IECF 2024 Conference

The 4th International Conference on Forests

23–25 September 2024 | Online

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MIXED METHODS TO ASSESS SACRED FORESTS MANAGEMENT PRACTICES IN GUINEAN FOREST OF WEST AFRICA BIODIVERSITY HOTSPOT

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BACKGROUND

Fig. 1-2 BIODIVERSITY HOTSPOTS @Critical Ecosystem Partnership Fund

The planet has lost 178 million hectares of forest since 1990 (FAO,2020). Africa has the highest rate of deforestation due to human activities.
Sacred Forests (SFs) possess high conservation value and have received less attention by mainstream policy makers. Listed as exceptional on a global scale, the Guinean Forest of West Africa (Fig.1-2) ecoregion has been classified as part of the Upper Guinea block of the Guinean-Congolese regional centre of endemism. The region is rich in species and endemism.

The **main threats** to the ecoregion are increasing demands for agricultural land, fuelwood, timber, bushmeat and mineral resources, all of which lead to forest loss.

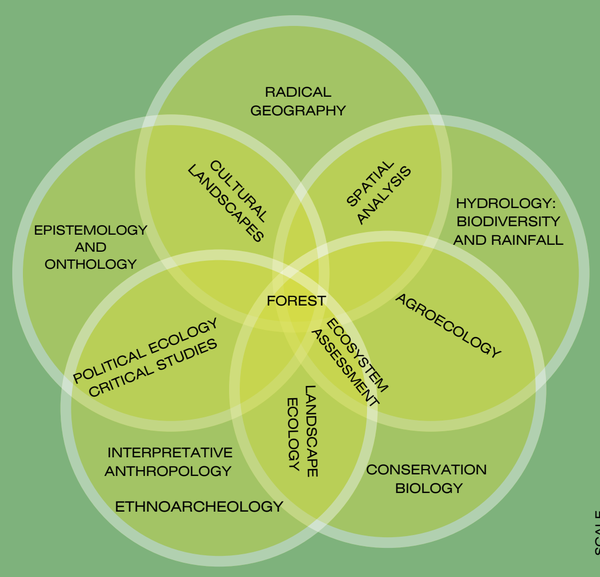
RESEARCH OBJECTIVES

1. Study the phenomenon of Sacred Forests in the West African hotspot ecology.
2. Propose a mixed methodology (multiscale, interdisciplinary, quali-quantitative) to study SFs Social ecosystems comparatively
3. Validate the hypothesis of SFs as governance models for biodiversity conservation purposes better described including traditional ecological knowledge.

HYPOTHESIS

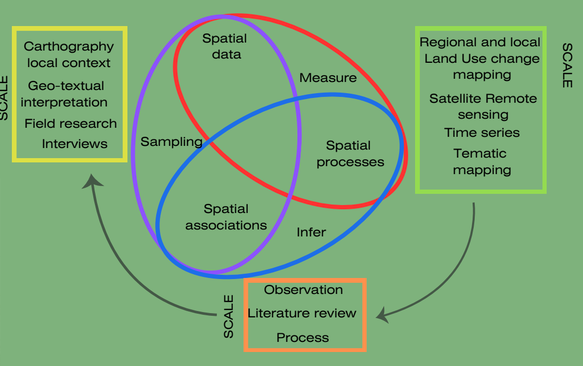
Sacred forests in the periphery of Guinean Forest of West Africa ecoregion are established typologies of forest management models based on Traditional Ecological Knowledge (TEK). The study of local populations' perceptions about SFs and endogenous mechanisms that can contribute to forest conservation strategy are better described if they incorporate TEK, the knowledge passed down through generations.

THEORETICAL FRAMEWORK & MIXED METHODOLOGY



Humanities unraveling patterns of human behavior provide solutions to the triple crises of our time (climate change, biodiversity loss, and pollution). Changing how we look at sustainability.
Science document evidence to validate hypothesis

MULTISCALE APPROACH



The **scheme** explain the **multiscale** nature of the method integrating different disciplines and tools from geo-textual interviews with local people, fito-sociological survey at the local level to the land cover change detection at the regional scale.

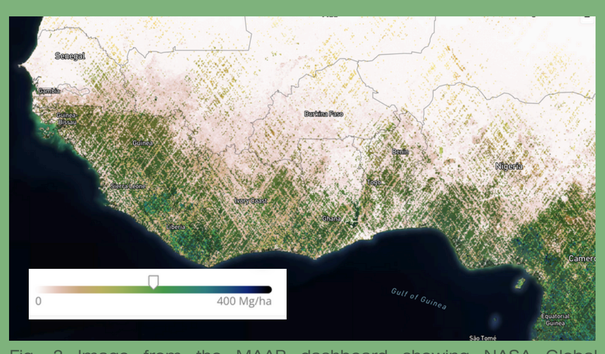


Fig. 3 Image from the MAAP dashboard showing NASA Global Ecosystem Dynamics Investigation (GEDI) Level 4B biomass densities across central Africa. credit: NASA/ESA MAAP. Mean aboveground biomass density (MU): Estimated mean AGBD for the 1 km grid cell, including forest and non-forest. This Global Ecosystem Dynamics Investigation (GEDI) L4B product provides 1 km x 1 km (1 km, hereafter) estimates of mean aboveground biomass density (AGBD) based on observations from mission week 19 starting on 2019-04-18 to mission week 138 ending on 2021-08-04.

RESEARCH RESULTS

BENIN with a surface area of 112,622 km2, vegetation cover was estimated in 2005 at 76,700 km2, or 68.10% of the territory's surface area (Image Lansat TM). Today, the forest cover of the State's classified domain is around 27,000 km2, or 19% of Benin's surface area. The classified forest of Kilir and the sacred forest of Sérou are two peri-urban forests marked by a strong human presence. However, their relationship with the local population has varied (S. Boni Biao et al, 2024)).

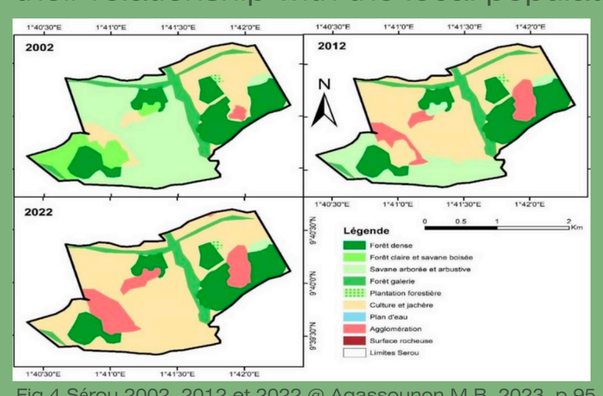


Fig.4 Sérou 2002, 2012 et 2022 @ Agassounon M.B, 2023, p.95

Land use maps of the Kilir (fig.5) classified forest and the Sérou (fig.4) sacred forest in 2000, 2012 and 2022 show that the same trend has been maintained in the Sérou sacred forest, although there has been slight degradation and deforestation in places.

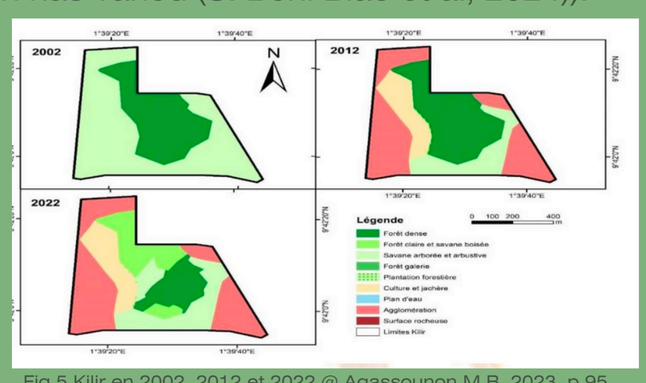


Fig.5 Kilir en 2002, 2012 et 2022 @ Agassounon M.B, 2023, p.95

In the Kilir classified forest, anthropised areas (crops and plantations, built-up areas and bare ground) have dominated the landscape (fig.5). Over the same periods, savannahs have been greatly reduced and open forests have increased significantly in the Kilir classified forest.

CASAMANCE, SENEGAL

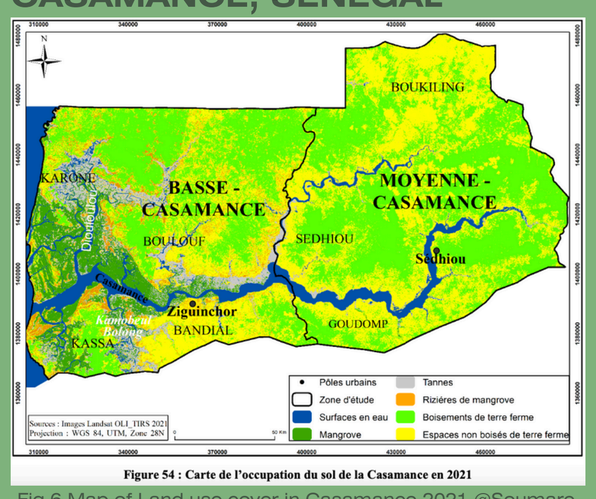
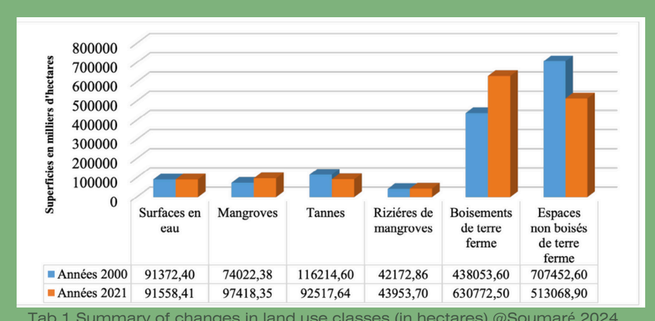


Figure 54 : Carte de l'occupation du sol de la Casamance en 2021

Fig.6 Map of Land use cover in Casamance 2021 @Soumare, 2024



Tab.1 Summary of changes in land use classes (in hectares) @Soumaré,2024

Between 2000 and 2021 (tab.1, fig.6), Casamance's woodland increased by 630,772 ha or 44%, while non-wooded areas decreased by 513,068 ha or 27%. (Soumaré 2024, p. 138-139).

GUINEA The map shows (fig.7) the land use in Upper Bafin basin between 2000 and 2020; the below map is the Dombélé basin, sub basin of the Bafing; it is the most urban area and is alsolocated in a hilly region with a high population density. Both show a sharp increase in vegetation and a significant decrease in bare soil.

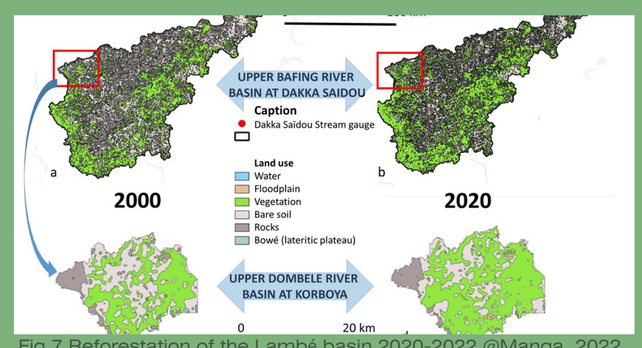


Fig.7 Reforestation of the Lambé basin 2020-2022 @Manga, 2022

The vegetation is evolving positively in a region with a high population density. A traditional system of high manpower intensity produces high agricultural yields and a good resilience of the "tapades" agrosystems. Tapades gather settlements and women gardens.

CONCLUDING REMARKS

In the case studies we observe, infer and validate the hypothesis assessing a correlation between the sacred forest typology of forest management, even if punctual and peripherical to the primary forest core areas, and the geospatially analysed phenomenon of reforestation with an increase rate between 30 to 44% in all the case studies. This preliminary results will open the way to evidence based interdisciplinary study based on the proposed mixed methodology to quantify the phenomenon.

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ACKNOWLEDGMENTS

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