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## Diachronic study of the Dallol Maouri *Borassus aethiopum* Mart. parkland in the south-western Niger employing remote sensing

DJIBRIM ABDOULAYE<sup>1</sup>, MARTIN WIEHLE<sup>2</sup>, LARWANOU MAHAMANE<sup>1</sup>

<sup>1</sup>*Abdou Moumouni University of Niamey, Rural Engineering, Waters and Forests, Niger*

<sup>2</sup>*University of Kassel, Tropenzentrum / Organic Plant Production and Agroecosyst. Res. in the Tropics and Subtropics (OPATS), Germany*

### Abstract

The Dallol Maouri Borassus grove, a wetland of approximately 30,000 ha, experienced once excessive exploitation of palm wood appreciated for construction, especially in urban areas. The awareness of its degradation in the 1990s led to several restoration interventions. This ecosystem is a hotspot for biodiversity in semi-arid regions but also a socio-economic backbone for local livelihoods. However, alongside these restoration efforts, certain practices like fraudulent logging and the effect of wind and floods, undermine this progress and threaten its sustainability. Hence, we carried out a comparative study over time to better understand the evolution of this palm grove and derive suitable future management strategies. To conduct this study, an unsupervised K-means classification method with QGIS software was applied to Landsat satellite images from the years 1987, 2003 and 2022, whose data was previously subjected to a principal component analysis. Five classes were identified: flooding area, area with high-, moderate- and low-density of Borassus and bare soil. Changes in land use were obtained by change detection method. For validation, 375 training points were used from virtual visit, i.e. 75 points per class. The overall accuracy and kappa values were 80.1 % and 0.71, respectively. During the regeneration interventions between 1987–2003, we found that the palm grove experienced an overall increase in moderate (2,229 ha) to high (794 ha) density areas of Borassus. Later between 2003 to 2022 and despite a continuation of regeneration actions, the palm grove lost an overall 1,415 ha, or 30 % of its area with moderate density of Borassus. In addition, the Bana-tela and Tousseye strata, both lost around one hundred (100) hectares, or 32 % of their high-density zone of Borassus. We also noted an expansion of the flood zone (1,209 ha) for all five strata of the Borassus grove. This study shows that despite regeneration actions, from 2003 to the present, moderate- and high-density areas of Borassus are increasingly transformed into areas with scattered palm trees, caused by natural phenomena and anthropogenic activities. Future development planning should focus on these land cover maps for more targeted actions and proceeding on a case-by-case basis.

**Keywords:** Borassus grove, evolution, unsupervised K-means classification