

Pattern of Tropical moist forest dynamics in Kahuzi-Biega National Park landscape, eastern DRC

Cirezi N.C.^{1,2,3*}, Bastin J-F¹, Mugumaarhahama Y.³, Katcho K.³, Sikuzani Y.U⁴, Lumbuenamo R.S², Bogaert J.¹

1. ULiège, Gembloux Agro Bio-tech, Belgique 2. ERAIFT, Kinshasa, DRC ; 3., UEA, Bukavu, DRC ; 4. UNILU, Lubumbashi, DRC

Introduction

- Kahuzi Biega National Park (KBNP): vast tracts of primary and secondary forest and Home to thousands of species of flora and fauna (Spira et al., 2019).
- Main threats: poaching, forest clearing, bushfire, timber cutting and the spread of *Sericostachys scandens* (Spira et al., 2019).
- The park lost approximately 10% of its high-integrity tropical rainforest between 1990 and 2023.
- Objective: Analyze and understand the detailed pattern of tropical moist forest dynamics in the KBNP landscape.

Methodology

- Study area: KBNP and a 15km buffer zone around, located in eastern DRC (Figure 1).
- Data used: Classified Landsat Images from Vancutsem et al. (2021), mains drivers identified by Cirezi et al.(2024) in the landscape: accessibility to minings, roads, fires, altitude level.
- Methods: pixel sampling(centroid) from transition matrix main classes, pixel neighborhood extraction at 3 scales (3*3, 9*9 and 27*27)and further analysis, see figure 2.

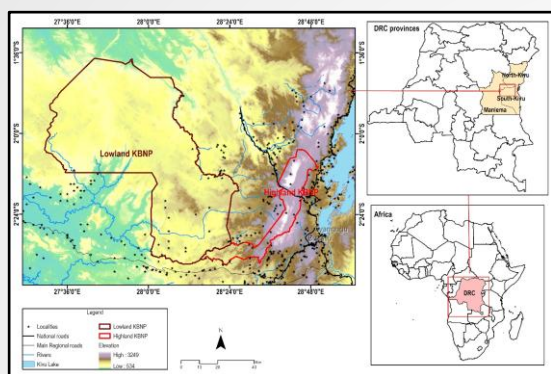


Figure 1: Study area (Kahuzi-Biega National Park and surrounding area)

Results

- The most significant transitions in the landscape are from Undisturbed TMF to degraded forest(10.17%) and from TMF to deforested land (5.76%).
- The diversity of classes around the pixels of interest varies according to the scales and classes concerned ($p\text{-value} < 2.2e-16$) while maintaining the same trends.
- Compared to other classes, the pixels in the Und.TMF class are characterised by an environment dominated by pixels of the same class (covering more than 70% of the window at all scales).
- Undisturbed TMF class is distinct from the other classes and its environment is characterised by its high distance from the various disturbances (roads, mining, fires) and represents the dominant class in low-land areas.

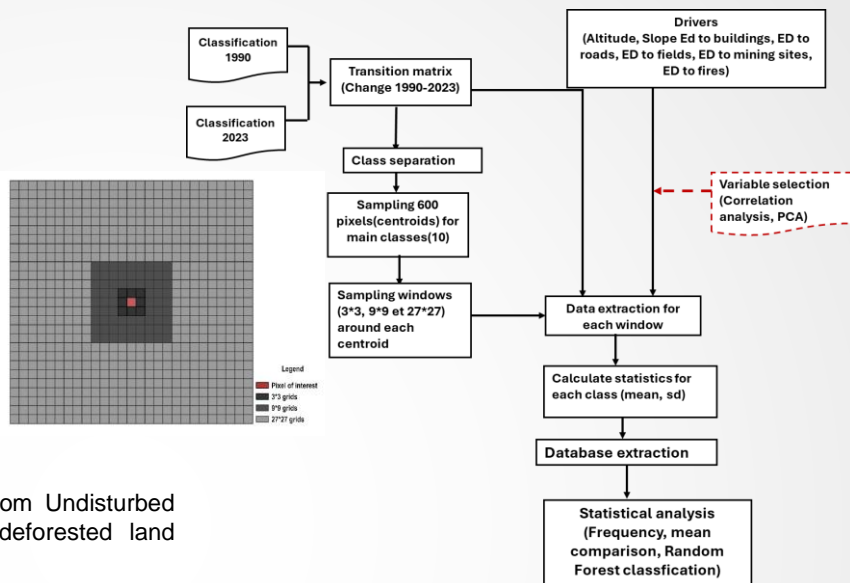


Figure 2 : Methodological workflow

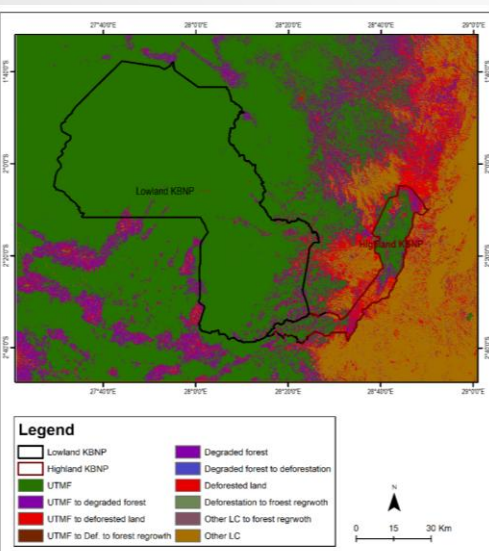


Figure 3: Transition map of main transitions from 1990 to 2023

References

- Plumptre, A. J. et al., (2016). <https://doi.org/10.1016/j.biocon.2006.08.021>
 Spira, C., et al., (2019). <https://doi.org/10.1017/S003060531600171X>
 Vancutsem, C., et al. (2021). <https://www.science.org>
 Cirezi et al.,(2024). <https://doi.org/10.3390/land14010049>

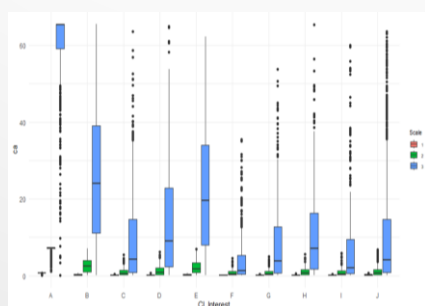


Figure 4: Undisturbed TMF class proportion per class of interest for each scale

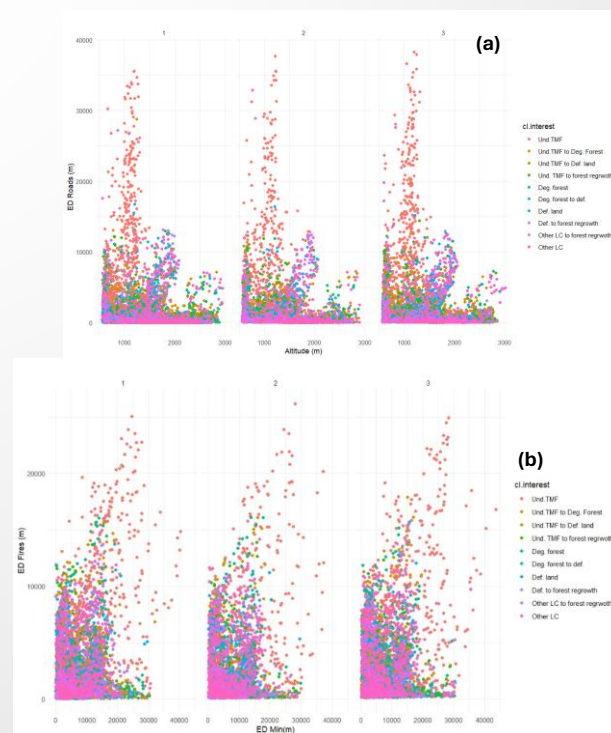


Figure 5: Characterization of classes of interest based on environmental parameters and main disturbances

Conclusion

- The KBNP landscape still retains much of its integrity.
- The greatest forest losses are found in the vicinity of fragmented areas that are open to various human-induced pressures.
- Conservation efforts have to limit the expansion of human action around the remaining intact areas.