

Innovative Dry Forest Mapping

An ongoing impact evaluation of AfDB Burkina Faso's Gazetted Forests Participatory Management Project for REDD+, supported by the Climate Investment Funds' (CIF) Forest Investment Program (FIP), in partnership with Development Impact Evaluation (DIME)¹, is assessing several pressing issues, including devising innovative dry forest mapping methods that allow the estimation and measurement of forest cover using ground truth points.

Understanding the real impacts of forest conservation policies requires accurate measurement of forest cover and trends. It calls for generating dryland-specific forest cover datasets so that the effectiveness of forest policy interventions can be measured and evaluated and lessons can be drawn. Monitoring REDD+ progress requires governments to develop greater capacity to measure and monitor forest cover, including tracking changes resulting from conservation and reforestation programs.

WHY FORESTS MATTER

Forests are an essential component of the global ecosystem. They provide habitats for animals, help conserve water and soil, capture and store carbon, and provide livelihoods to populations that depend on them. Unfortunately, forest cover loss accounts for between 12 and 15 percent of annual human-driven greenhouse gases (GHG)² emissions. Forest protection is a cost-effective way to mitigate climate change.

THE IMPORTANCE OF FOREST COVER MAPPING

Effective protection of forest resources requires detailed knowledge about the state of the forest, as well as the capacity to monitor changes. More importantly, conservation policies, such as payments for avoided deforestation or forest conservation impact assessments, require regular and accurate forest size estimations as well as indications of any related changes. The project has built on global approaches to forest mapping by tailoring them to a localized context thus creating a land cover map for Burkina Faso.



COUNTRY Burkina Faso
REGION Sub-Saharan Africa
PROJECT Gazetted Forests Participatory Management Project for REDD+
CIF FUNDING USD 11.5 million from FIP
EXPECTED CO-FINANCING USD 1.17 million government grant
MDB African Development Bank
SECTOR Public

1. DIME is a unit of the World Bank Development Research Group
 2. Canadell, J.G., Gullison, R.E., Frumho, P.C., Field, C.B., Nepstad, D.C., Hayhoe, K., Avissar, R., Curran, L.M., Friedlingstein, P., Jones, C.D., Nobre, C., 2007. *Tropical forests and climate policy*. Science 316, 985-986.

INNOVATION TO MAP FORESTS AND MONITOR RESTORATION INITIATIVES

The project has utilized images from the European Space Agency's (ESA) fleet of Sentinel satellites, which provide high-resolution imagery for Earth observation purposes. These satellites help monitor 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.

On-the-ground mapping of specific locations where trees have been planted in an afforestation program can also be done at low cost. In this project, approximately 33,000 trees were planted. With minimal training, local project teams on the ground have been able to use the ESRI Survey123 tool to georeference the trees planted in different parts of the forests. To further streamline the monitoring of these trees, a virtual forest corridor was created that allowed teams to verify the survival rate in that narrow band.

Additionally, the project undertook a pilot initiative to test the use of drones in precise forest mapping. This showed significant improvements in image precision to establish ground truth data.

SURVIVAL RATES

In Burkina Faso and many other countries implementing large-scale afforestation programs in the drylands, there has not been a system in place to accurately record, geolocate, and track the survival rate of the trees planted and learn about the conditions that are conducive to their sustainability. This project has been able to generate insight on survival rates as planted trees were revisited the following season. Geospatial technologies were used to track the precise survival rates of reforested trees to between 30 and 37

percent. By establishing what could be used as baseline survival rates in a context where there is very little global data on reforestation survival rates, this is an important step forward. With this type of data, more informed and targeted decisions can be taken on forest management policies and activities, global investments in reforestation, and selecting the most resilient tree species.

EMERGING EARLY EVIDENCE

This work is demonstrating the opportunity offered by low-cost, higher resolution Sentinel-2 satellite images to map forest cover in dryland forests. Further application of this approach could include expansion to the remaining forests in Burkina Faso, as well as incorporation into routine forest monitoring to track real time changes in forest resources and evaluate the outcomes of conservation programs. If successful, the approach could be scaled up to several other countries in the Sahel region.

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 the goal to enhance results. This is increasingly important as most dryland countries' NDCs involve ambitious forest landscape restoration plans. Given the availability of high frequency and no cost of the satellite imageries, forest mapping is also useful for MRV purposes as part of the REDD+. As this initiative forms part of a REDD+ readiness project, the tools and lessons developed are intended to inform the efficient planning of the REDD+ implementation phase.

Additionally, this innovative, low-cost scheme provides essential information on survival rates that could guide and prioritize both national and international forest conservation policies. The ability to establish accurate baseline reforestation survival rates provides the ability to measure and quantify forest conservation methods in a way that was previously not possible.

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.