

Quantifying the carbon stocks and sink effects in the forests of Guinea - Bissau

Overall Goals

Getting the forest sector of Guinea-Bissau ready for accessing the carbon market

Monitoring tropical deforestation and Land Use Change

Objectives

Quantification of historical land cover changes and deforestation rates – *baseline*

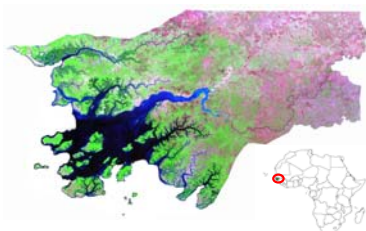
Quantification of the carbon stock contained in Above Ground Biomass (AGB)

Assessment of the carbon sinks of the Guinea-Bissau forest area

Set up a forest vegetation monitoring system and characterization of farming systems and fire practices

Capacity building for several institutions

Study Area



2007 Guinea-Bissau Landsat image mosaic (RGB-743)



Methodologies

Multi-temporal satellite image processing and production of a land cover map series

Forest inventory with measurement of vegetation biophysical parameters and calculation of AGB¹

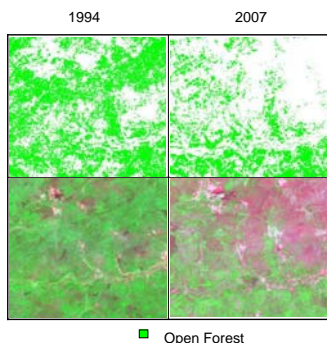
Modelling and calculation of carbon sink effect based on field data and measured plot age

Socio-economic assessment - interviews with farmers, with sampling procedure supported by observed land cover changes and fire practices

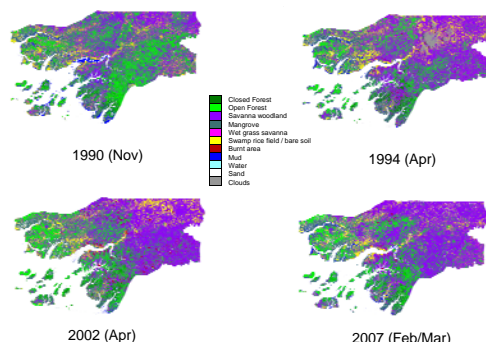
Training of Guinean technicians included in the project team

¹Pearson, T.; Walker, S. and Brown, S. (2005) – Sourcebook for land use, land-use change and forestry projects, BioC/Winrock International, 64 pp.

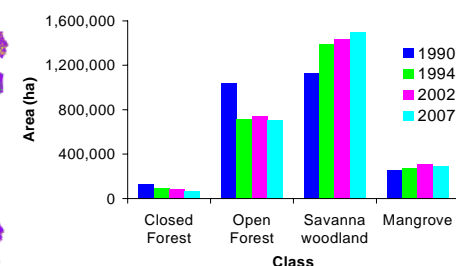
Preliminary Results



Forest cover change obtained with classification trees algorithm combined with expert knowledge and field work

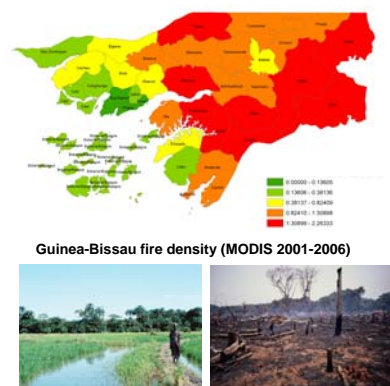


Land cover maps of Guinea-Bissau



	1990	% Change	1994	% Change	2002	% Change	2007	% Change 1990-2007
Closed Forest	128361	-28.43	91871	-5.99	86363	-23.84	65775	-48.76
Open Forest	1043411	-31.47	715016	3.83	742280	-4.77	709386	-32.24
Savanna woodland	1127313	23.09	1397622	3.38	1434229	4.81	1533534	33.37
Mangrove	251405	9.33	274848	11.61	306765	-5.31	290482	15.54

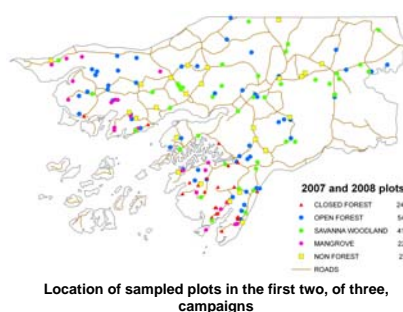
Land Cover Change between 1990 and 2007 (data in ha and annual percentage change)



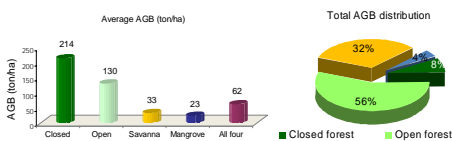
Guinea-Bissau fire density (MODIS 2001-2006)



- Guinea-Bissau agro-ecological regions characterized in relation to farming systems and fire practices.
- Identification of proximate causes and underlying drivers of deforestation



Location of sampled plots in the first two, of three, campaigns



Average and total AGB distribution per forest type

Parameters collected in the field

- Plot Site Characterization and forest type classification (Closed Forest, Open Forest, Savanna Woodland and Mangrove)
- Forest structure characterization: Canopy cover, Vertical and Horizontal vegetation structure, Litter depth
- Forest degradation analysis: Soil erosion, Burning practices, Reported logging and Agriculture expansion
- Forest-tree measurements: Specie identification, Vitality classification, DBH, Total height, Top and basal diameter of dead trees, small tree count (< DBH < 5). Palm-tree measurements: Vitality classification, Stem height, Small palm-tree counts (stem height < 1.3m)
- Downed dead wood measurements (in two 40 meter transects)
- Collection of wood samples for specific density estimation
- Collection and weighting litter sampling

Forest type	Above ground biomass of alive trees		Carbon stock on AGB of alive trees and CO ₂ equivalent		
	Average AGB ton/ha	Total AGB Mton	C Mton	CO ₂ Mton	%
Closed forest	214	14	7	26	8%
Open forest	130	101	50	184	56%
Savanna woodland	33	57	29	105	32%
Mangrove	23	7	3	13	4%
Total Forest	62	179	80	329	100%

Average and total AGB, and carbon stocks distribution per forest type

THE WAY FORWARD

The results of CARBOVEG-GB directly contribute to improve the ability of Guinea-Bissau (GB) to successfully proceed with its efforts of attaining sustainable forest management and preventing forest degradation and deforestation. Like in other countries, increased forest degradation in GB results from local economic needs. Valuing forest carbon stocks and providing incentives for the improvement of sinks is a good approach to support local forestland owners and forest communities, while attaining development goals like poverty alleviation, climate change mitigation and the protection and management of natural resources. Mechanisms, such as REDD, that pay for ecosystem services, are an important contribution to finance the non-timber goods and services provided by GB forests. This project is an important contribution to the identification of target areas for REDD and CDM projects.

Guinea-Bissau signed and ratified the Kyoto Protocol in November 18th, 2005. The Decree n.º 11/2006 of the Ministers Council, of August 11th, published in the Official Bulletin n.º 34, of August 22nd, 2006 created the **Designated National Authority (DNA)** which has the ability to approve and monitor the development of projects under the Clean Development Mechanism (CDM) framework. Once the forest baseline is established at the conclusion of CARBOVEG-GB, Guinea-Bissau is ready to consider projects to generate Certified Emission Reductions (CERs, under CDM) and Verified Emission Reductions (VERs, for voluntary markets), and be a candidate for the REDD mechanism. Presently, Guinea Bissau is strongly committed in the preparation of policies and capacity building in public institutions to support Sustainable Forest Management, to be fully prepared to host projects under the UNFCCC.

Acknowledgments: This work is co-funded by a doctoral grant provided by the Gulbenkian Foundation, Lisbon, Portugal.
Instituto da Biodiversidade e das Áreas Protegidas da Guiné-Bissau (IBAP) and NGO Acção para o Desenvolvimento (AD) contributed with support during fieldwork.