Evaluation Brief: SERVIR Products and Tools

Background

SERVIR is a joint development initiative of NASA and the United States Agency for International Development (USAID) that partners with regional organizations worldwide to promote the use of Earth observation data and geospatial tools for managing climate risks, ecosystems, natural resources, and natural disasters in developing countries. In collaboration with its regional hub in Eastern and Southern Africa, the Regional Center for Mapping of Resources for Development (RCMRD), SERVIR created land-cover maps to support greenhouse gas (GHG) emissions inventory in Africa.

Launched in 2011, SERVIR’s land-cover maps use a classification methodology based on satellite data to establish baseline rates of land-cover change in nine African countries. These maps are used for reporting GHG inventories in the land use, land-use change, and forestry (LULUCF) and agriculture sectors, which are the agreed categories under the United Nations Framework Convention on Climate Change (UNFCCC). Adhering to guidelines established by the Intergovernmental Panel on Climate Change (IPCC), the land-cover mapping project is intended to quantify land-cover change in Zambia over time, enabling development of a national GHG emissions inventory.

Zambia has relied upon these land-cover maps and land-cover mapping capacity to facilitate country-level participation in readiness efforts for Reducing Emissions from Deforestation and Degradation (REDD) and expanded REDD+ programs. To a lesser extent, these maps have also assisted with project-level decision-making for forestry and land use planning.

Land-Cover Mapping Details

- Uses 30-meter resolution imagery from free Landsat archives to generate land-cover maps for 1990, 2000, and 2010.
- Determines forest reference levels, which help establish a baseline for land cover change and GHG emissions inventories.
- Produced according to 2 land-cover classification schemes: (a) scheme I, using 6 land-cover classifications conforming to IPCC standards; and (b) Scheme II, using 12 Zambia-specific land-cover classifications.
- Accuracy ensured through ground-level validation conducted by Forestry Department, Survey Department, National Remote Sensing Center, and RCMRD at 1,200 sites across Zambia.
- Accompanied by local capacity development to monitor, report, and verify land cover change.
Use for Decision-Making

At the time of this study, the 2000 and 2010 land-cover maps were still awaiting final approval by Zambia’s Ministry of Lands, Natural Resources, and Environmental Protection and had not been formally disseminated. However, shortly after the study’s conclusion, the maps were approved and their data were included in Zambia’s Forest Reference Emissions Level submission to the UNFCCC in January 2016. Zambian officials also indicated that SERVIR’s capacity-building initiatives had significantly improved the government’s ability to monitor, report, and verify change in forest cover and land use related to GHG inventories. Training was completed for 10 national forest monitoring system laboratories, which will collect provincial geospatial data on deforestation and degradation.

Zambian officials signaled a desire and legal responsibility to establish uniformity in the country’s geospatial recordkeeping. A National Forest Monitoring System is expected to provide full access to the land-cover maps in the future, and pending approval by the Office of the Surveyor General, the land-cover maps will carry legally binding authority.

Informally, provincial forestry officials reported use of the land-cover maps for forestry-sector project planning during the evaluation team’s visit to North-Western Province, where the Forestry Department has sponsored the planting of approximately 9,800 trees on at least 3 plantations. In that case, the maps helped determine site selection for tree planting through the identification of highly deforested areas.

Use Outside the Decision-Making Context

Outside the decision-making context, LULUCF GHG inventories constitute part of a standardized process for communicating total national GHG inventories to the UNFCCC. Under UNFCCC protocols, Zambia submits National Communications on GHG inventories and mitigation and adaptation measures every four years, most recently in January 2016. Land-cover mapping capacity is also a key component of Zambia’s National Joint Program for REDD+. The UNFCCC REDD+ Readiness process aims to prepare Zambia for future entry into global carbon markets, as those markets materialize. Zambia’s Climate Change Secretariat intends to use the land-cover maps to establish a baseline rate of deforestation that will allow the country to model and report changes in forest GHG inventories according to standards set by the IPCC.

Research Overview

This brief highlights findings from a case study conducted as part of a three-year performance evaluation of SERVIR by the E3 Analytics and Evaluation Project. SERVIR is a partnership between NASA, USAID, and regional hubs such as RCMRD to provide geospatial data tools and services to inform environmental decision-making in partnering countries.

Research for this case study was conducted in April and May 2015 by a team of U.S.- and Zambia-based evaluators. Data collection included focus group discussions, semi-structured interviews, and site visits, supplemented by a desk review of relevant literature and specialized sectoral knowledge from local team members.

In total, the evaluation team conducted 24 interviews in Lusaka and Solwezi in Zambia's North-Western Province. Interviewees and focus group participants represented government agencies and non-government organizations working in the fields of forestry, remote sensing, and land survey and land-use management, as well as provincial and district management personnel.
Factors Affecting Adoption and Use

Several factors affect the adoption and use of the land-cover maps in Zambia, including product-specific and institutional factors:

**Product Accuracy:** The accuracy of land-cover maps is imperative to generating accurate emissions inventories. Furthermore, for REDD+ purposes, LULUCF emissions inventories must meet international standards for adequate, consistent, and replicable procedures to ensure complete, transparent, and comparable map products. In early 2015, a working group of government and international stakeholders detected significant errors in SERVIR’s land-cover maps for 2000, due to unaccounted-for seasonal variance. The collective effort of multiple actors from Zambia’s cadastral and geospatial data sectors throughout 2015 was required to correct the 2000 maps before they could be used for their intended purpose. Difficulties in measuring Zambia’s woodland biomass and swampland present further impediments to product accuracy, and given the rapid rate of deforestation in Zambia, the accuracy of the land-cover maps also depends on the frequency with which they are updated.

**Precision of Land-Cover Classifications for Project-Level Planning:** National-level classifications may not always be appropriate for project planning in local or scaled-down contexts, particularly in cases where important local land-cover variations diverge from broader national-level classifications. For project-level planning, government officials suggested there may be added value in applying different forest definitions by province. For example, Zambia’s Wildlife Authority is concerned with ecological sensitivity and requires precise land-cover definition, whereas the Survey Department and the Ministry of Local Government and Housing are more concerned with general forest cover in relation to cadastral layouts or settlement locations.

**Scale of REDD+ and Other Forestry Projects:** Multiple informants cited the land-cover maps as an important tool that can be used to inform REDD+ and other forestry efforts. The scale of stakeholder needs will affect the utility of any satellite-based land-cover estimates. Small-scale REDD+ projects, such as BioCarbon Partners’ REDD+ pilot in Rufunsa, require significant precision in establishing forest cover baselines. However, recent reforestation activity in Solwezi had no difficulty using the land-cover maps to guide site selection for tree planting in highly deforested areas.
**Institutional Buy-In:** The use of the land-cover maps for project planning depends on recognition of their value by project-level decision-making institutions such as the provincial offices of Zambia’s Forestry Department. Approval from the Surveyor General should generate institutional recognition of the maps’ authority and lend them credibility moving forward.

**Institutionalization of Measurement, Reporting, and Verification (MRV) Systems:** The purpose of the capacity-building component of the land-cover maps was to ensure that the mapping process could be independently replicated by Zambian authorities for future MRV activities. Replication will require institutionalization of data-collection methods for continued use in the future. The quality of successional planning in government institutions is thus an important factor affecting sustained use, but cannot yet be verified.

**Maturation of Carbon Markets:** Zambia has strong financial incentive to partner with UNFCCC for REDD+. Between 2010 and 2013, Zambia received $4.49 million in UN-REDD funding. Broader use of the inventory maps for establishing reference GHG emissions levels in the international community will depend on the continuation of REDD+ funding and/or the maturation of international carbon markets.

**Impact and Value of Use**

The most visible impact of the land-cover mapping project in Zambia is the strengthening of the country’s MRV systems for reporting forest GHG inventories. With the finalization of the maps, two avenues for impact are possible:

1. The establishment of a baseline deforestation rate in accordance with IPCC standards will contribute to Zambia’s eligibility for REDD+ financing. Standard reporting practices can inspire donor confidence in Zambia’s MRV systems and encourage international financing to strengthen REDD+ systems and enhance the country’s REDD+ readiness status under IPCC guidelines.
2. At the project-planning level, robust land-cover data and the ability to collect such data can help Zambia identify drivers of deforestation and target forestry programs to areas at high risk of deforestation, increasing the efficiency and effectiveness of forestry project planning. Value can accrue over the longer term as increased forest cover and mitigation of deforestation drivers foster greater provision of ecosystem services.

**Recommendations:**

Accuracy, consistency and replicability are critical to achieving GHG reporting goals. Toward this end, the evaluation team offers two recommendations:

1. Put accountability measures and quality-control mechanisms in place to ensure product accuracy and timeliness.
2. Take measures to ensure adequate local participation at all stages of the mapping process and not just during the ground-truthing phase.

Where secondary potential exists for project-based planning in the forestry sector, based on the use of these land cover maps, the evaluation team recommends:

1. A decentralized approach to dissemination and use of the inventory maps.
2. Active engagement with the private sector, including non-governmental organizations, for responsible forestry management.