CARBON DYNAMICS IN VARIOUS TYPES OF AGROFORESTRY IN TUKUM HAMLET, WONOSALAM, JOMBANG REGENCY

A THESIS

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DINAMIKA KARBON PADA BERBAGAI JENIS AGROFORESTRI DI DUSUN TUKUM, WONOSALAM, KABUPATEN JOMBANG

CARBON DYNAMICS IN VARIOUS TYPES OF AGROFORESTRY IN TUKUM HAMLET, WONOSALAM, JOMBANG REGENCY

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ABSTRAK

Perubahan iklim global secara signifikan memengaruhi dinamika karbon pada ekosistem tanaman tahunan, termasuk sistem agroforestri. Penelitian ini bertujuan untuk menganalisis dinamika karbon pada tiga jenis sistem agroforestri: agrosilvopastura, agrosilvikultura berbasis tanaman hortikultura, agrosilvikultura berbasis tanaman berkayu, serta mengidentifikasi keragaman dan jenis vegetasi. Penelitian dilakukan pada bulan Januari hingga Maret 2025 menggunakan survei lapangan dan metode purposive sampling di Wonosalam, Jawa Timur, Indonesia. Analisis laboratorium meliputi sifat fisika dan sifat kimia tanah. Hasil penelitian menunjukkan hubungan yang sangat kuat antara biomassa dan total cadangan karbon ($R^2 = 0,984$), serta korelasi yang kuat antara kerapatan vegetasi dan cadangan karbon ($R^2 = 0,8246$). Peningkatan biomassa dan kerapatan vegetasi memberikan kontribusi signifikan terhadap peningkatan cadangan karbon melalui akumulasi biomassa hidup dan masukan bahan organik ke dalam tanah. Sistem agrosilvikultura berbasis tanaman berkayu memberikan kontribusi tertinggi terhadap dinamika karbon. Persebaran Indeks Nilai Penting (INP) yang merata mencerminkan ekosistem yang stabil dan seimbang, seperti yang diamati pada plot 3, di mana kopi excelsa (*Coffea excelsa*) memiliki INP sebesar 37,78%, durian (*Durio zibethinus*) sebesar 35,56%, dan pisang (*Musa spp*) juga sebesar 37,78%.

Kata kunci : Agroforestri, Biomasa, Cadangan Karbon

ABSTRACT

Global climate change significantly affects carbon dynamics in perennial crop ecosystems, including agroforestry systems. This study aims to analyze carbon dynamics in three types of agroforestry systems: agrosilvopastoral, agrosilvicultural based on horticultural crops, agrosilvicultural based on woody plants, and to identify the diversity and types of vegetation. The study was conducted from January to March 2025 using field surveys and purposive sampling in Wonosalam, East Java, Indonesia. Laboratory analyses included physical properties dan chemical properties. The results showed a very strong relationship between biomass and total carbon stock ($R^2 = 0,7867$) as well a strong correlation between vegetation density and carbon stock ($R^2 = 0,7981$). Increases in biomass and vegetation density significantly contributed to the anhanvement of carbon stock through the accumulation of living biomass and organic matter input into the soil. The agrosilvicultural system based on woody plants provides the highest contribution to carbon dynamics compared to other types of agroforestry, due to its vegetation composition dominated by woody and perennial plants. The even distribution of the Importance Value Index (IVI) reflects a stable and balanced ecosystem, as observed in plot 3, where excelsa coffee (*Coffea excelsa*) has an IVI of 37,78%, Durian (*Durio zibethinus*) has 35,56%, and banana (*Musa spp*) also has 37,78%.

Keywords: Agroforestry, Biomass, Carbon Dynamic

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