

Anggelia Dewanti. 220311100119. Identifikasi Genangan dan Kelembaban Tanah Sawah Menggunakan Citra Sentinel-1 SAR di Desa Telang, Bangkalan Periode Desember 2025- Maret 2026. Dibimbing Oleh : Fahmi Arief Rahman, S.P., M.Si. dan Ir. Slamet Supriyadi, M.Si.

ABSTRAK

Indonesia merupakan negara agraris dengan padi sebagai salah satu sumber pangan utama, termasuk bagi masyarakat Desa Telang, Bangkalan. Desa Telang berada pada kawasan pesisir yang rentan terhadap banjir akibat curah hujan tinggi yang menyebabkan genangan dan peningkatan kelembaban tanah pada lahan sawah. Pemantauan genangan secara konvensional memiliki keterbatasan cakupan dan waktu, sehingga diperlukan pendekatan penginderaan jauh berbasis citra Sentinel-1 SAR yang mampu merekam dalam berbagai kondisi cuaca. Penelitian ini bertujuan menghasilkan peta sebaran genangan dan kelembaban tanah sawah di Desa Telang pada periode Desember 2025 hingga Maret 2026. Identifikasi genangan dilakukan menggunakan polarisasi VH dengan metode *Thresholding Otsu*, sedangkan kelembaban tanah dianalisis melalui pendekatan *Soil Moisture Index* (SMI). Validasi hasil dilakukan menggunakan *Confusion Matrix*, citra drone, data curah hujan CHIRPS, serta pengukuran kelembaban tanah lapang pada 13 titik sampel. Hasil penelitian menunjukkan bahwa luas genangan bersifat dinamis dengan nilai akurasi klasifikasi (*Overall Accuracy*) berkisar 78–99% dan koefisien kappa 0,56–0,98, yang mengindikasikan tingkat ketelitian yang baik hingga sangat kuat. Distribusi nilai SMI menunjukkan pola yang sejalan dengan dinamika genangan, dengan koefisien korelasi terhadap kelembaban tanah lapang berkisar antara 0,613–1,000. Hasil validasi menggunakan citra drone dan data curah hujan menunjukkan kesesuaian yang baik antara hasil pemetaan dan kondisi aktual di lapangan. Penelitian ini membuktikan bahwa citra Sentinel-1 SAR efektif digunakan untuk pemantauan genangan dan kelembaban tanah sawah secara multitemporal dan dapat menjadi dasar pertimbangan dalam pengelolaan lahan

Kata Kunci : Genangan, Sentinel-1, *Thresholding Otsu*, *Soil Moisture Index* (SMI), Kelembaban Tanah.

Anggelia Dewanti. 220311100119. Identification of Flood Inundation and Paddy Field Soil Moisture Using Sentinel-1 SAR Imagery in Telang Village, Bangkalan periods December 2025-March 2026. Under the guidance of Fahmi Arief Rahman, S.P., M.Si. and Ir. Slamet Supriyadi, M.Si.

ABSTRACT

Indonesia is an agrarian country where rice serves as one of the primary staple foods, including for the community of Telang Village, Bangkalan. Located in a coastal area, Telang Village is vulnerable to flooding due to high rainfall, resulting in surface inundation and increased soil moisture in paddy fields. Conventional flood monitoring is limited in terms of spatial coverage and temporal efficiency; therefore, a remote sensing approach using Sentinel-1 Synthetic Aperture Radar (SAR) imagery was employed, as it can acquire data under various weather conditions. This study aimed to produce multitemporal maps of flood inundation and soil moisture in the paddy fields of Telang Village from December 2025 to March 2026. Flood inundation was identified using VH polarization and the Otsu Thresholding method, while soil moisture was analyzed using the Soil Moisture Index (SMI). The results were validated using a Confusion Matrix, drone imagery, CHIRPS rainfall data, and field soil moisture measurements collected from 13 sampling points. The results showed that flood inundation areas varied dynamically, with an Overall Accuracy ranging from 78% to 99% and a Kappa coefficient ranging from 0.56 to 0.98, indicating good to almost perfect classification performance. The SMI distribution exhibited a pattern consistent with flood dynamics and showed a positive correlation with field soil moisture measurements, with correlation coefficients ranging from 0.613 to 1.000. Validation using drone imagery and CHIRPS rainfall data demonstrated good agreement between the mapping results and actual field conditions. These findings indicate that Sentinel-1 SAR imagery is effective for multitemporal monitoring of flood inundation and soil moisture in paddy fields and can support agricultural land management.

Keywords: *Flood Inundation, Sentinel-1 SAR, Otsu Thresholding, Soil Moisture Index (SMI), Soil Moisture.*