

MANAGEMENT OF LANDSCAPE SERVICES USING *I-TREE ECO* AT IPB DRAMAGA CAMPUS

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2026

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SUMMARY

MUTIARA DEWI. Management of Landscape Services Using i-Tree Eco at Ipb Dramaga, Bogor. Supervised by KASWANTO and NURHAYATI.

Climate change and biodiversity loss are global challenges that also affect university campuses. As a biodiversity campus and a Green Campus, IPB Dramaga Campus plays an important role in providing ecosystem services through carbon storage, carbon sequestration, and biodiversity conservation. However, ongoing infrastructure development may reduce the ecological functions of the campus landscape. Therefore, this study aimed to identify land cover changes, analyze carbon storage and carbon sequestration, evaluate tree biodiversity, and formulate landscape service management recommendations for IPB Dramaga Campus. The study began with a land cover change analysis using the Random Forest classification method on satellite imagery from 2013, 2018, and 2023. Carbon analysis was conducted using i-Tree Eco software based on vegetation inventory data collected from 98 randomly distributed sample plots. Biodiversity was assessed using the Shannon-Wiener, Simpson, Margalef, and Menhinick indices, while management recommendations were developed through SWOT analysis. The results showed that vegetation cover decreased from 146.95 ha in 2013 to 128.97 ha in 2023, representing a decline of approximately 12.2%. In contrast, built-up areas increased from 67.14 ha to 99.98 ha, an increase of approximately 48.9%, while open land decreased from 29.55 ha to 13.56 ha. Despite these changes, tree cover still occupied 128.97 ha, accounting for approximately 50.46% of the total campus area, indicating that the ecological functions of the landscape remain relatively well maintained. The vegetation of IPB Dramaga Campus was estimated to sequester 3,555 tons of carbon annually and store 29,300 tons of carbon. The species contributing most significantly to carbon-related ecosystem services were *Samanea saman*, *Tectona grandis*, *Ficus benjamina*, and *Aquilaria malaccensis*. The high carbon storage and sequestration capacities were primarily associated with the presence of large, broad-canopied, and long-lived trees. A total of 610 tree individuals representing 140 species from various families were identified. The Shannon-Wiener index (3.72), Simpson index (0.99), and Margalef index (26.73) indicated high levels of species diversity and richness. Correlation analysis revealed a weak relationship between biodiversity and carbon storage. Based on the SWOT analysis, the recommended priority strategies include protecting areas with high biodiversity and carbon storage, utilizing spatial technologies for environmental monitoring, developing a GIS-based tree database, and establishing ecological protection zones. The findings demonstrate that integrating carbon, biodiversity, and spatial technology into landscape planning can support more sustainable landscape management and strengthen the role of IPB Dramaga Campus as a biodiversity campus and Green Campus in the future.

Keywords: biodiversity, carbon stock, i-Tree Eco, landscape management services, land cover change



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LANDSCAPE SERVICES MANAGEMENT USING *I-TREE ECO* AT IPB UNIVERSITY DRAMAGA CAMPUS

MUTIARA DEWI

Thesis
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PREFACE

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Bogor, August 2026

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