

Overview: Leveraging Innovation to Improve Forest Policy Interventions

OBJECTIVE

The Climate Investment Funds (CIF) has a mandate to accelerate climate action. Where it invests directly in projects, it seeks also to measure, evaluate, and refine the delivery of impacts. This is particularly valuable in scenarios where real time assessments and course-corrections stand to significantly enhance the targeting and maximization of impacts. To this end, CIF has partnered with the World Bank Group's Development Impact Evaluation Group (DIME) to carry out an in-depth impact evaluation of the African Development Bank's (AfDB) Gazetted Forests Participatory Management Project for REDD+ in Burkina Faso. The evaluation seeks to gauge the effectiveness of various key aspects of the project's design and delivery.

The project focusses on 12 gazetted forests and is supported by CIF's Forest Investment Program (FIP), a funding window set up to provide and mobilize financing to address drivers of deforestation and forest degradation. Forests cover a third of the Earth's terra firma and are essential on many fronts—sometimes for livelihoods and jobs, and always as habitats for animals, for soil and water conservation, and for carbon capture and storage. The FIP works to support lower-income countries to institute woodland management practices that address these aspects in tandem, creating win-win strategies for human development and for climate action. Within this frame, the evaluation in Burkina Faso assesses the utilization of Payment for Ecosystem Services (PES) as timely cash transfers to support: reforestation and improved food security; the utilization of remote sensing techniques for tree



COUNTRY Burkina Faso

PROJECT Gazetted Forests Participatory Management Project for REDD+

CIF FUNDING USD 11.5 million from FIP

MDB African Development Bank

PRODUCT TYPE Development Impact Evaluation (DIME)

cover mapping; and the utilization of georeferencing techniques for rigorous tracking of the survival rates of trees.

Burkina Faso is a lower-income, landlocked country with significant forest cover: 49 percent¹ of the country is home to semi-arid forests that are typical of Sahel corridor ecosystems. While the related vegetation may hold less carbon than a similarly sized tropical forest, below ground carbon stocks are an important part of the ecological balance—wooded savannahs hold an average of 74 tons of soil organic carbon per hectare. However, forest-related activities are also an important contributor to poverty reduction and economic security, with non-timber forest products representing 23 percent of rural household incomes², particularly in months with droughts or low harvests. At the national level, the forest sector contributes 5.6 percent of GDP via fees, taxes, and permits for the use of timber and other forest products, mostly in the form of wood fuels³. The need for forest protection and livelihood generation therefore often compete, and projects such as this are important to testing and realizing the aligning of incentives. With this in mind, the evaluation seeks to understand if and how payments for ecosystem services (PES) and participatory forest management approaches affect both forest conservation and the generation of supplementary incomes.

INTENDED USES AND USERS

The intended audience for this evaluation is forest policymakers and practitioners who implement, plan, or monitor afforestation programs, including those who utilize community PES schemes. This is particularly important in dryland, arid-climatic countries like Burkina Faso, where the sole rainy season is getting shorter and more irregular, resulting in poor, agriculture-dependent communi-

1. *MECV*, 2009 0

2. *Theforestdialogue.org*, 2011, Page 11

3. *Burkina Faso CIF Investment Plan*, 2012, Page 10

ties experiencing heightened food insecurity between harvests.

PROJECT OVERVIEW

The Gazetted Forests Participatory Management Project for REDD+ is a US\$11.5mil project implemented by the African Development Bank, with twin objectives: improving the carbon sequestration capacity of gazetted forests and reducing poverty in rural areas.

The project does this by instituting Payments for Ecosystem Services (PES) which involve inviting communities near selected forests to participate in afforestation campaigns, wherein they plant new trees and are offered a monetary reward conditional on the survival of those trees. The approach works multi-fold. On the forest-protection side, the monetary incentives ensure the planting and protection of new seedlings. On the social protection side, well-structured PES schemes contribute to increased rural incomes that aid poverty reduction and food security. Emerging lessons on doing this effectively are particularly important from a policy perspective—climate vulnerable countries are looking for ways to increase the reach of their upcoming Nationally Determined Contributions (NDCs) in the face of significant resource scarcity.

Additionally, the evaluation is breaking new ground on how to precisely and cost effectively map dry forest cover using satellite and drone imagery and remote sensing techniques. It is also testing innovative methods for precision monitoring of tree survival rates during afforestation campaigns using GIS techniques. The goal is to devise and replicate an accurate measurement of afforestation and tree survival rate outcomes.

CAN PES REDUCE FOOD INSECURITY?

Within this frame, the ongoing evaluation tests if

and how PES participation effects households' food security by uncovering the linkages between conservation incentives and food security outcomes. PES programs, like Conditional Cash Transfer (CCT) programs, are often justified by their potential contribution to social protection. Communities in the drylands of Burkina Faso, for example, rely primarily on rainfed agriculture for their food, with only one rainy season per year. This means that for a large part of the calendar year, families face food shortages. The impact evaluation shows that well timed cash transfers can provide timely and needed income when food insecurity is reaching its peak, just prior to the harvest season. Evidence from the impact evaluation indicates that there is a statistically significant link between environmental conservation incentives and improved food security outcomes.

FINDINGS: Participants in the PES scheme were shown to experience less food insecurity than those not participating in the scheme. According to the Household Food Insecurity Experience Scale (FIES), participants in the PES scheme were significantly less likely to be food insecure or severely food insecure than non-participants. These outcomes are consistent with the results of a 2017 survey of participants at the time of the PES transfers, in which more than half of respondents indicated that they would use PES incomes for food-related expenditures. That the receipt of this income coincided with the pre-harvest period, when farmers have little food stocks remaining from the previous season, stands in line with efforts for social protection at vulnerable periods.

WHAT IS THE BEST WAY TO STRUCTURE PES CONTRACTS?

PES are becoming increasingly popular in forest conservation programs, but relatively little is known about the conditions of their effectiveness. Pricing and incentives matter. The theory of change behind

the use of PES is that the provision of ecosystem services generates positive externalities for which participants need be compensated so as to generate socially desirable levels of outcomes. Given that these arrangements are delivered collectively to communities or groups, rather than to individuals, collective action failure presents a threat to the effectiveness of the monetary incentives. The DIME evaluation aims to test the extent to which alternative contract designs could mitigate such losses.

With an objective to learn, the project designed and implemented two types of PES contracts: one using a linear payment and another using a threshold-based payment. Groups of five community members were enrolled in one of the two PES contracts with the objective of maintaining new saplings planted at the beginning of the reforestation season.

The linear payment contract paid a group USD 0.62 per tree surviving at the end of a designated time frame, with each member of the group receiving one fifth of the total income. The threshold payment contract paid a group a predetermined amount based on the number of living trees at the end of the designated time frame, with each member of the group receiving one fifth of the payment (USD 238 for 400 or more trees, USD 185 for 300 or more trees, or USD 62 for less than 100 trees). Overall, some 33,000 trees were planted and are being maintained under these contract arrangements.

FINDINGS: While the impact evaluation is still on-going and concrete results have yet to be determined, there is some early evidence emerging. Linear payments appear to outperform threshold payments both in terms of the absolute number and the quality of surviving trees. In the threshold payment model the evaluation did not observe a "bunching" of tree-counts around participants aiming for a just-over-the-threshold number of trees, but this alone cannot yield any conclusive results. Further obser-

uations and data are being collected to determine the underlying perceptions and/or incentives that resulted in the difference of success rates.

WHAT ARE THE MOST EFFECTIVE METHODS FOR MEASURING FOR TREE COVER AND SURVIVAL RATES?

Precise data gathering is not only necessary but also possible. Monitoring REDD+ progress, as well as the real impacts of forest conservation policies, will likely require governments to develop greater capacity to measure and monitor forest cover, including tracking changes resulting from conservation and reforestation programs. The inability to precisely measure outcomes often curtails the opportunity to monitor and learn effectively from development interventions. In Burkina Faso, and many other countries implementing largescale afforestation programs in the drylands, there has often not been a system in place to track tree cover loss within forests, or to accurately record, geolocate, and track the survival rate of the trees planted during afforestation campaigns so as to learn about the conditions that are conducive to their sustainability.

To begin to address this issue, the project utilized images from the European Space Agency's (ESA) fleet of Sentinel satellites to map tree cover in select Burkina Faso gazetted forests. The sentinel images provide sufficiently high-resolution imagery for Earth-observation purposes. These satellites help monitor variability in land surface conditions over large areas every 10 days. The Sentinel satellites support the ESA Copernicus environmental studies program, which includes the monitoring of vegetation, soil, water, and coastal areas. These images, and related processing technology, are available at little-to-no cost. This means that Burkina Faso can precisely map forest cover using extremely cost-effective and easy-to-use methods. The project also undertook a pilot initiative to test the use of drones

in precise forest mapping. This showed significant improvements in image precision when establishing ground truth data.

On-the-ground mapping of specific locations where trees have been planted in an afforestation program can also be done at low cost. With minimal training, local teams have been able to use the ESRI Survey123 tool to geo-reference the 33,000 trees planted in various forest locations under the PES contracts. Nine months later, the ESRI Collector tool was used to locate those same trees and record survival status, for a precise measurement of tree survival rates. To streamline monitoring of these trees, a virtual forest corridor was created, which allowed teams to verify tree survival rates within a narrow band.

FINDINGS: Tree survival rates can be better monitored using low-cost technologies to achieve landscape restoration objectives. Geospatial technologies were used in this project to track the precise survival rates of reforested trees the following season. It emerged that the survival rate of reforested trees is between 30 to 37 percent. By establishing what could be baseline survival rates, this innovative low-cost scheme presents important landscape restoration opportunities that could guide and prioritize both national and international forest conservation policies. Establishing accurate baseline reforestation survival rates provides the ability to measure and quantify forest conservation methods in a way that was not previously possible.

WHAT'S NEXT?

Both the project and the impact evaluation are still ongoing, and final results have yet to be determined. Key take-aways and course correction options however, are already available.

Understanding the Incentives within PES Contract Designs. The team is further investigating the underlying reasons for linear payments performing better than thresholds payments in this context. That

there was no “bunching” of tree-counts around threshold markers implies that incentives were not affected by participants aiming for just-over-a-threshold number of trees, and this could have resulted from insufficient information, communities’ inability to track the number of trees within their purview, or a weakness in the understanding of the assured conditionality of payments—the existing data alone cannot yet yield any conclusive results, and the attribution of effects is still under study.

Scaling-up and Replication. PES contract approaches could be expanded to the remaining forests in Burkina Faso. Given the availability of high-frequency and low-cost satellite images, forest mapping could also be scaled and replicated—in fact, remote sensing analyses of Sentinel-2 images are already fully incorporated into the routine measured, reported and verified (MRV) REDD+ forest monitoring by the project team. As this initiative forms part of REDD+ readiness project, the tools and lessons developed are intended to inform the efficient planning of the REDD+ implementation phase.

The tree planting and survival rate tracking approach is innovative and should be tested in several other contexts to improve the ways in which afforestation activities are implemented, with a goal

to enhance results. This is becoming increasingly important as most dryland countries’ NDCs involve ambitious forest landscape restoration plans.

New Inquiries. Having investigated the effectiveness of various contract types, the impact evaluation will now go on to investigate the effectiveness and cost of technology dissemination. Looking at a suite of sustainable land management techniques, including agroforestry and water management techniques, the impact evaluation will explore how best to finance the adoption and diffusion of these technologies.

The team will also investigate effects of monitoring performance and of communicating to participants that payments will be conditional upon performance. Half of the villages participating in a PES scheme will be randomly selected, then contacted and updated on the survival rates in the area they are overseeing. This will allow comparisons between the villages that were contacted with survival rates and those that were not, testing if the perception of conditionality had any weight on afforestation performance rates.

The impact evaluation is expected to be finalized at the end of 2019 and a full array of valuable lessons shared in 2020-21.

The World Bank’s Development Impact Evaluation (DIME) group generates high-quality and operationally-relevant data and research to transform development policy, help reduce extreme poverty, and secure shared prosperity. It develops customized data and evidence ecosystems to produce actionable information and recommend specific policy pathways to maximize impact.



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