

## KOMPARASI SIMPANAN KARBON HUTAN ALAM DAN HUTAN TANAMAN DI TAHURA KGPA MANGKUNAGORO I KARANGANYAR, JAWA TENGAH MENGGUNAKAN CITRA SENTINEL-2

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### INTISARI

Setiap jenis hutan memiliki kemampuan menyimpan karbon yang berbeda-beda. Dalam hal produktivitas penyimpanan karbon, ada kemungkinan hutan tanaman memiliki kemampuan menyimpan karbon lebih besar dibandingkan dengan hutan alam karena daur hutan tanaman lebih pendek. Penelitian ini bertujuan untuk menyusun model pendugaan simpanan karbon serta membandingkan potensi biomassa dan simpanan karbon hutan alam dan hutan tanaman di kawasan Taman Hutan Raya KGPA Mangkunagoro I, Karanganyar, Jawa Tengah.

Pengambilan sampel dilakukan dengan metode inventarisasi menggunakan teknik *stratified sampling* dengan jumlah sampel 50 pada setiap jenis hutan dengan petak ukur 30 x 30 m. Pendugaan biomassa dilakukan dengan *non-destruktive*, menggunakan persamaan alometrik dari Chave dkk. (2005):  $AGB = \rho \times \exp(-1,499 + 2,148 \ln(D) + 0,207(\ln(D))^2 - 0,0281(\ln(D))^3)$ . Simpanan karbon dihitung menggunakan model regresi yang diperoleh dari hubungan antara nilai transformasi indeks vegetasi dengan nilai simpanan karbon sampel menggunakan analisis regresi pada EnMAP-Box QGIS. Indeks vegetasi yang digunakan adalah NDVI, EVI, SAVI, GLI, dan GNDVI pada citra Sentinel-2 perekaman 24 Desember 2023.

Persamaan terbaik untuk mengestimasi simpanan karbon pada hutan tanaman adalah  $Y(\text{ton/ha}) = 0,79484 \text{ NDVI} \times 22,81078$ , MAE=15,4723,  $R^2=0,6536$ , sedangkan pada hutan alam  $Y(\text{ton/ha}) = 0,70186 \text{ EVI} \times 39,55307$ , MAE=20,3308,  $R^2=0,7486$ . Dalam penelitian ini, hutan alam memiliki potensi simpanan biomassa dan karbon yang lebih besar dari hutan tanaman, yaitu nilai biomassa hutan alam sebesar 260,33 ton/ha dan simpanan karbon 122,36 ton/ha sedangkan nilai biomassa hutan tanaman 215,91 ton/ha dan simpanan karbon 101,48 ton/ha.

Kata kunci : Hutan Alam, Hutan Tanaman, Simpanan Karbon, Biomassa, Indeks Vegetasi, NDVI

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COMPARISON OF NATURAL FOREST AND PLANTATION FOREST CARBON STORES IN TAHURA KGPA MANGKUNAGORO I KARANGANYAR, CENTRAL JAVA USING SENTINEL-2 IMAGE

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**ABSTRACT**

*Each type of forest has a different capacity to store carbon. In terms of carbon storage productivity, it is possible that plantation forests have a greater capacity to store carbon compared to natural forests because the plantation forest cycle is shorter. This research aims to develop a carbon storage estimation model and compare the biomass and carbon storage potential of natural forests and plantation forests in the KGPA Mangkunagoro I Grand Forest Park area, Karanganyar, Central Java.*

*Sample was carried out using the inventory method using a stratified sampling technique with a sample size of 50 for each type of forest with a plot measuring 30 x 30 m. The biomass estimation was carried out non-destructively, using the allometric equation from Chave et al. (2005):  $AGB = \rho \times \exp(-1.499 + 2.148 \ln(D) + 0.207(\ln(D))^2 - 0.0281(\ln(D))^3)$ . Carbon stores were calculated using a regression model obtained from the relationship between the transformation value of the vegetation index and the sample carbon storage value using regression analysis in EnMAP-Box QGIS. The vegetation indices used are NDVI, EVI, SAVI, GLI, and GNDVI on the Sentinel-2 image recorded on December 24, 2023.*

*The best equation to estimate carbon storage in plantation forests is  $Y(\text{tons/ha}) = 0,79484 \text{ NDVI} \times 22,81078$ , MAE=15,4723,  $R^2=0,6536$ , while in natural forests it is  $Y(\text{tons/ha}) = 0,70186 \text{ EVI} \times 39,55307$ , MAE=20,3308,  $R^2=0,7486$ . In this research, natural forests have greater biomass and carbon storage potential than plantation forests, namely the value of natural forest biomass is 260,33 tons/ha and carbon storage is 122.36 tons/ha while the biomass value of plantation forests is 215.91 tons/ha. ha and carbon storage 101.48 tons/ha.*

**Keywords:** Natural Forest, Plantation Forest, Carbon Storage, Biomass, Vegetation Index, NDVI

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