

## ABSTRAK

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Judul Laporan Skripsi : Spatio-Temporal Analysis Dengan Menggunakan Ekstraksi Fitur Ndvi Untuk Deteksi Tingkat Kerusakan Mangrove Menggunakan Algoritma Random Forest Dan Maximum Likelihood  
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Penelitian ini bertujuan untuk mengembangkan analisis spasio-temporal menggunakan ekstraksi fitur NDVI guna mendeteksi tingkat kerusakan mangrove di kawasan Pantai Indah Kapuk, Jakarta Utara. Data citra satelit Landsat 8 dengan rentang waktu 1 April hingga 1 November 2022 diekstraksi melalui Google Earth Engine. Proses pra-pemrosesan melibatkan clipping, stacking, dan perhitungan NDVI. Pengolahan data menggunakan algoritma Random Forest dan Maximum Likelihood untuk mengklasifikasikan tingkat kerusakan mangrove. Tujuan penelitian meliputi evaluasi hasil klasifikasi Random Forest dan Maximum Likelihood, deteksi tingkat kerusakan, dan pemanfaatan hasil deteksi untuk pengelolaan dan pemulihan ekosistem mangrove. Dataset dianalisis di kawasan Pantai Indah Kapuk dengan koordinat tertentu. Pra-pemrosesan mencakup cropping dan stacking citra. Ekstraksi fitur NDVI dilakukan untuk membedakan tingkat kerusakan, yang dikategorikan sebagai tanah non-vegetasi, vegetasi sehat, vegetasi moderat, vegetasi tertekan/kerusakan, dan air. Pemodelan dilakukan dengan Random Forest dan Maximum Likelihood, diikuti oleh evaluasi kinerja menggunakan metrik seperti akurasi, presisi, dan recall. Hasil pengujian menunjukkan bahwa keduanya, Random Forest dan Maximum Likelihood, memiliki kinerja yang sangat baik dengan tingkat akurasi, presisi, dan recall sekitar 97% hingga 98%. Meskipun perbedaan antara keduanya relatif kecil, Maximum Likelihood menunjukkan sedikit keunggulan dalam tingkat akurasi, presisi, dan recall. Pemilihan antara keduanya dapat bergantung pada faktor-faktor tambahan seperti kecepatan pelatihan dan interpretabilitas model. Dengan demikian, penelitian ini memberikan kontribusi dalam pengembangan metode analisis spasio-temporal untuk deteksi kerusakan mangrove dengan mengintegrasikan ekstraksi fitur NDVI dan algoritma klasifikasi seperti Random Forest dan Maximum Likelihood. Hasil deteksi dapat digunakan sebagai dasar untuk pengelolaan dan pemulihan ekosistem mangrove di kawasan tersebut.

**Kata Kunci : degradation, mangrove, ndvi, random forest, spatio-temporal analysis**

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The study aimed to develop a spatial-temporal analysis using NDVI feature extraction to detect the level of mangrove damage in the Pantai Indah Kapuk area, North Jakarta. Landsat 8 satellite imagery with a time span of April 1 to November 1, 2022 was extracted through Google Earth Engine. The pre-processing process involved clipping, stacking, and calculation of NDVI. Data processing used the Random Forest and Maximum Likelihood algorithms to classify the level of mangrove damage. The study objectives included evaluating the classification results of Random Forest and Maximum Likelihood, detecting the level of damage, and utilizing the detection results for the management and restoration of mangrove ecosystems in the area. The dataset was analyzed in the Pantai Indah Kapuk area with specific coordinates. Pre-processing included cropping and stacking of images. NDVI feature extraction was performed to distinguish the level of damage, which were categorized as non-vegetated land, healthy vegetation, moderate vegetation, stressed/damaged vegetation, and water. Modeling was done with Random Forest and Maximum Likelihood, followed by performance evaluation using metrics such as accuracy, precision, and recall. The test results showed that both, Random Forest and Maximum Likelihood, have very good performance with an accuracy, precision, and recall rate of around 97% to 98%. Although the difference between the two is relatively small, Maximum Likelihood shows a slight advantage in terms of accuracy, precision, and recall. The choice between the two can depend on additional factors such as training speed and model interpretability. In conclusion, the study contributes to the development of a spatial-temporal analysis method for mangrove damage detection by integrating NDVI feature extraction and classification algorithms such as Random Forest and Maximum Likelihood. The detection results can be used as a basis for the management and restoration of mangrove ecosystems in the area. The study's findings are significant because they demonstrate that NDVI feature extraction and machine learning algorithms can be used to effectively detect the level of mangrove damage. This information can be used to identify areas of concern and prioritize restoration efforts.

**Keywords : degradation, mangrove, ndvi, random forest, spatio-temporal analysis**