

MAPPING EXTENT AND RECENT CHANGES OF ANKIEMBE AND SARODRANO MANGROVES (TOLIARA, MADAGASCAR) WITH REMOTE SENSING

Ricardo Ratsimba ANDRIATSIARONANDROY ONJANAMBOARA^{1,2,3}, Aude Nuscia TAÏBI¹, Aziz BALLOUCHE¹, Félicitée REJO-FIENINA²

ABSTRACT

Madagascar is an island located at 400km east of the African coast, between the Indian Ocean and the Channel of Mozambique. This island figures among the 10 hotspots of the world biological diversity and has the richest ecosystems in the world. Madagascar's littoral ecosystems of 6000 km are formed by coral reefs, maritime and mangrove swamps which represent all crucial ecological areas of interest (Andriatsiaronandroy *et al.*, 2017). These mangrove swamps growing in intertidal zones are excellent indicators of environmental variations and of the health situation of surroundings.

This study, within the framework of an agreement between the University of Angers (France) and the University of Toliara (Madagascar), supported by the program "Horizons Francophones" of the "Agence Universitaire de la Francophonie" (AUF) and by the International Foundation for Science (IFS), has for purpose to highlight the evolution of mangrove swamp at two particular sites: Ankiembe and Sarodrano between 1987 and 2012, and to determine various pressures and threats related to mangroves in these sites. In order to achieve these goals, dual approaches were adopted, combining SPOT satellite imagery processing (supervised land cover classification) and field measurements (species inventory, measurement of breast-height diameter of woody plants, analysis of the substrata, counting of individuals cut, dead on the ground as well as young shoots, measurement of dominant height, investigation around villages near sites) were adopted. Note that in this work, we were specifically interested in the forests of mangroves and our results are precisely based on this ecosystem. Two mangrove swamp's sites along the coast of the region of Toliara were chosen, Ankiembe who is located in the South of Toliara (District of Toliara I, Atsimo Andrefana Region) and who is especially characterized by the presence of a mosaic of saltworks and the city of Toliara in the North (**Plate 1**). The other site is developed in a protected bay by the Sarodrano's arrow of sand and is located in the north river mouth of

the Onilahy river (**Plate 2**). Mapping and monitoring of mangrove swamp's evolution at the two sites have been implemented from the analysis of multitemporal Landsat images obtained in 1987 and 2012 (**Table 1**). Results of land-cover mapping at these 2 dates show a complex dynamic (**Table 2**), since the Sarodrano's mangrove swamps are in progress with + 9 ha (**Plate 3**), contrasting with Ankiembe's mangrove swamps which retracted of - 4 ha (**Plate 4**) during the last 25 years. In addition to that, the driving factors of these dynamics are variable, associating anthropogenic factors (clear-cuts, pollution, preservation, ...) and natural factors (sand accumulation, mudding, ...). Moreover, in any case, we cannot incriminate in an unambiguous way human-induced degradation, since the anthropogenic impacts can also take the form of artificial reforestations.

In this work, the use of satellite imagery allowed to create improved quantitative and qualitative information on mangrove swamps, especially mapping mangrove extent, considering that available cartographic documents are old or even non-existent. Based on produced mangrove swamps' maps, it is possible to put a decision-making tool at disposal of the State (Regional office in charge of the Environment and Forests), and of technical and financial partners such as NGO and VOI (local basic community).

KEYWORDS

Mangroves, mapping, monitoring, multitemporal analysis, remote sensing, Toliara, Madagascar.

How to cite this article (originally published in French):

ANDRIATSIARONANDROY ONJANAMBOARA R. R., TAÏBI A. N., BALLOUCHE A., REJO-FIENINA F., 2018 - Caractérisation et évolution récente des mangroves d'Ankiembe et de Sarodrano (Toliara-Madagascar) par télédétection spatiale. *Photo Interprétation European J. of Applied Remote Sensing*, **54** (3-4), 43-49.

1. Littoral Environnement Télédétection Géomatique (LETG), Université d'Angers, CNRS, Université Bretagne Loire, UFR Sciences, 2 Bd Lavoisier, 49045 Angers Cedex 01, France.

2. Faculté des sciences, Ecole doctorale « biodiversité et environnements tropicaux », Université de Toliara, 601 Toliara-Madagascar.

3. Auteur correspondant : courriel aorr Ricardo@yahoo.fr

LIST OF TABLES AND PLATES

Tables

Table 1: Summary table of SPOT satellite images used in this study.

Table 2: Evolution of mangrove extent (ha) at Ankiembe and Sarodrano sites between 1987 and 2012.

Plates

Plate 1: Location of site and transects at Ankiembe.

Plate 2: Location of site and transects at Sarodrano.

Plate 3: Multi-temporal analysis of Ankiembe mangrove between 1987 and 2012.

Plate 4: Multi-temporal analysis of Sarodrano mangrove between 1987 and 2012.