

JEREMIA KELVIN SIHOTANG - Polarimetric SAR Data Analysis for Land Cover Classification: Differentiating Residential Areas and Vegetation Near Mount Semeru, East Java.

Abstract: This research focuses on the polarimetric analysis of Synthetic Aperture Radar (SAR) data for land cover classification, specifically distinguishing between residential areas and adjacent vegetation in the southern region of East Java, near Mount Semeru. The objective is to explore how SAR data can be used to differentiate between these land cover types for environmental monitoring and land-use studies. The research applies various preprocessing and processing techniques, including Split, Update Orbit, Coregister (Backgeocoding), Multilooking, Speckle Filtering, and Range Doppler Terrain Correction, followed by image classification using ArcMap 10.8.

Using this data:



Introduction:

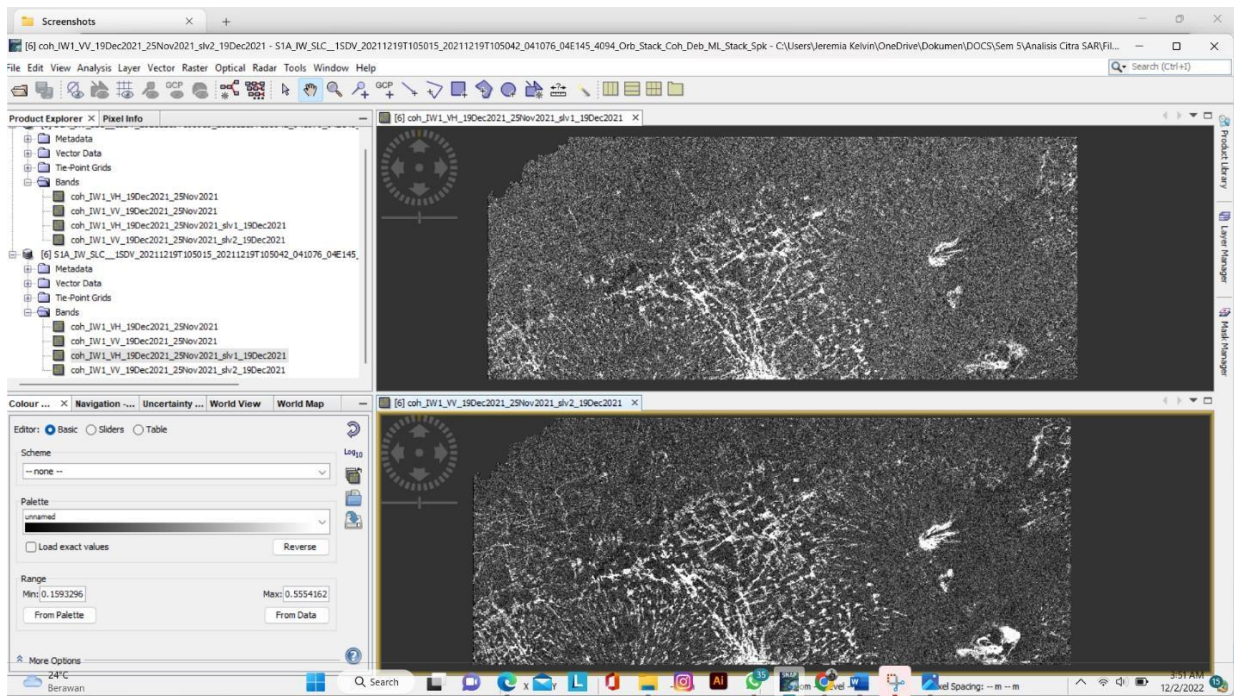
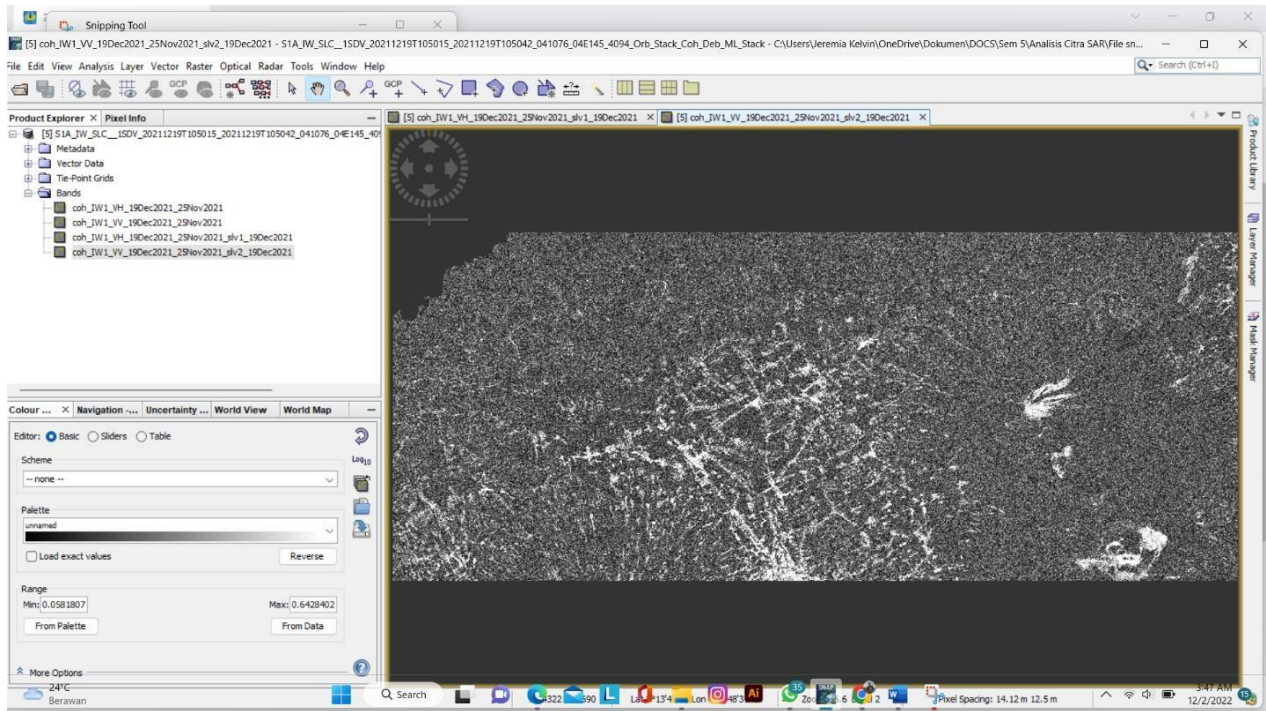
The use of SAR data for land cover classification is an effective method for monitoring and analyzing environmental changes, especially in areas with mixed terrain. This study focuses on the classification of vegetation and residential areas in the southern region of East Java, particularly near Mount Semeru, where urban development and vegetation coexist in close proximity.

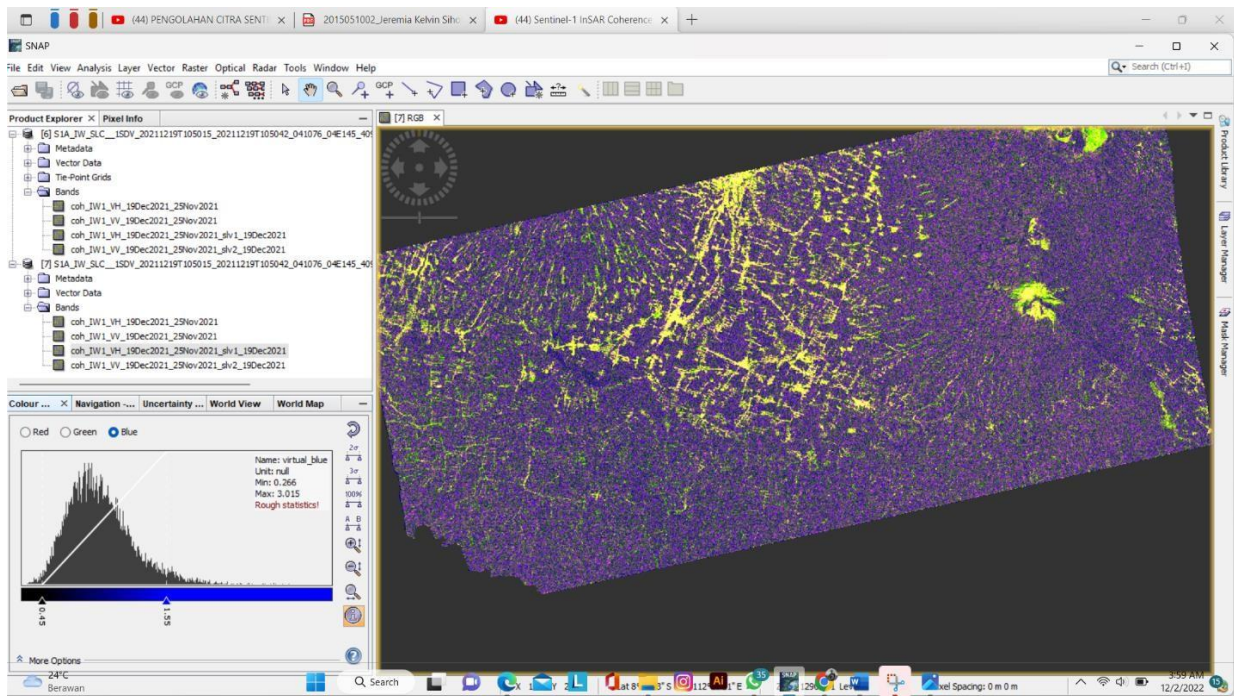
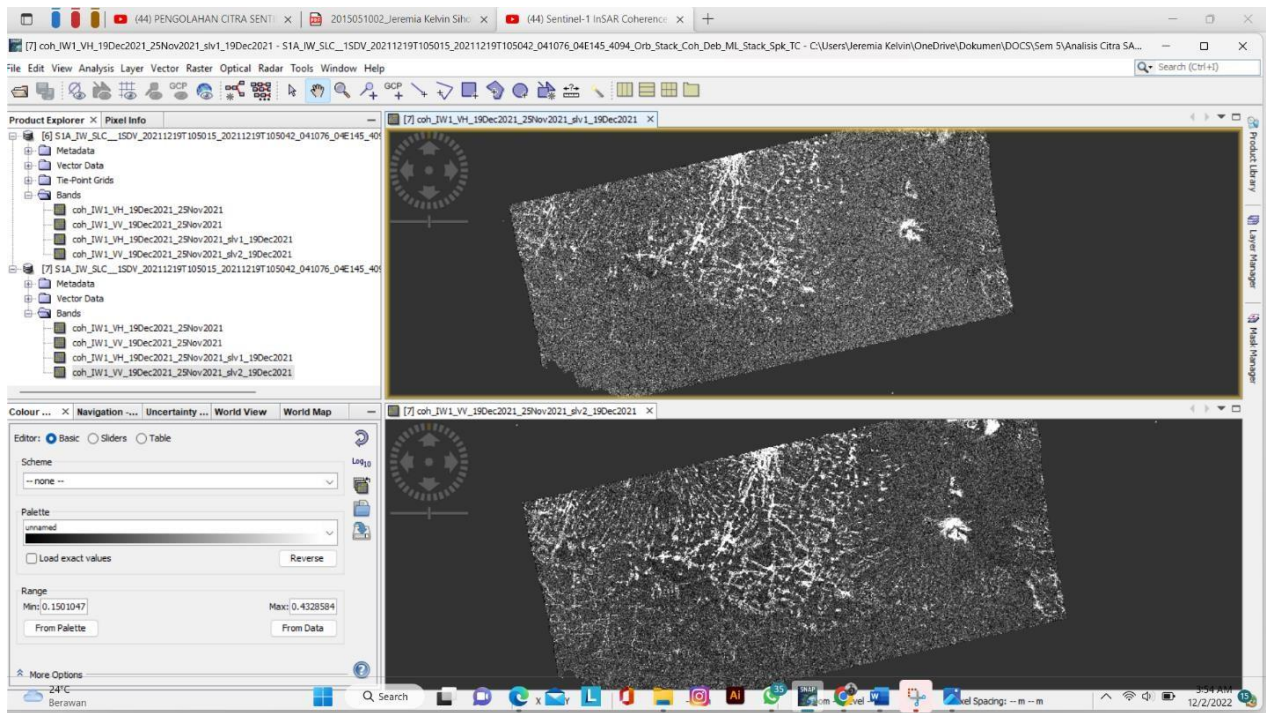
Methodology:

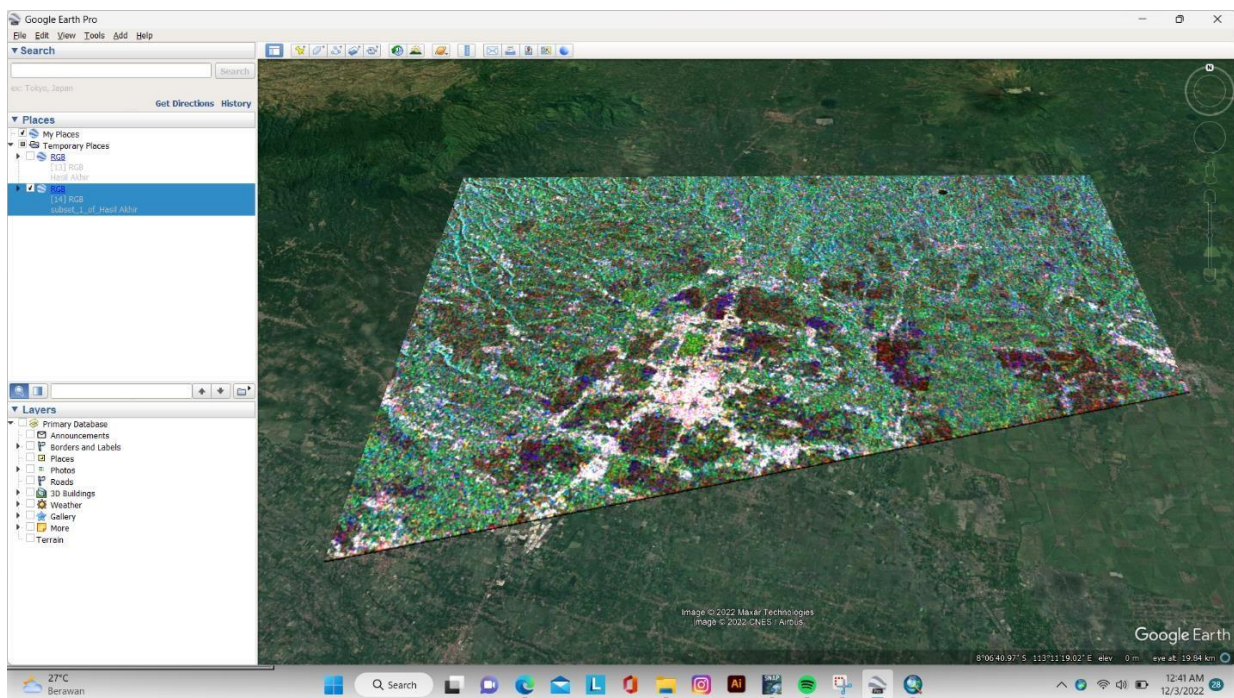
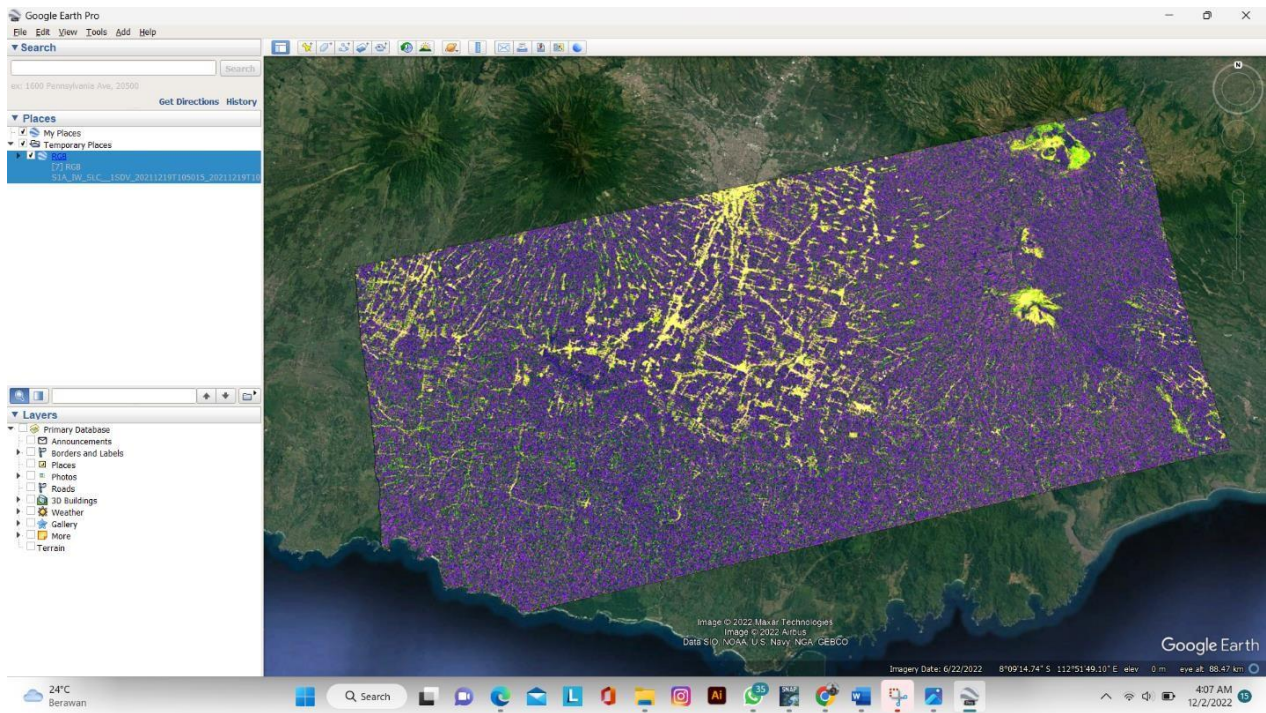
The study utilized Single-Look Complex (SLC) SAR data. The region of interest includes areas with dense vegetation and residential settlements located in close proximity. The preprocessing steps were conducted using SNAP software, including the following operations: Split: Dividing the SAR data into smaller sections for analysis. Update Orbit: Adjusting the orbit data to improve the accuracy of geolocation. Coregister (Backgeocoding): Aligning the SAR images for accurate comparison. Multilooking: Reducing the resolution of the data to improve signal-to-noise ratio. Speckle Filtering: Minimizing noise and improving image clarity. Range Doppler Terrain Correction: Correcting for terrain distortion in SAR images. The processed SAR data was then imported into ArcMap 10.8 for image classification. Using these techniques, the classification differentiated between residential areas and adjacent vegetation in the study region.

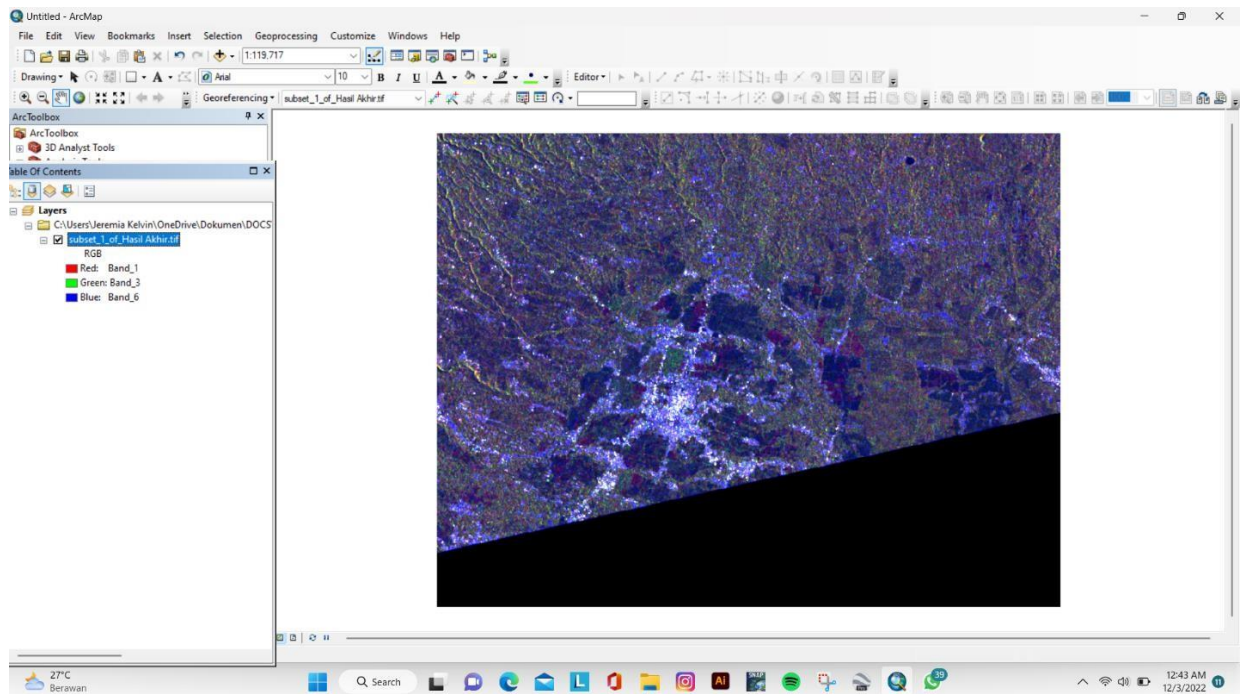
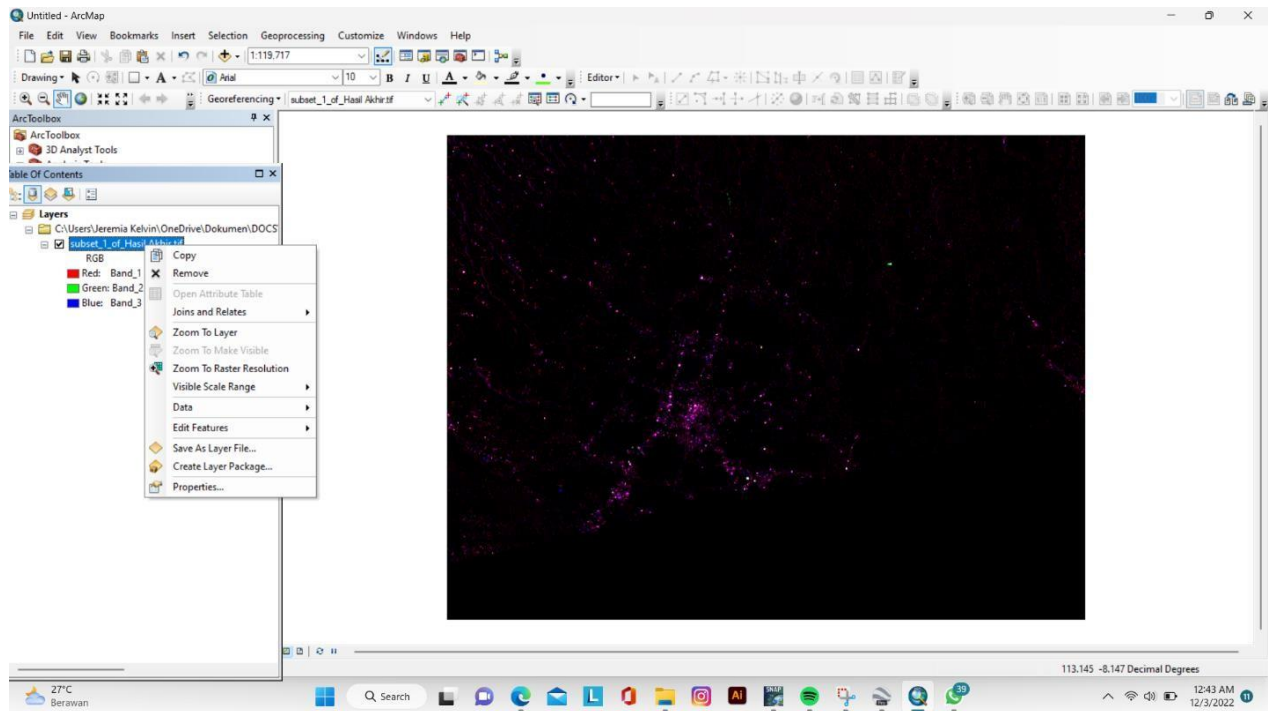
Results:

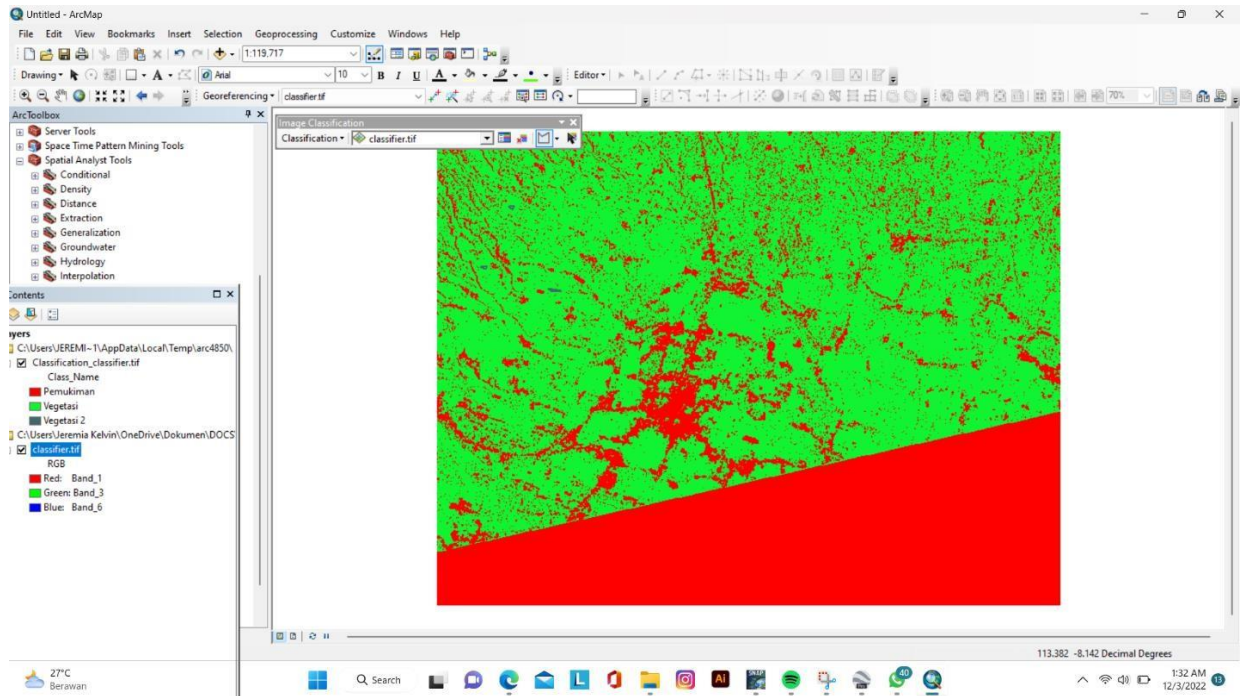
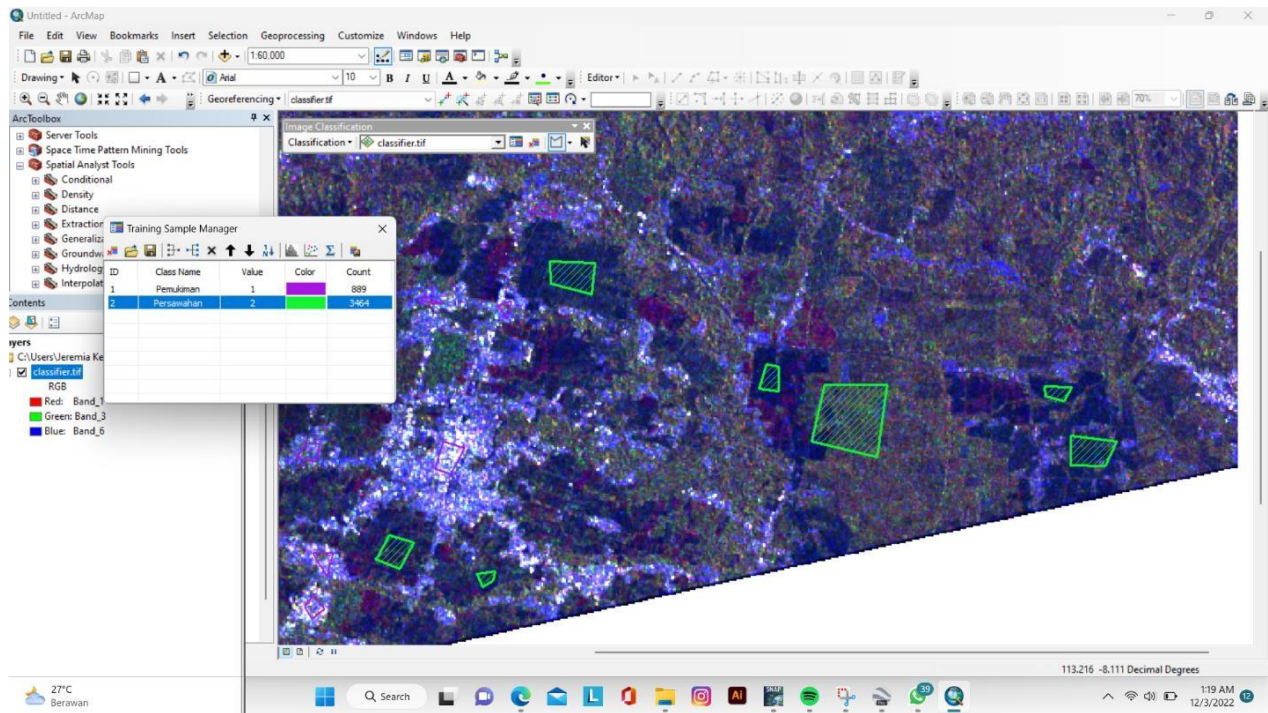
The results of the classification reveal distinct patterns in land use, with clear differentiation between urbanized areas and vegetation. This classification helps identify the extent of urban sprawl and the relationship between residential development and natural vegetation, providing valuable insights for environmental monitoring and urban planning..

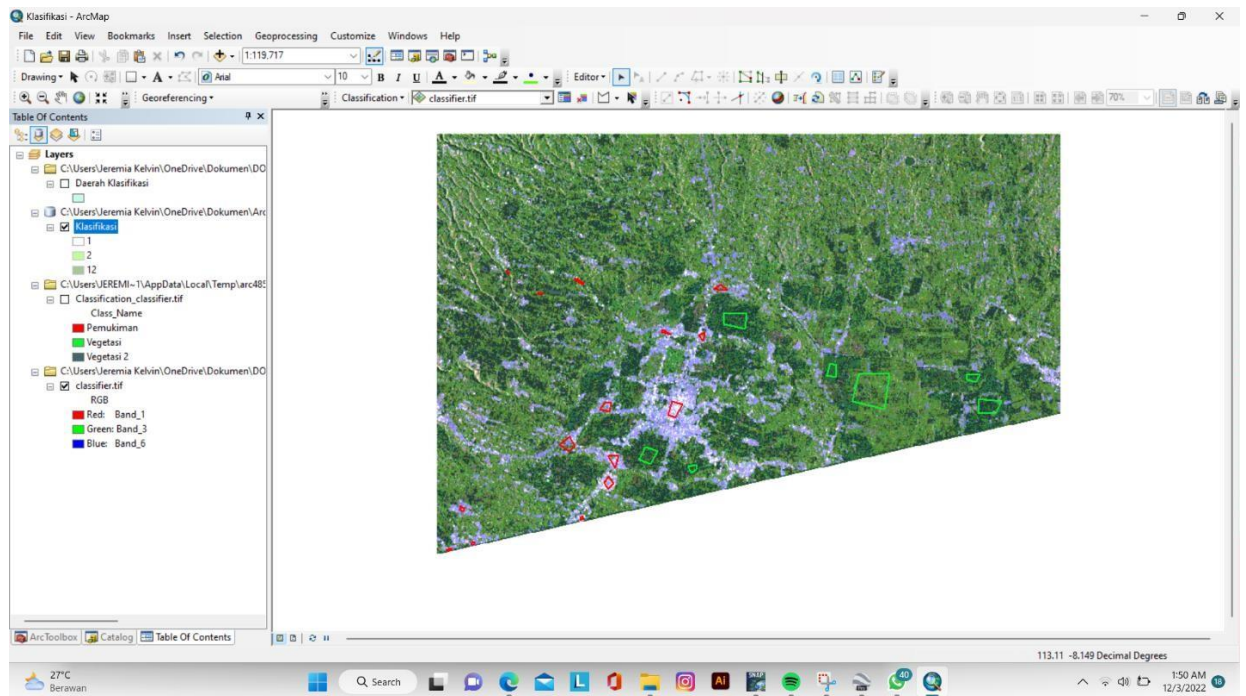
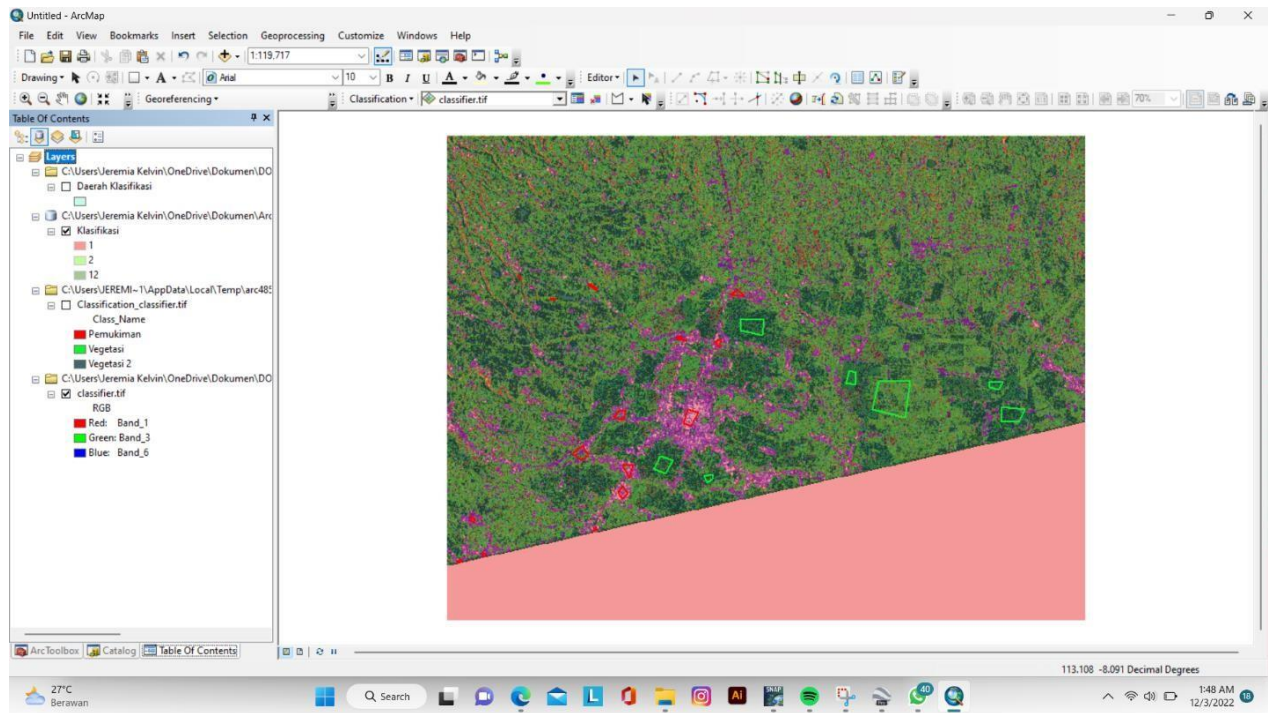


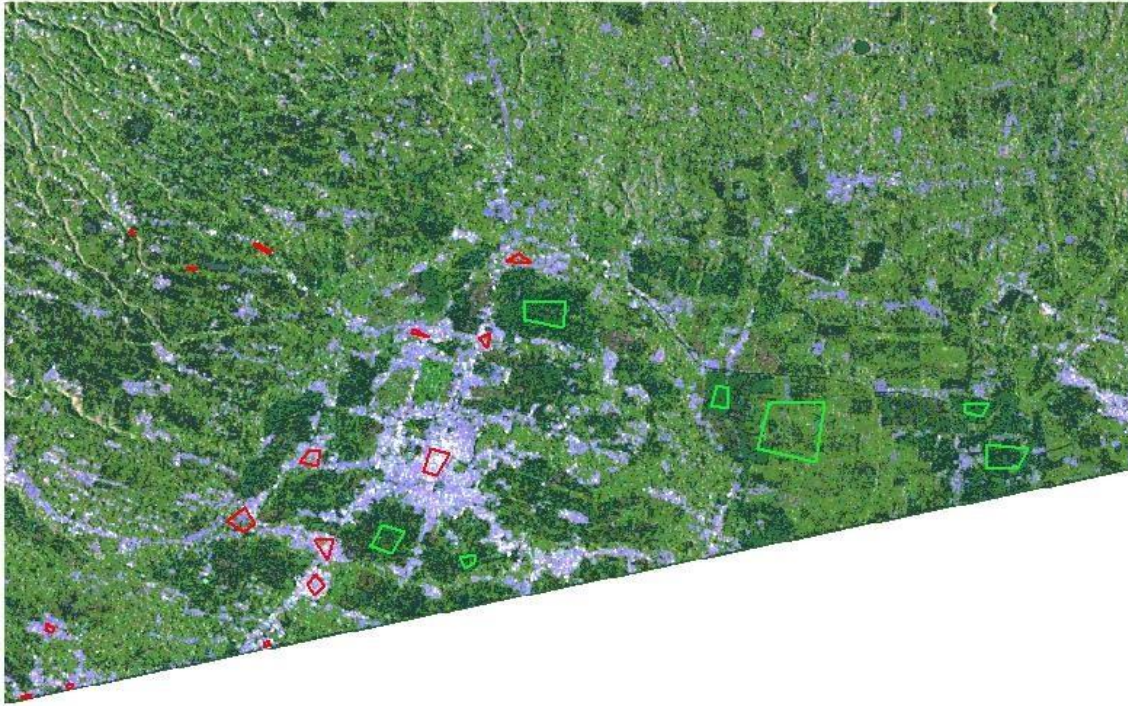










**Conclusion:**

The use of polarimetric SAR data for land cover classification in the southern region of East Java demonstrated its effectiveness in distinguishing between residential areas and vegetation. This study contributes to the growing field of remote sensing applications for land-use analysis, providing critical data for environmental management and urban development studies.