Pemetaan Leaf Area Index (LAI) Mangrove Menggunakan Citra WorldView-2 di Estuari Perancak, Bali

Intisari

Mangrove adalah ekosistem unik yang memiliki banyak fungsi di lingkungan. Mangrove memiliki fungsi sebagai penyedia makanan dan energi untuk ekosistem pesisir, habitat flora dan fauna, serta memberikan perlindungan dari abrasi pantai. Tingkat kesehatan mangrove dapat direpresentasikan menggunakan parameter biofisik yang disebut Leaf Area Index (LAI). LAI dapat didefinisikan sebagai luasan sisi daun per luas permukaan tanah. Penelitian ini bertujuan untuk (1) memetakan distribusi LAI mangrove di Estuari Perancak, Bali, Indonesia, menggunakan citra dengan resolusi spasial tinggi yaitu WorldView-2 (2 m) dan Indeks Vegetasi (SVI), dan (2) menilai keakuratan pemetaan LAI mangrove. Lokasi kajian mangrove yang dipilih berada di bawah wewenang Balai Riset dan Observasi Laut (BROL) di mana pemantauan berkelanjutan kesehatan mangrove dilakukan secara berkala, terutama di kawasan hutan mangrove yang dipulihkan. Penelitian ini dirancang untuk mengembangkan garis batas untuk pemantauan LAI mangrove di beberapa lokasi sampel. Objek-objek mangrove dibedakan secara visual dari objek-objek non-mangrove untuk fokus pada objek-objek mangrove. Peta LAI mangrove dibuat melalui pendekatan semi-empiris antara indeks vegetasi dan nilai-nilai LAI lapangan yang diukur menggunakan teknik fotografi hemisphere. Nilai kedua variabel dikorelasikan untuk mendapatkan fungsi regresi untuk pemodelan peta LAI mangrove. Peta LAI mangrove menunjukkan bahwa distribusi nilai LAI yang tinggi berkitan dengan jenis mangrove dewasa yang ditanam, sedangkan mangrove alami yang berumur muda merepresentasikan nilai LAI rendah dan sedang. Akurasi peta LAI mangrove yang dihasilkan cukup tinggi yaitu sebesar 91% dan plot 1: 1 menunjukkan bahwa model *underestimated.*

Kata Kunci: Leaf Area Index, mangrove, vegetation index, WorldView-2

Mangrove Leaf Area Index (LAI) Mapping Using WorldView-2 Imagery in Perancak Estuary, Bali

Abstract

Mangrove forests are unique ecosystem that have many functions in the environment. Mangroves provide food and energy for tropical coastal ecosystem, habitat for coastal flora and fauna, and protection from coastal abrasion. The health status of mangrove could be represented using a biophysical tree parameter called Leaf Area Index (LAI). LAI can be defined as one half the total of green area per unit horizontal ground surface area. This study aims to (1) map the distribution of mangrove LAI in Perancak Estuary, Bali, Indonesia, using a high-spatial resolution WorldView-2 image data (2 m pixel size) and Spectral Vegetation Indices (SVI), and (2) assess the accuracy of the LAI mapping. The selected mangrove site is under authority of Institute of Marine Research and Observation (IMRO) where continuous monitoring of mangrove health is conducted periodically, especially in the restored mangrove areas. Part of this study was designed to develop a baseline for mangrove LAI monitoring at some permanent sample sites. Mangrove objects were first visually discriminated from non-mangrove objects and the non-mangrove objects were masked out to focus on the mangrove objects. The LAI map was created based on the semi-empirical relationships between NDVI and field LAI values measured from hemispherical photograph. The corresponding values of both parameters were correlated to find the regression function for modelling the LAI map. The LAI map shows the distribution of high LAI values corresponds to the mature planted mangroves, and the natural mangrove and young planted mangroves representing moderate and low LAI values, respectively. The accuracy of mangrove LAI map was high at 91 % and 1:1 plot shows the model was underestimated.

Key Words: Leaf Area Index, mangrove, vegetation index, WorldView-2