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Measuring, Reporting and Verification of Climate and Forest Protection Activities in the Kafa Biosphere Reserve, Ethiopia

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Introduction

The protection of tropical forests represents a key component in the effort to combat global climate change, due to their capacity to act as a terrestrial carbon store, an important characteristic being increasingly recognised in international discussions. To effectively monitor the climate impact of forest and human-induced forest change, robust measuring, reporting, and verification (MRV) systems are required, following principles outlined by the Intergovernmental Panel on Climate Change (IPCC) for monitoring and reporting of national GHG inventories. In developing countries, however, significant capacity gaps still exist, both in terms of data availability and processing capacity. Monitoring GHG emissions and removals on sub-national or project scales can alleviate these capacity gaps by focussing on specific implementation activities. In this study, the activities implemented in the UNESCO Kafa Biosphere Reserve under the auspices of NABU's climate and forest project, funded within the frame of the International Climate Initiative (ICI) of the German Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)[1] ,are to be monitored in the context of GHG emissions monitoring. With such mechanisms as REDD+[2] being put forward as a means to mitigate the effects of greenhouse gas (GHG) emissions, the knowledge gained from this research is vital in addressing the capacity gaps currently present in countries participating in these programmes, and will serve as a model for future project-based forest carbon monitoring.

1 Full title of the NABU project: "Climate Protection and Primary Forest Preservation – A Management Model using the Wild Coffee Forests in Ethiopia as an Example"
2 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".

Study Area

The afro-montane wild coffee forests contained within the UNESCO Kafa Biosphere Reserve in the Southwest of Ethiopia represent some of the country's last remaining cloud forests. These forests therefore represent an important national carbon store, estimated to absorb on the order of 600,000 tonnes of carbon annually. This project aims to monitor the effect of forest preservation and rehabilitation activities in the Kafa Biosphere Reserve on carbon emissions and removals.
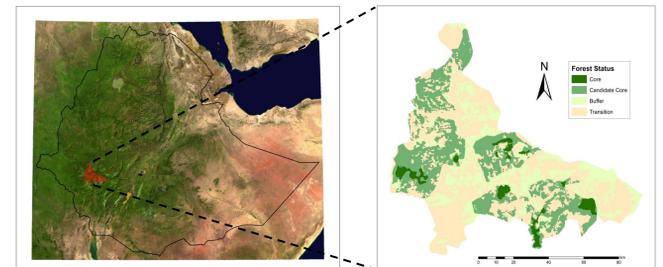
Methods and Expected Results

As defined by the International Panel on Climate Change (IPCC), Measuring, Reporting, and Verification (MRV) of GHG emissions and removals is centred around the calculation of emissions over the reporting timeframe using a variety of data sources. In this project, Activity Data (AD) is derived from satellite-based deforestation and forest degradation data, implementation monitoring data (such as reforestation and participatory forest management activities), and community-based monitoring data. Emission Factors (EF) are derived from field-based carbon stock inventory data and biomass maps. All of these data are integrated in a carbon budget modelling framework, and estimates for carbon emissions, emissions reductions and removals against Reference Emission Levels (REL) are produced based on model results.

MRV (IPCC)

Emissions = AD X EF

Activity Data (AD) ⟶ Area of forest affected or changed

1. Satellite-based Forest Change Analysis
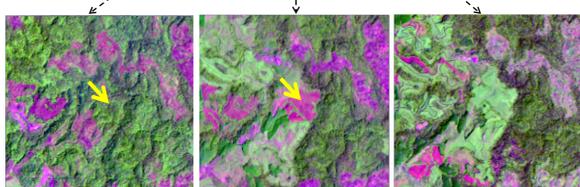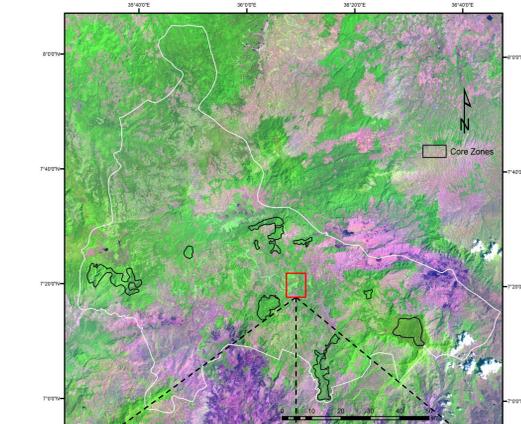
| 1987 | 2001 | 2010 |

Example of forest change between 1987 and 2010

2. Implementation Monitoring

Participatory Forest Management Committee meeting in Saja, March 2011

3. Community-Based Monitoring

OPEN DATA KIT

Applications for forest disturbance monitoring developed for hand-held devices via Open Data Kit (ODK)

Emission Factor (EF) ⟶ Emissions or removals of carbon per unit area

mean Above Ground Biomass
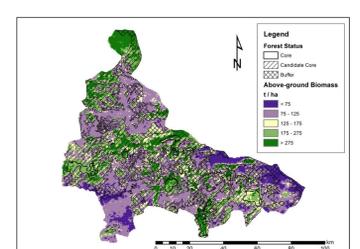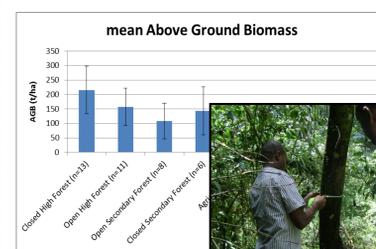
Above-ground Biomass Estimates (Baccini et al., 2011)

Integration of Data Sources

Above Ground C
Below Ground C
Litter C
Soil C

Change in C stocks over time
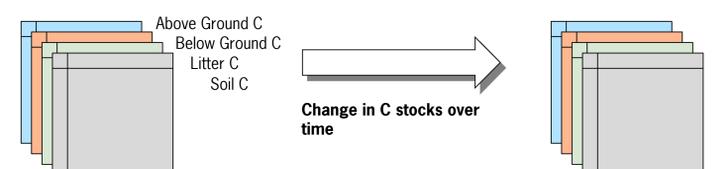
Carbon Budget Modelling ⟶ Emissions & Removals against Reference Emissions (baseline)

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