

# **Experiences and Attitudes about AI-Enabled Technologies for Forest Management in the Brazilian Amazon Rainforest: Three Decades of Lessons Learned.**

Igor Barboza<sup>1</sup> | Dr. Stibniati Atmadja<sup>2</sup> (supervisor)

1 - Department of Forest Sciences, Technical University of Dresden.

2 - Center for International Forest research – World Agroforestry

This thesis investigates the Artificial Intelligence (AI) and AI-enabled technologies applications, synergies, benefits, risks, costs, priorities, and their relevance for the conservation and management of the Brazilian Amazon Rainforest (BAR). Historically, the application of technologies has exponentially accelerated businesses and initiatives, installed fast-paced economic transformations, and radically changed deep-rooted structures of society, as happened in previous Industrial Revolutions (IR). But from harmful impacts on the environment related to natural resources exploitation to improvements on worldwide life quality standards, the development and application of technologies have brought ambivalent and multifold developments, many of which are problem-engendered solutions that create unwelcomed outcomes.

Compared to current in place technologies, AI and AI-enabled technologies enable processes that may present many advantages – e.g., data processing for decision-making within complex systems. Amidst the ongoing 6th biodiversity mass extinction and disruption to nature and livelihoods that climate change has brought and will bring about, the urgency for multidisciplinary collaborations already in the design phase of sustainability-oriented impact applications of AI and AI-enabled technologies. Well-planned AI-deploying action can catalyze the protection and reforestation, and to bridge the gap between technological advances and its uptaking within the BAR region is key to prevent ambivalences in development and optimally use technologies for sustainability in forests and forestry.

Thereby, this research aims to inform decision-makers and experts on how AI and AI-enabled technologies can be applied across relevant sectors for the BAR region. This project employs mixed methods: a) qualitative review of literature, b) key informant interviews, c) mapping of technological synergies, and the main actors in forests and forestry applying AI and AI-enabled technologies – e.g., Internet of Things (IoT). By aligning this thesis framework with the objectives and lines of action proposed by the Action Plan for Deforestation Prevention and Control in the Legal Amazon (PPCDAm) – a Brazilian public policy that historically assisted reducing the deforestation in the BAR region by around 70% in 2004-2012, re-established on April, 2023 – this thesis investigates the positive and negative impacts and synthesizes the state-of-the-art about AI and AI-enabled technologies applications in the BAR region.

## **Keywords**

Brazilian Amazon Rainforest, 4th Industrial Revolution, Artificial Intelligence, Machine Learning, Deep Learning, Qualitative Review, Interviews, Tropical Forests, Forestry, Deforestation, Forest Degradation, Reforestation, Decision-Making.