Monitoring the impact of REDD+ implementation in the UNESCO Kafa biosphere reserve, Ethiopia

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Nice to meet you!

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The “NABU Project”

Forest and Climate Monitoring

Funded through the International Climate Initiative (ICI) by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

This research falls under a broader implementation project carried out by NABU Germany / Ethiopia and local partners in Kafa, Southwest Ethiopia: 
*Climate Change Mitigation and Primary Forest Conservation – A Best-Practice Management Scheme for Wild Coffee Forests in Ethiopia*

General project objective is to monitor the impact of REDD+ related implementation activities on carbon emissions in the project area
The UNESCO Kafa Biosphere Reserve

- Established officially in March 2011
- Consists of 4 zones: Core, ‘Candidate’ Core, Buffer, and Transition
  - Related to forest protection status under the BR
- Over 700,000 hectares – approximately half with forest cover remaining
- Deforestation and forest degradation (due to e.g. fuelwood collection)
What is REDD+

REDD+

Reducing Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries

UNFCCC – determines the “rules”

IPCC – Good Practice Guidelines (GPG) for reporting in various sectors, including Land Use, Land Use Change, and Forestry (LULUCF)
Measuring, Reporting and Verification (MRV)

Emission Factor: amount of carbon released per unit area as a result of activity

Field-based quantification of carbon stocks, or use of IPCC default factors

Activity data: land area affected by change (e.g. area of forest cleared)

Activity monitoring system is important
A conservative approach to estimating emissions reductions reduces the risks of crediting false emission reductions. Conservative estimate: The difference between the lower confidence bound of Reference Emission Levels (REL) and the upper confidence bound of the reported emissions in the assessment period.

A Conservative Approach to MRV

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**Challenge**: Can we prove that emission reductions have taken place if uncertainties are very high?

**Integrated Monitoring System** to improve MRV of REDD+ in low capacity contexts

Integrated Monitoring and MRV

Integrated Monitoring Framework

1. Earth Observation Time-Series Data

2. Forest Inventory

3. Local Monitoring Data

National / Global Maps / Databases

Carbon Budget Modelling

Measuring, Reporting & Verification → Uncertainties

C stock changes over time
1. Remote Sensing Data

Adapted from Tessema, F. (2012, MSc thesis in preparation)
2. Forest Inventory Data

Degradation

Deforestation

Carbon stock

Aboveground Tree Biomass

Forest Floor

Mineral Soil

Coarse woody Debris

Belowground root biomass
Inventory Data Processing Chain

- Tree data (DBH, local name)
- Tree Species data (scientific names, wood density)
- Plot data (location, projected plot area)
- GIS (Strata, etc.)

Allometric Equation: \( B = f(d, \rho) \)

- Biomass per tree (kg)
- Biomass per plot (t/ha)
AGB Variance within Strata

Post-Stratification

Original strata

Revised strata
3. Local Monitoring Data

- Involving local forest rangers in data collection serves a number of objectives:
  - Expertise: use of local expertise to enhance data quality: link change with drivers
  - Cost-effectiveness: rangers are stationed where they live (usually)
  - Timing: ongoing monitoring by rangers allows for “real-time” monitoring of change
  - Validation: compare ranger observations with remote sensing-based observations
  - Sustainability: involvement of communities in forest and climate monitoring will allow them to understand and take ownership of activities
Forest Ranger Data: A First Look

What can we learn from the data?

Conversion in 2006 from closed forest to agricultural land (maize and barley).

Conversion of natural forest for cultivation of teff and enset. Illegal settlements, but farmers have since left the area.
Integrating Data Streams

Local Ranger Data (GPS, forms)

“Real Time” Monitoring

Earth Observation time series data

Disturbance Locations

Cross-Validation

Forest Change maps

Implementation Activities

Targetted Sampling

Targetted Sampling

Carbon stock (& change) sampling
Integrating Data Streams

Earth Observation time series data

Technological Scaling-Up?

Real Time Monitoring

Disturbance Locations

Cross-Validation

Forest Change maps

Targetted Sampling

Targetted Sampling implementation activities

Carbon stock (and change) sampling
Thanks for your attention!

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Further Reading


