

**PENGARUH TUTUPAN LAMUN TERHADAP STOK KARBON
ORGANIK DALAM SEDIMEN EKOSISTEM LAMUN DI PULAU
TUNDA, KABUPATEN SERANG, PROVINSI BANTEN**

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Diajukan untuk Memenuhi Sebagian
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dalam Prodi Ilmu Kelautan



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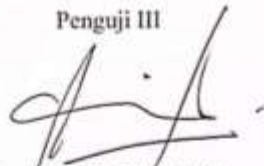
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ABSTRAK

Padang lamun merupakan salah satu ekosistem pesisir yang berperan penting dalam menyerap dan menyimpan karbon biru (*blue carbon*), terutama dalam bentuk karbon organik yang terakumulasi di sedimen. Penelitian ini bertujuan untuk menganalisis perubahan tutupan lamun di Pulau Tunda periode 2015–2025 menggunakan citra Sentinel-2 berbasis *Google Earth Engine* (GEE), mengukur kandungan karbon organik sedimen menggunakan metode *Loss on Ignition* (LOI), serta menganalisis hubungan antara tutupan lamun dan karbon organik sedimen. Penelitian ini menggunakan pendekatan deskriptif-kuantitatif dengan data citra satelit multitemporal dan data lapangan. Klasifikasi tutupan lamun dilakukan menggunakan algoritma *Random Forest* dengan tiga kelas habitat, yaitu lamun, pasir campuran, dan perairan dalam. Hasil uji nilai *overall accuracy* berkisar antara 66,7%–100% dengan koefisien kappa sebesar 0,52–1,00, yang termasuk kategori baik hingga sangat baik. Hasil penelitian menunjukkan bahwa tutupan lamun di Pulau Tunda mengalami penurunan sebesar 53,83 ha selama periode 2015–2025 dengan pola fluktuatif. Kandungan karbon organik sedimen berkisar antara 30,53–44,23 mg/ha pada kedalaman 0–5 cm dan 26,92–48,51 mg/ha pada kedalaman 5–10 cm. Analisis statistik menunjukkan adanya hubungan positif antara tutupan lamun dan karbon organik sedimen dengan nilai koefisien determinasi (R^2) 0,5058 untuk lapisan sedimen 0-5 cm dan 0,7189 untuk lapisan sedimen 5-10 cm sehingga menunjukkan bahwa peningkatan tutupan lamun cenderung diikuti oleh peningkatan kandungan karbon organik sedimen, meskipun kekuatan hubungan tergolong sedang. Hasil ini menunjukkan bahwa ekosistem lamun di Pulau Tunda memiliki peran penting dalam penyimpanan karbon pesisir, namun kondisinya dipengaruhi oleh dinamika lingkungan dan tekanan antropogenik.

Kata Kunci: Lamun, Tutupan Lamun, *Random Forest*, *Google Earth Engine*, Karbon Organik, Pulau Tunda.

ABSTRACT

Seagrass meadows are one of the coastal ecosystems that play a crucial role in absorbing and storing blue carbon, particularly in the form of organic carbon accumulated in sediments. This study aims to analyze changes in seagrass cover on Tunda Island during the 2015–2025 period using Sentinel-2 imagery based on Google Earth Engine (GEE), to measure sediment organic carbon content using the Loss on Ignition (LOI) method, and to examine the relationship between seagrass cover and sediment organic carbon. This research employed a descriptive-quantitative approach using multitemporal satellite imagery and field data. Seagrass cover classification was conducted using the Random Forest algorithm with three habitat classes: seagrass, mixed sand, and deep water. The overall accuracy ranged from 66.7% to 100%, with a kappa coefficient of 0.52–1.00, indicating good to very good classification performance. The results showed that seagrass cover on Tunda Island decreased by 53.83 ha over the 2015–2025 period, with a fluctuating pattern. Sediment organic carbon content ranged from 30.53 to 44.23 mg/ha at a depth of 0–5 cm and from 26.92 to 48.51 mg/ha at a depth of 5–10 cm. Statistical analysis indicated a positive relationship between seagrass cover and sediment organic carbon, with coefficients of determination (R^2) of 0.5058 for the 0–5 cm sediment layer and 0.7189 for the 5–10 cm layer. This suggests that an increase in seagrass cover tends to be followed by an increase in sediment organic carbon content, although the strength of the relationship is moderate. These findings indicate that seagrass ecosystems on Tunda Island play an important role in coastal carbon storage; however, their condition is influenced by environmental dynamics and anthropogenic pressures.

Keywords: *Seagrass, Seagrass Cover, Random Forest, Google Earth Engine, Organic Carbon, Tunda Island*

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