

**PEMETAAN KOMPOSISI SPESIES, TUTUPAN, DAN STOK KARBON LAMUN ATAS PERMUKAAN DAN BAWAH PERMUKAAN TANAH MENGGUNAKAN CITRA PLANETSCOPE DI LABUAN BAJO, PROVINSI NUSA TENGGARA TIMUR**

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**INTISARI**

Informasi kondisi padang lamun dapat diekstrak dari data penginderaan jauh resolusi spasial tinggi. *Random forests* merupakan algoritma *machine learning* dapat digunakan untuk meningkatkan akurasi klasifikasi pemetaan menggunakan data penginderaan jauh khususnya pemetaan padang lamun di perairan dangkal kompleks. Penelitian ini bertujuan untuk memetakan komposisi spesies, tutupan, dan stok karbon lamun atas permukaan dan bawah permukaan tanah menggunakan algoritma *random forests* pada citra PlanetScope.

Koreksi *sunlint* dan kolom air diterapkan pada citra terkoreksi level *surface reflectance*. Transformasi *Principle Component Analysis* (PCA) diterapkan pada citra terkoreksi *surface reflectance*, citra terkoreksi *sunlint*, dan citra terkoreksi kolom air. Ketiga saluran citra tersebut digunakan sebagai input saluran untuk algoritma *random forests* menggunakan data lapangan sebagai referensi algoritma. Data lapangan bentik dikoleksi menggunakan teknik foto transek dan data lapangan padang lamun dikoleksi menggunakan foto kuadrat transek.

Skema klasifikasi habitat bentik dibangun berdasarkan variasi habitat bentik secara insitu, yang terdiri dari terumbu karang, padang lamun, makroalga, dan substrat. Skema klasifikasi komposisi spesies lamun dibangun mengikuti variasi spesies padang lamun di lapangan, yaitu *Enhalus acoroides* (Ea), *Enhalus acoroides-Syringodium isoetifolium* (EaSi), *Enhalus acoroides-Thalassia hemprichii* (EaTh), *Halodule uninervis* (Hu), kelas *mixed species*, *Thalassodendron ciliatum* (Tc), *Thalassodendron ciliatum-Enhalus acoroides* (TcEa), *Thalassia hemprichii* (Th), *Thalassia hemprichii-Cymodocea rotundata* (ThCr), dan *Thalassia hemprichii-Syringodium isoetifolium* (ThSi). Uji akurasi menunjukkan bahwa algoritma *random forests* mampu menghasilkan nilai *overall accuracy* (OA) 63,57%-72,09% untuk habitat bentik dan nilai OA 83,52%-85,71% untuk komposisi spesies lamun. Regresi *random forests* menghasilkan nilai  $R^2$  0,76-0,82 dengan RMSE 14,92-15,58% untuk tutupan lamun dan  $R^2$  0,43-0,56 dengan nilai RMSE 10,65-11,52 gC/m<sup>2</sup> untuk stok karbon atas permukaan dan nilai  $R^2$  0,61-0,69 dengan nilai RMSE 177,48-192,06 gC/m<sup>2</sup>. Total stok karbon padang lamun di Labuan Bajo sebesar 1.152,84-1.273,24 ton karbon yang terdiri dari 125,34-132,44 ton karbon atas permukaan dan 1.027,5-1.140,8 ton karbon lamun bawah permukaan tanah.

Kata kunci: komposisi spesies, padang lamun, PlanetScope, *random forests*, stok karbon, tutupan

**MAPPING OF SEAGRASS SPECIES COMPOSITION, PERCENT COVER,  
AND ABOVE GROUND CARBON AND BELOW GROUND CARBON  
STOCK USING PLANETSCOPE IMAGE IN LABUAN BAJU,  
EAST NUSA TENGGARA**

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**ABSTRACT**

*Information of seagrass conditions can be extracted from remote sensing data, that is, high-resolution PlanetScope imagery. Random forest is a machine learning algorithm that can be used to improve the classification accuracy of mapping using remote sensing, especially for seagrass mapping in a complex optically water shallow. This research is aimed to map the species composition, percent cover and above carbon stock and below carbon stock of seagrass using random forests algorithm on PlanetScope image.*

*Sunlight and water column corrections were applied to the surface reflectance image. Principle Component Analysis (PCA) transformation was applied on surface reflectance bands, deglint bands, and depth-invariant index bands. These bands were used as the input band for random forest classification and regression algorithm, using field data to train the algorithm. Benthic field data was collected by the photo transect and seagrass field data was collected by the photo quadrat transect technique.*

*Benthic habitat classification scheme was constructed based on the variation of benthic habitat insitu, which consisted of coral reefs, seagrass, macroalgae, and bare substratum. Seagrass species composition classification scheme was constructed following the variation of seagrass species insitu, which consisted of *Enhalus acoroides* (Ea), *Enhalus acoroides* mixed *Syringodium isoetifolium* (EaSi), *Enhalus acoroides* mixed *Thalassia hemprichii* (EaTh), *Halodule uninervis* (Hu), Mixed species class, *Thalassodendron ciliatum* (Tc), *Thalassodendron ciliatum* mixed *Enhalus acoroides* (TcEa), *Thalassia hemprichii* (Th), *Thalassia hemprichii* mixed *Cymodocea rotundata* (ThCr), and *Thalassia hemprichii* mixed *Syringodium isoetifolium* (ThSi) class. Accuracy assessment using independent field data showed that random forest algorithm produced 63.57%-72.09% overall accuracy for benthic habitat and 83.52%-85.71% overall accuracy for seagrass species composition. Random forest regression for seagrass percent cover produced  $R^2$  between 0.76-0.82 with the error of prediction between 14.92-15.58 and produced  $R^2$  between 0.43-0.56 with the error of prediction between 10.65-11.52% for AGC stock and produced  $R^2$  between 0.61-0.69 with the error of prediction between 177.48-192.06 for BGC stock. Seagrass carbon stock total is about 1,152.84-1,1273.24 ton carbon which consisted of 125.34-132.44 ton carbon of AGC stock and 1,027.5-1,140.8 ton carbon of BGC stock.*

*Keywords: random forests, PlanetScope, seagrass, species composition, percent cover, carbon stock*