

VEGETATION INDICES COMPARISON FOR MANGROVE ABOVE-GROUND CARBON STOCK ESTIMATION USING WORLDVIEW-2 IMAGE IN PERANCAK ESTUARY, BALI, INDONESIA

Dian Utari (1), Muhammad Kamal (1), Frida Sidik (2)

¹Department of Geographic Information Science, Faculty of Geography, Universitas Gadjah
Mada, Yogyakarta, 55281, Indonesia

²Institute of Marine Research and Observation, The Ministry of Maritime Affairs and
Fisheries Jembrana, Bali, 88281, Indonesia

Email: dian.utari@mail.ugm.ac.id; m.kamal@ugm.ac.id; sidik.frida@gmail.com

Abstract: Mangrove ecosystem has a function to reduce climate change through carbon sequestration. Mangrove forests function more as carbon sinks than carbon sources because they contain organic material that's not easily decomposed. Estimating and mapping of mangrove above-ground carbon stock could be done using remote sensing data, mainly using vegetation indices as proxy. This study aims to (1) compare several vegetation indices (VI) in estimating mangrove above-ground carbon stock, and (2) map above-ground carbon stock stored in Perancak Estuary mangroves, Bali, Indonesia. This mangrove site occupies 178,6 ha and is under authority of Institute of Marine Research and Observation (IMRO). Continuous monitoring needs to be undertaken to evaluate the effectivity of mangrove restoration efforts. An eight bands high-spatial resolution WorldView-2 image data (2 m pixel size) was used as the main data for estimating mangrove above-ground carbon stock. The VIs used in this study are *Soil Adjusted Vegetation Index* (SAVI) and *Modified Red Edge-Simple Ratio* (MRE-SR). Mangrove above-ground carbon stock can be estimated from mangrove tree biomass, where 47% of biomass represent carbon stock of mangrove forest. A semi-empirical approach was used to find the relationship between VIs and the field mangrove biomass. The results of this study show that SAVI has higher accuracy in estimating mangrove biomass ($r=0.68$, $n=30$), thus result in higher accuracy of above-ground carbon stock estimation. According to the final map produced, the accuracy of the estimation is 66,73% using *standart error of estimate* (SEE) method. The total estimated above-ground carbon stock is 144,96 tons with the carbon value varies between 0,5114 – 2,0458 ton/ha.

Keywords: Above-ground carbon stock, WorldView-2, Mangrove, SAVI, MRE-SR