ABSTRAK

DISTRIBUSI POTENSI STOK KARBON PADA EMPAT EKOSISTEM UTAMA DI TAMAN NASIONAL BALI BARAT UNTUK MENDUKUNG STRATEGI MITIGASI PERUBAHAN IKLIM BERBASIS EKOSISTEM

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Kata Kunci: *Stok karbon, Taman Nasional Bali Barat, alometrik, mitigasi iklim, ekosistem.*

Penelitian ini bertujuan untuk mengkuantifikasi dan membandingkan potensi stok karbon pada empat tipe ekosistem utama (Hutan Hujan, Hutan Musim, Hutan Mangrove, dan Hutan Pantai) di Taman Nasional Bali Barat sebagai landasan perumusan strategi mitigasi perubahan iklim. Pengukuran cadangan karbon menggunakan persamaan alometrik pada petak ukur sampel yang mencakup lima kolam karbon di alam: biomassa atas tanah, biomassa bawah tanah, kayu mati, serasah, dan karbon organik tanah. Analisis data dilakukan melalui uji One-Way ANOVA, Regresi Linear, dan Korelasi Pearson. Hasil penelitian menunjukkan adanya perbedaan yang sangat signifikan terhadap rata-rata kerapatan stok karbon antar ekosistem. Hutan Hujan memiliki kerapatan stok karbon tertinggi secara absolut, diikuti oleh Hutan Musim, Hutan Mangrove, dan Hutan Pantai. Namun, pada ekstrapolasi skala lanskap kawasan, Hutan Musim mendominasi kontribusi absolut terbesar dari total agregat karbon Taman Nasional Bali Barat akibat luas hamparannya. Analisis edafik membuktikan bahwa kepadatan fisik tanah berpengaruh negatif dan sangat signifikan terhadap persentase karbon organik murni, sementara uji korelasi menunjukkan bahwa tingginya kerapatan tegakan tidak berkorelasi dengan total biomassa atas tanah, yang mengindikasikan besarnya peran pohon klimaks berdiameter besar. Berdasarkan temuan empiris tersebut, direkomendasikan tiga strategi mitigasi: manajemen krisis kebakaran di zona Hutan Musim, proteksi absolut pohon besar di Hutan Hujan, dan restriksi aktivitas antropogenik penyebab pemadatan tanah.

ABSTRACT

DISTRIBUTION OF CARBON STOCK POTENTIAL IN FOUR MAIN ECOSYSTEMS IN WEST BALI NATIONAL PARK TO SUPPORT ECOSYSTEM-BASED CLIMATE CHANGE MITIGATION STRATEGIES

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Keywords: *Carbon stock, West Bali National Park, allometric, ecosystem-based climate mitigation, carbon sequestration*

This study aims to quantify and compare the carbon stock potential across four main ecosystems (Rainforest, Seasonal Forest, Mangrove Forest, and Coastal Forest) in West Bali National Park as a baseline for formulating climate change mitigation strategies. Carbon reserve measurements utilized allometric equations across sample plots, encompassing five natural carbon pools: above-ground biomass, below-ground biomass, deadwood, litter, and soil organic carbon. Data were analyzed using One-Way ANOVA, Linear Regression, and Pearson Correlation. The results revealed a highly significant difference in the average carbon stock density among the ecosystems. The Rainforest exhibited the highest absolute carbon stock density, followed by the Seasonal Forest, Mangrove Forest, and Coastal Forest. However, in the landscape-scale extrapolation, the Seasonal Forest dominated the largest absolute contribution of the total carbon aggregate due to its massive spatial extent. Edaphic analysis proved that soil bulk density had a highly significant negative effect on the percentage of pure soil organic carbon, while correlation tests showed that high stand density did not correlate with total above-ground biomass, indicating the critical role of giant climax trees. Based on these empirical findings, three mitigation strategies are recommended: fire crisis management in the Seasonal Forest zone, absolute protection of giant trees in the Rainforest, and restriction of anthropogenic activities causing soil compaction.