

Pemodelan Kesesuaian Lahan untuk Tanaman Singkong (Manihot Esculenta) di Kabupaten Purbalingga dengan Pendekatan Random Forest (Studi Kasus Kecamatan Kejobong) = Land Suitability Modeling for Cassava (Manihot esculenta) Cultivation in Purbalingga Regency Using the Random Forest Approach (Study Case Kejobong Sub-District)

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Abstrak

Penelitian ini bertujuan untuk memodelkan kesesuaian lahan dan menganalisis produktivitas tanaman singkong (*Manihot esculenta*) di Kecamatan Kejobong, Kabupaten Purbalingga, dengan pendekatan algoritma Random Forest. Variabel biofisik yang digunakan meliputi lereng, elevasi, curah hujan, jenis tanah, penggunaan lahan, serta jarak terhadap jalan dan sungai. Data diperoleh dari survei lapangan dan sumber sekunder seperti citra Sentinel-2, DEMNAS, dan CHIRPS. Pemodelan kesesuaian lahan dilakukan dalam lingkungan spasial dan divalidasi menggunakan MAE, RMSE, dan R^2 . Hasil menunjukkan sebagian besar wilayah tergolong cukup sesuai (S2) dan sesuai marginal (S3) untuk budidaya singkong. Sementara itu, analisis produktivitas dilakukan menggunakan indeks vegetasi (NDVI, SAVI, dan IRECI) dari citra Sentinel-2 melalui Google Earth Engine. Nilai indeks dihitung secara zonal dan dikorelasikan dengan data produktivitas aktual dari BPS. Hasil regresi menunjukkan adanya hubungan positif antara nilai kesesuaian lahan dan produktivitas, meskipun kontribusinya tidak dominan. Penelitian ini menunjukkan bahwa integrasi pemodelan spasial, machine learning, dan penginderaan jauh mampu mendukung perencanaan pertanian presisi berbasis data pada skala kecamatan.

.....This study aims to model land suitability and analyze the productivity of cassava (*Manihot esculenta*) in Kejobong Sub-district, Purbalingga Regency, using the Random Forest algorithm. The biophysical variables used include slope, elevation, rainfall, soil type, land use, and proximity to road and river networks. Data were collected through field surveys and secondary sources such as Sentinel-2 imagery, DEMNAS, and CHIRPS rainfall data. Land suitability modeling was conducted in a spatial environment using the Random Forest algorithm and validated using MAE, RMSE, and R^2 . The results indicate that most of the area is classified as moderately suitable (S2) and marginally suitable (S3) for cassava cultivation. Meanwhile, productivity analysis was carried out using vegetation indices (NDVI, SAVI, and IRECI) derived from Sentinel-2 imagery and processed through Google Earth Engine. These indices were calculated zonally and correlated with actual productivity data obtained from BPS. The regression analysis shows a positive relationship between land suitability levels and productivity, although the correlation is not entirely linear. This study contributes to the integration of spatial modeling, machine learning, and remote sensing to support data-driven agricultural planning at the sub-district level.