

ABSTRAK

ESTIMASI BIOMASSA PERMUKAAN MANGROVE MENGGUNAKAN CITRA PLANET SCOPE DESA MARGASARI LAMPUNG TIMUR

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Penelitian ini bertujuan mengestimasi biomassa permukaan (*above-ground biomass*) mangrove di Desa Margasari, Kabupaten Lampung Timur, menggunakan citra satelit PlanetScope dan menganalisis korelasinya dengan indeks vegetasi. Mangrove berperan krusial sebagai penyimpan karbon (*blue carbon*), namun pemantauan biomassa secara konvensional (*ground-based*) memiliki keterbatasan biaya dan waktu. Citra PlanetScope dengan resolusi spasial 3 meter dan band spektral (termasuk *red edge* dan NIR) digunakan untuk menghitung empat indeks vegetasi: NDVI (*Normalized Difference Vegetation Index*), GNDVI (*Green Normalized Difference Vegetation Index*), NDVIRE (*Normalized Difference Vegetation Index Red Edge*), dan NDRE (*Normalized Difference Red Edge*). Data lapangan biomassa diperoleh melalui pengukuran *non-destructive* pada 40 plot (30×30 m) dengan persamaan alometrik spesies-spesifik. Hasil penelitian menunjukkan total biomassa mangrove sebesar 16,48 ton (dari luas sampel 3,6 ha), dengan rata-rata 183,13 ton/ha, mengindikasikan kerapatan dan produktivitas ekosistem yang optimal. Konversi biomassa ke karbon mengungkap simpanan karbon sebesar 8,24 ton. Analisis regresi mengonfirmasi hubungan non-linear antara biomassa dan indeks vegetasi, di mana NDRE menjadi prediktor terbaik dengan model kubik ($R^2 = 0,726$). Hasil ini menegaskan (NDRE) dalam pemantauan biomassa mangrove skala luas, serta mendukung strategi konservasi dan rehabilitasi berbasis data untuk pengelolaan berkelanjutan ekosistem pesisir.

Kata kunci: Biomassa Mangrove, Planetscope, Indeks Vegetasi, NDRE, Karbon Biru, Desa Margasari.

ESTIMATION OF MANGROVE ABOVE-GROUND BIOMASS USING PLANET SCOPE IMAGERY IN MARGASARI VILLAGE, EAST LAMPUNG

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This study aims to estimate mangrove above-ground biomass (AGB) in Margasari Village, East Lampung Regency, using PlanetScope satellite imagery and analyze its correlation with vegetation indices. Mangroves serve as critical blue carbon sinks, but conventional ground-based biomass monitoring faces cost and time limitations. PlanetScope imagery (3 m spatial resolution; spectral bands including red edge and NIR) was used to calculate four vegetation indices: NDVI (Normalized Difference Vegetation Index), GNDVI (Green Normalized Difference Vegetation Index), NDVIRE (Normalized Difference Vegetation Index Red Edge), and NDRE (Normalized Difference Red Edge). Field biomass data were collected non-destructively from 40 plots (30×30 m) using species-specific allometric equations. Results revealed a total mangrove biomass of 6.48 ton (sampled area: 3.6 ha), averaging 183.13 tons/ha, indicating optimal ecosystem density and productivity. Biomass-to-carbon conversion yielded a carbon stock of 8.24 tons. Regression analysis confirmed a non-linear relationship between biomass and vegetation indices, with NDRE as the strongest predictor (cubic model: $R^2 = 0.726$). These findings validate NDRE's advantage for large-scale mangrove biomass monitoring and support data-driven conservation/rehabilitation strategies for sustainable coastal management.

Keywords: Mangrove biomass, PlanetScope, vegetation indices, NDRE, blue carbon, Margasari Village.