KAJIAN ANALISIS PERFORMA PLANETSCOPE ANTARGENERASI UNTUK PEMETAAN PERSENTASE TUTUPAN PADANG LAMUN DAN STOK KARBON ATAS PERMUKAAN DI SEBAGIAN KAWASAN KONSERVASI PERAIRAN BONTANG, KALIMANTAN TIMUR

INTISARI

Padang lamun merupakan bagian dari ekosistem di pesisir yang memiliki peranan penting dalam penyedia jasa ekosistem, termasuk dalam penyerapan dan penyimpanan karbon, namun pemetaan padang lamun secara detail menghadapi tantangan keterbatasan data penginderaan jauh resolusi tinggi untuk mendapatkan model yang presisi dengan tingkat performa akurasi terbaik. Penelitian ini bertujuan untuk mengetahui performa terbaik dari citra PlanetScope antargenerasi (Dove Classic, Dove R, dan SuperDove) menggunakan skenario koreksi citra dan algoritma pemodelan berbeda untuk pemetaan klasifikasi habitat bentik, persentase tutpan lamun (*percent cover*/PC), dan estimasi stok karbon atas permukaan lamun (AGC*seagrass*). Pemetaan klasifikasi habitat bentik menggunakan metode klasifikasi *random forest* (RFC) menghasilkan total lima kelas habitat bentik, (*Bs + Sg, Bs Dom, Mix Sg-Bs, Sg + Bs, dan Sg Dom*), performa generasi sensor dengan skenario koreksi terbaik tiap generasi sensor, yaitu Dove Classic 4 *band surface reflectance*, Dove R 4 *band* koreksi *sunglint*, SuperDove 4 *band* koreksi *sunglint*, dan Superdove 8 *band* koreksi *sunglint*. Sedangkan, pemetaan PC lamun dan AGC*seagrass* menggunakan metode *random forest regression* (RFR) dan *support vector* regression (SVR). Evaluasi performa model menggunakan metrik akurasi klasifikasi dan statistik regresi untuk membandingkan kinerja antargenerasi sensor dan skenario koreksi citra. Hasil penelitian menunjukkan terdapat peningkatan performa model secara konsisten seiring dengan peningkatan generasi sensor, khususnya pada SuperDove 8 *band surface reflectance* yang memberikan performa terbaik untuk pemetaan habitat bentik (5 kelas; OA 96,44%; KA 95,16%), pemetaan PC lamun metode RFR (R^2 0,66; RMSE 21,09), dan pemetaan AGC*seagrass* metode RFR (R^2 0,66; RMSE 9,24). Pemilihan generasi sensor dan skenario koreksi citra yang digunakan memengaruhi performa pemodelan.

Kata Kunci: PlanetScope antargenerasi; skenario koreksi; pemetaan habitat bentik; *percent cover*; AGC*seagrass*; regresi *random forest* (RFR); regresi *support vector* (SVR).

PERFORMANCE ANALYSIS OF MULTIGENERATIONAL PLANETSCOPE IMAGERY FOR MAPPING SEAGRASS PERCENT COVER AND ABOVE-GROUND CARBON STOCK IN PART OF THE BONTANG MARINE PROTECTED AREA, EAST KALIMANTAN

ABSTRACT

Seagrass meadows are an integral part of coastal ecosystems and play an important role in providing ecosystem services, including carbon uptake and storage. However, detailed mapping of seagrass meadows still faces challenges due to limitations in high-resolution remote sensing data required to develop precise models with optimal accuracy performance. This study aims to evaluate the best performance of multi-generation PlanetScope imagery (Dove Classic, Dove-R, and SuperDove) using different image correction scenarios and modeling algorithms for benthic habitat classification, seagrass percent cover (PC), and above-ground carbon stock estimation (AGCseagrass). Benthic habitat classification was conducted using the Random Forest Classification (RFC) method, resulting in five benthic habitat classes, namely (1) Bs + Sg, (2) Bs Dom, (3) Mix Sg–Bs, (4) Sg + Bs, and (5) Sg Dom. The best performance for each sensor generation under the optimal correction scenario was achieved by Dove Classic 4-band surface reflectance, Dove-R 4-band sunglint correction, SuperDove 4-band sunglint correction, and SuperDove 8-band surface reflectance. Meanwhile, seagrass percent cover and AGCseagrass mapping were performed using Random Forest Regression (RFR) and Support Vector Regression (SVR) methods. Model performance was evaluated using classification accuracy metrics and regression statistics to compare the performance across sensor generations and image correction scenarios.The results indicate a consistent improvement in model performance with increasing sensor generation, particularly for SuperDove 8-band surface reflectance, which produced the best performance for benthic habitat mapping (5 classes; OA 96.44%; KA 95.16%), seagrass percent cover mapping using RFR (R^2 = 0.66, RMSE = 21.09), and AGCseagrass mapping using RFR (R^2 = 0.66, RMSE = 9.24). These findings demonstrate that the selection of sensor generation and image correction scenario significantly influences modeling performance.

Keywords: *Multigeneration PlanetScope; image correction scenarios; benthic habitat mapping; percent cover; AGCseagrass; Random Forest Regression (RFR); Support Vector Regression (SVR).*