

**Abstract of Thesis Presented to the Graduate School
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Application of satellite remote sensing techniques to detect spatial and temporal patterns of
fire and other deforestation drivers in NW Madagascar

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Madagascar's northwestern dry forests, a biome of immense ecological significance, face escalating threats from anthropogenic activities and climate-related disturbances. This thesis presents a comprehensive analysis of these forests, utilizing advanced remote sensing techniques and spatial-temporal data analysis to elucidate the intricate dynamics shaping this unique ecosystem. In the eight chapters, it aims to identify the key drivers of forest loss (Chapter 2), evaluate the effectiveness of remote sensing in monitoring forest recovery (Chapters 3 and 4), assess the impact of disturbance drivers on forest dynamics (Chapter 5), quantify the impact of fires on forest structure (Chapter 6), and understand how Ankarafantsika National Park enhances resilience to disturbance (Chapter 7). More specifically, Chapter 2 highlights how NW Madagascar has the highest forest loss rates in the nation, exacerbated by growing populations, wildfires, and droughts. Chapters 3 and 4 demonstrate the efficacy of the Global Ecosystem Dynamics Investigation (GEDI) in augmenting traditional landcover timeseries, offering deeper insights into forest recovery. Chapter 5 further elucidates the influence of fire and long-term water availability on forest degradation and regeneration. Chapter 6 presents an in-depth analysis of fire impacts on the southern part of Ankarafantsika National Park, demonstrating that these forests exhibit high vulnerability and low resilience to anthropogenic fires. Chapter 7 illustrates the role of forest protection status in enhancing resilience against environmental disturbances. It also evaluates the efficacy of the park's zoning system as a means of safeguarding the forest. Overall, the thesis contributes significantly to our understanding of the dynamics of Madagascar's dry forests. By emphasizing the importance of remote sensing for monitoring and analysis, it provides a vital tool for conservation efforts. The research highlights the need for immediate and targeted conservation strategies to protect these biodiverse and ecologically essential landscapes. Its findings are particularly relevant for conservation practitioners, offering evidence-based insights to inform effective management and preservation of these threatened forests.