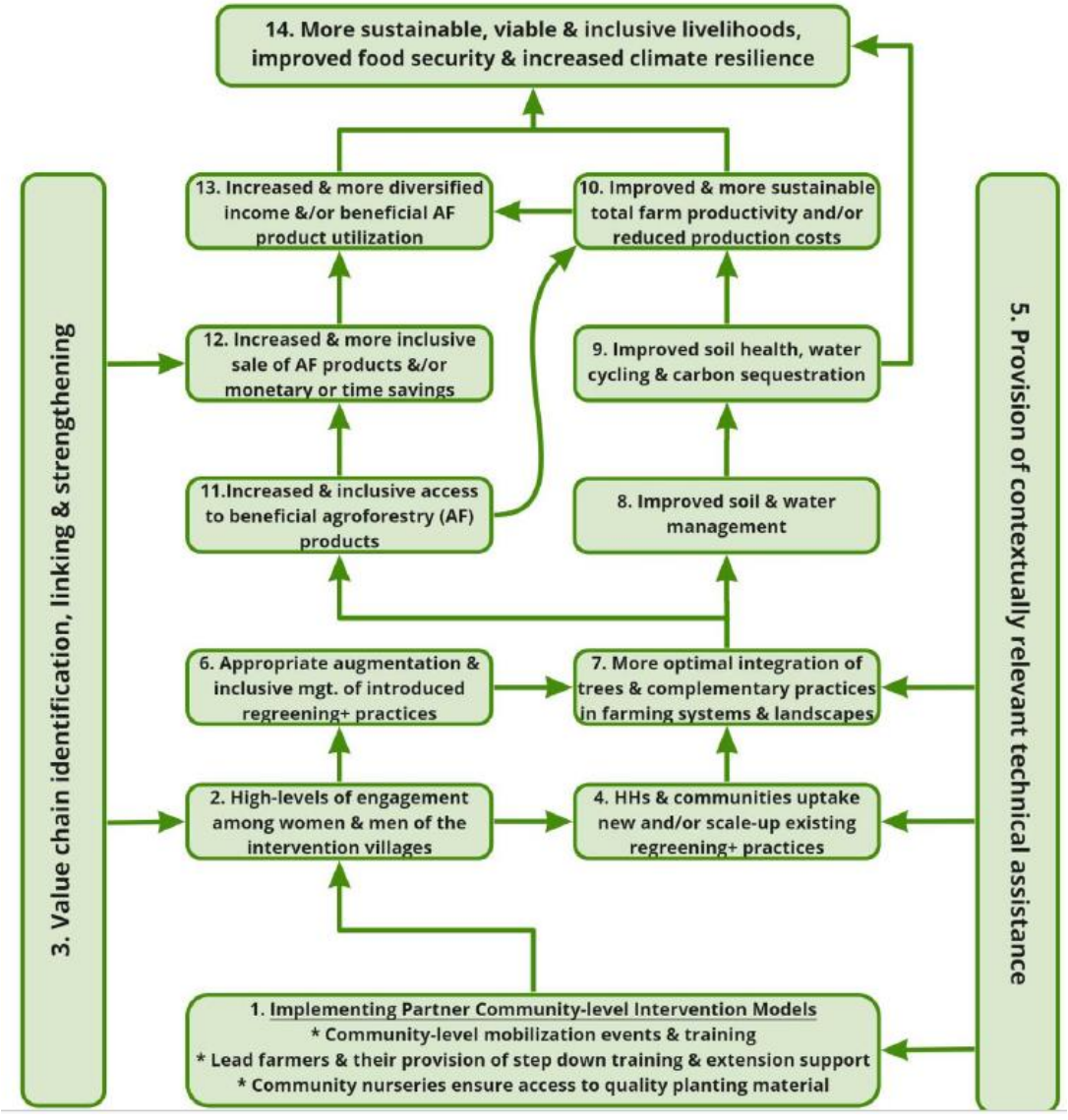


Figure 1: Theory of change of the Regreening Africa program (simplified version).

In Ghana, the activities implemented by World Vision and CRS were very similar. Both NGOs focused on Farmer Managed Natural Regeneration (FMNR) trainings and tool provision, disseminated radio messaging, visited households, promoted gender transformative programming, worked through existing government and community-based organization structures to establish

communal lands and by-laws, created nurseries, and collaborated with government and cooperative nurseries, and identified, linked and strengthened the respective value chains. WVI worked on cashew value chain activities and both CRS and WVI worked within the shea butter value chain; CRS also included clean cook stove programming.

In Rwanda, the approach implemented by World Vision was different, opting instead for agroforestry approaches, focusing on seedlings, including high value fruit trees, and technical skills and building capacity to manage and maintain these resources. This is because there is a scarcity of land for cultivation in the Rwanda context and farmers have smaller available tracts of land, which means FMNR is not possible for large numbers of households.

ICRAF provided technical assistance and quality control to implementers' community interventions in the 8 implementing countries, to their scale-up activities, and the integration of trees and complimentary practices in farming systems and landscapes. ICRAF also carried out the research, communication, evidence integration, reflective management and stakeholder engagement, and evaluation activities.

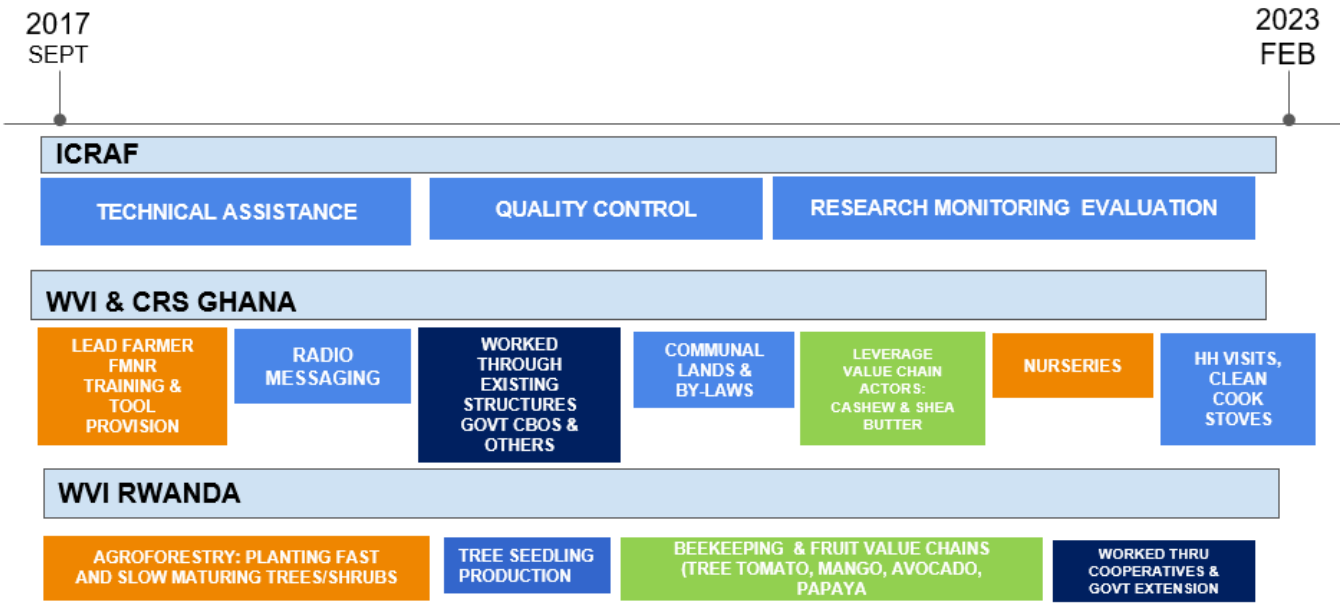


Figure 2: Implementation activities of the Regreening Africa program by ICRAF, WVI Ghana, CRS Ghana, and WVI Rwanda.

CRS and ICRAF were interested in conducting this cost analysis as land restoration is a priority sector and a foundation for improving environmental sustainability and agricultural livelihoods. The results of this analysis would be shared to inform implementation and scale-up of land restoration practices.

Analysis Approach and Methodology

This analysis focused on quantifying the cost-efficiency (i.e., cost per output) of the Regreening Africa program in Ghana and Rwanda to assess how resources were spent on achieving program quality, learn about drivers of costs and efficiency, and identify lessons to improve reach and impact per dollar spent.

In March and April 2023, CRS facilitated 4 virtual analysis sessions using the Dioptra tool with the support of IRC; each NGO team participated in each session separately (ICRAF, WVI Rwanda, WVI Ghana, CRS Ghana). A final debrief with all NGOs was held in May 2023.

Data

The costs analyzed included Direct Project Costs, Direct Shared Costs, and Indirect Costs incurred between September 2017 and February 2023. The analysis used the total costs incurred by each NGO over the 5 years of implementation, because the theory of change could only be fully realized if all program activities were carried out across the full implementation period.

Since ICRAF supported 8 countries across the award, we estimated the cost of ICRAF's technical assistance (TA), coordination and Monitoring, Evaluation and Learning (MEL) activities for each country and included it in the analysis. The proportion of ICRAF's TA and MEL support to Ghana and Rwanda was estimated at 13% for each country, so 13% of ICRAF's costs were included in each country's analysis.

Photo credit: Kelvin Trautman/Regreening Africa

The cost-efficiency metrics analyzed were:

- **Cost to adopt land restoration practices (at least 1) per household:** Total costs divided by the number of households that adopt at least 1 land restoration practice
- **Cost to adopt land restoration practices per hectare:** Total costs divided by the number of hectares where at least 1 land restoration practice is adopted

Evaluation data provided the estimate of the number of households that adopted the regreening practices: 18,585 in Rwanda, 44,542 in Ghana (35,613 in WVI Ghana's implementation area and 8,929 in CRS Ghana's implementation area). Rwanda's hectare imprint was 2,690 while in Ghana, it was 50,656.

The Dioptra Tool

Dioptra is a web-based cost analysis software that allows program staff in country offices, who are most familiar with day-to-day program implementation, to rapidly estimate the cost-efficiency of their program activities. It guides users through a standardized costing methodology, ensuring that all analysis results are methodologically consistent and can be meaningfully compared across different contexts and organizations.

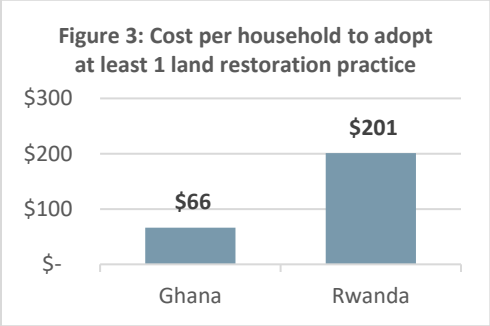
By using the Dioptra tool, rather than having to learn a complex costing methodology and assemble data manually in spreadsheets, staff can focus on providing crucial estimates of how different resources were used across activities within a program, which are not captured in any current data system. For more information, see www.dioptratool.org/how-does-dioptra-work.

Results

Country	Costs (USD)	Number of households that adopt at least 1 land restoration practice	Cost per household (USD)	Number of hectares where at least 1 land restoration practice is adopted	Cost per hectare (USD)
Ghana	$2,945,005	44,542	$66	50,656	$58
CRS Ghana	$599,649	8,929			
WVI Ghana	$1,048,542	35,613			
ICRAF's contribution	$1,296,814				
Rwanda	$3,729,996	18,585	$201	2,690	$1,387
WVI Rwanda	$2,433,181	18,585			
ICRAF's contribution	$1,296,814				

Table 1: Cost-efficiency results of the Regreening Africa program in Ghana and Rwanda.

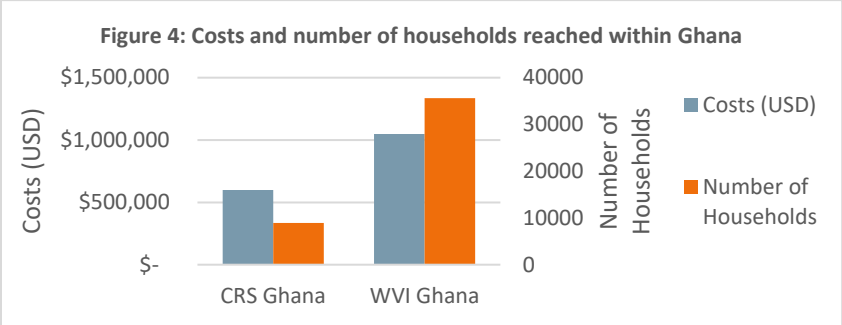
The adoption of land restoration practices cost $66 per household in Ghana and $201 per household in Rwanda. Farmer managed natural regeneration (FMNR) in Ghana cost less per household than tree-planting agroforestry in Rwanda. Saturating coverage within a geographic zone maximized the reach per spend.



The cost per household in Ghana was lower than in Rwanda (Table 1, Figure 3), mainly because farmer managed natural regeneration (FMNR) which was prioritized in Ghana required less intensive technical support and inputs from implementing staff, compared to tree planting which was prioritized in Rwanda but requires additional inputs (such as tree seedlings) and is thus more costly. Tree planting was more contextually appropriate in Rwanda due to small, limited areas of cultivation that would not be suitable for FMNR.

Geographic coverage of participating households was also an important driver of cost-efficiency. In Ghana, most households in the intervention zone were targeted, and the participating communities were often clustered close to each other in each site, which minimized travel costs for staff to visit the communities and maximized the number of households reached. In Rwanda, the program reached households beyond the area that was surveyed and not all households were reached so there was less saturation. Households were targeted based on interest and peer encouragement instead of saturating all households within the intervention zone.

Higher cost-efficiency was possible where there were existing and established relationships with local leaders and officials, community urgency for land restoration in that ecological area, and higher population density that maximized the number of households reached and minimized travel costs.



Within Ghana, there were some differences in cost-efficiency between NGOs: WVI Ghana spent 75% more than CRS Ghana but was able to reach 400% more households (Figure 4). Some reasons for this surfaced during the discussions with the various teams:

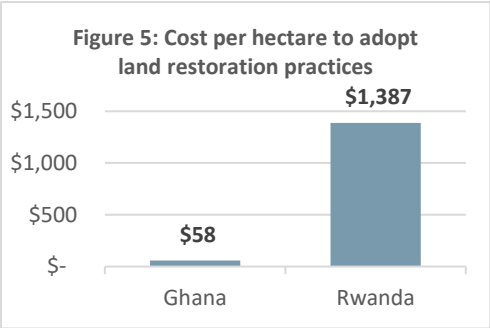
1. **Program maturity:** WVI and CRS were at different levels of scaling maturity. WVI Ghana had already been working on regreening practices (including FMNR) in their district before the program started, while CRS Ghana only began working in a district where regreening was new to the authorities, therefore more investment was required for community awareness and establishment of government relationships.

2. **Initial conditions of land degradation:** Different ecological zones meant different intensities of community engagement were required. The WVI intervention area in the Upper East Region was more degraded because it is closer to the Sahel, so residents were already bought in to the need for land restoration practices. The CRS intervention area in the Northern Region was less degraded, so more community engagement efforts and visits were required to convince residents of the consequences of land degradation and the need to prevent it. In areas where the level of land degradation is high, the costs for community engagement may be low and the number of households adopting land restoration practices may be high, but it will likely take longer and therefore incur more costs cumulatively to restore land.

3. **Population density:** The WVI intervention area was more densely populated (135 people per square kilometer) than the CRS intervention area (36 people per square kilometer), so WVI was able to reach four times the number of households per square kilometer compared to CRS. However, since each household in the WVI intervention area has less land holding compared to the households in the CRS intervention area, it would take 1.7 times more households in the WVI intervention area to cover the same number of hectares as the CRS intervention area. Due to the low population density and the distance of the CRS implementing team from the intervention area, more travel costs were also required by CRS Ghana to visit and reach each participating household.

Photo credit: Kelvin Trautman/Regreening Africa

The cost to adopt land restoration practices was $58 per hectare in Ghana and $1,387 per hectare in Rwanda, highlighting a need to reconsider the current approach in Rwanda and similar contexts with limited land availability, such as low-cost incentives for farmers to restore land and purchase seedlings or to improve assessments carried out in similar contexts to determine whether the long-term gains justify the investment.



The cost per hectare in Ghana was 24 times lower than in Rwanda. The Rwanda team reflected on what they would do differently to improve value for money in the future:

1. In a context like Rwanda where each farmer has limited hectares available for land restoration, the overall number of hectares impacted will be low, resulting in a high cost per hectare for land restoration in that context. A shift in the existing program approach such as deprioritizing the provision of high value trees would be warranted to reduce the cost per hectare.
2. The next program phase may consider selling seedlings to generate income instead of giving them away and would therefore require more engagement with the government and other projects that give tree seedlings away.
3. It may be worthwhile to consider what incentives can be created for adoption at low cost. It may be acceptable to invest in incentives for longer term sustainability and for farmers to purchase the tree seedlings themselves instead of getting them for free (and at a cost to the program).
4. Another perspective was that more time is needed for farmers to organize into food and beekeeping production groups and to become strong enough to negotiate with buyers and service providers. Now that the value chain activities have been initiated, more time is needed to strengthen the process and determine if the long-term benefits are substantial.

The Regreening Africa program may be more effective at achieving environmental sustainability outcomes than short-term income generation outcomes, so other measures to support income generation and incentivize land restoration practices would be required.

The program team was unable to reliably model the income farmers would earn 10-40 years into the future, so it was not possible to estimate the cost per additional dollar earned by households with land under restoration. Preliminary modelling estimated that it would take more than 4 years to show a meaningful change in average income, suggesting that the Regreening Africa program was less effective in achieving income generation outcomes in the short term, and more effective in achieving environmental sustainability outcomes. This corroborates existing evidence that agroforestry and related conservation practices may not be sufficiently profitable to guarantee farmer adoption[i], so other measures to increase near-term income and incentivize sustainable adoption of land restoration practices would be required. As a positive benefit at the household level, the final evaluation found that households were taking advantage of the recently available tree products for income supplement, asset acquisition, dietary diversity, fuel, fodder, and medicinal use[ii].

[i] https://www.fao.org/documents/card/en/c/CB0575EN/

[ii] https://regreeningafrica.org/wp-content/uploads/2023/08/Endline-Report_21_08_23_Online.pdf