

RINGKASAN

SUNYI FARTA SEPIA. Biomassa dan Simpanan Karbon Lamun serta Hubungannya dengan Kualitas Perairan di Perairan Desa Pengudang. Dibimbing oleh ANDI ZULFIKAR dan WINNY RETNA MELANI.

Pemanasan global akibat peningkatan emisi CO₂ mendorong pentingnya peran ekosistem pesisir, khususnya lamun, sebagai penyerap dan penyimpan karbon biru. Perairan Desa Pengudang, Pulau Bintan, memiliki ekosistem lamun yang relatif masih terjaga, namun menghadapi tekanan dari aktivitas antropogenik dan pencemaran yang berpotensi menurunkan kualitas perairan serta fungsi ekologisnya. Penelitian ini bertujuan untuk mengetahui nilai biomassa dan simpanan karbon lamun serta menganalisis hubungannya dengan parameter kualitas perairan. Penelitian dilaksanakan pada Juli 2025 hingga Juni 2026 di Perairan Desa Pengudang, menggunakan *systematic random sampling* untuk penentuan titik pengamatan dan *purposive sampling* untuk penentuan area, dengan total 108 titik pengamatan. Data yang dikumpulkan meliputi kerapatan, biomassa dan simpanan karbon lamun serta parameter kualitas perairan yaitu pH, suhu, salinitas, DO, kekeruhan, TDS, konduktivitas, nitrat, fosfat, dan amonia. Analisis biomassa dilakukan dengan metode berat kering, sedangkan simpanan karbon dianalisis menggunakan metode *Loss on Ignition* (LOI). Hubungan antar variabel dianalisis menggunakan uji korelasi *Spearman* dengan bantuan perangkat lunak Jamovi. Hasil penelitian menunjukkan bahwa biomassa lamun berkisar antara 78,42–427,05 gr/m² dan simpanan karbon berkisar antara 38,67–209,94 g C/m², dengan nilai tertinggi pada Area 2 dan terendah pada Area 4. Secara umum, kualitas perairan masih berada dalam kisaran yang mendukung pertumbuhan lamun, meskipun nitrat pada Area 1 dan fosfat di seluruh area tidak memenuhi baku mutu. Hasil analisis korelasi menunjukkan bahwa hubungan antara biomassa dan simpanan karbon lamun dengan parameter kualitas perairan umumnya tergolong lemah, dengan beberapa parameter seperti pH, salinitas, TDS, konduktivitas, dan amonia menunjukkan keterkaitan secara umum pada seluruh area. Namun, pola hubungan tersebut berbeda pada setiap area pengamatan. Hanya beberapa parameter yang menunjukkan hubungan pada area tertentu, sementara pada area lainnya tidak ditemukan hubungan yang signifikan. Hubungan antara biomassa dan simpanan karbon lamun dengan kualitas perairan secara umum bersifat lemah dan cenderung bervariasi antar lokasi, sehingga menunjukkan bahwa kualitas perairan bukan satu-satunya faktor yang menentukan, melainkan dipengaruhi pula oleh jenis substrat, kedalaman, intensitas cahaya, dan pergerakan arus.

Kata kunci: Biomassa, Karbon Biru, Kualitas Perairan, Lamun, Simpanan Karbon

SUMMARY

SUNYI FARTA SEPIA. Seagrass Biomass and Carbon Stock and Their Relationship with Water Quality in Pengudang Village. Supervised by ANDI ZULFIKAR and WINNY RETNA MELANI.

Global warming caused by increasing CO₂ emissions has emphasized the important role of coastal ecosystems, particularly seagrass beds, as blue carbon sinks and reservoirs. The coastal waters of Pengudang Village, Bintan Island, support a relatively well-preserved seagrass ecosystem, although it is increasingly exposed to anthropogenic activities and pollution that may reduce water quality and ecological functions. This study aimed to determine the biomass and carbon stock of seagrass and to analyze their relationship with water quality parameters. The research was conducted from July 2025 to June 2026 in the coastal waters of Pengudang Village. Observation stations were determined using a systematic random sampling method, while the study areas were selected through purposive sampling, resulting in a total of 108 observation points. Data collected included seagrass density, biomass, carbon stock, and water quality parameters, namely pH, temperature, salinity, dissolved oxygen (DO), turbidity, total dissolved solids (TDS), conductivity, nitrate, phosphate, and ammonia. Biomass was measured using the dry weight method, while carbon stock was estimated using the Loss on Ignition (LOI) method. The relationships among variables were analyzed using Spearman correlation analysis with the assistance of Jamovi software. The results showed that seagrass biomass ranged from 78,42–427,05 g/m², while carbon stock ranged from 38,67–209,94 g C/m², with the highest values recorded in Area 2 and the lowest in Area 4. In general, water quality conditions remained within ranges that support seagrass growth, although nitrate concentrations in Area 1 and phosphate concentrations in all areas exceeded the established water quality standards. Correlation analysis indicated that the relationships between seagrass biomass and carbon stock with water quality parameters were generally weak. Several parameters, including pH, salinity, TDS, conductivity, and ammonia, showed overall associations across all study areas. However, the patterns of these relationships varied among sampling areas. Only a few parameters showed significant relationships in specific areas, whereas no significant relationships were observed in others. Overall, the weak and spatially variable relationships suggest that water quality is not the sole factor influencing seagrass biomass and carbon stock, as they are also affected by substrate type, water depth, light availability, and current dynamics.

Keywords: Biomass, Blue Carbon, Carbon Stock, Seagrass, Water Quality