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APPLICATION OF REMOTE SENSING FOR INCLUSION IN GEOGRAPHIC INFORMATION SYSTEM

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Annotation: Geomorphology is a comprehensive landscape study that reviews a space from the aspects of morphology, chronology, arrangements and processes. Accompanied by observation and field validation, the rapid development of remote sensing technology greatly helped the geomorphological mapping process.

Keywords: GIS, method, map, technology, research.

INTRODUCTION

Geomorphological maps have a broad scope of studies as representation, analysis, and visualization of the shape of the earth's surface and the processes that occur in a space. A space in geomorphology is reviewed through four main approaches, namely morphological, morphochronological, morphoprocess, and morphological arrangements [1-5]. Geomorphological mapping is considered a technique that produces basic data that can be used in other scientific practices such as environment, disaster, regional development and land evaluation.

MATERIALS AND METHODS

Techniques in geomorphological mapping experienced rapid development due to the existence of remote sensing technology and geographic information systems (GIS). The 2-dimensional model and 3-dimensional earth surface and physiological changes can be observed using remote sensing results that are useful for geomorphological mapping [4].

RESULTS AND DISCUSSION

Remote sensing technology, geographic information systems, and field surveys are used for making geomorphological maps of Bendo watershed. Morphological information was obtained from digital elevation model (DEM) data processing, morphochronological information and soil surface material obtained from the

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geological map of the Ijen sheet, while morphological information was obtained from optical system remote sensing data. Geomorphological mapping of Bendo watershed consists of stages of data collection and data analysis.

Geomorphological mapping research was carried out on the Bendo watershed, Banyuwangi, East Java with an absolute location of 114º12'53.43" E to 114º23'11.45" E and 8º0336 "S to 8º13'19.17" S. Relatively, the location of the study was located in Licin District, Glagah District, Giri District, Kalipuro District, and Banyuwangi District, East Java Province. Bendo watershed's upstream located in the Ijen Mountains Complex, namely Mt. Ijen, Mt. Merapi, and Mt. Rante elogated watersheds up to Bali Strait in the Banyuwangi District. The elevation of the study area ranges from -3.78 to 3269.52 above sea level as wide as 40.13 km^2. The study area is presented in **Figure 1**.

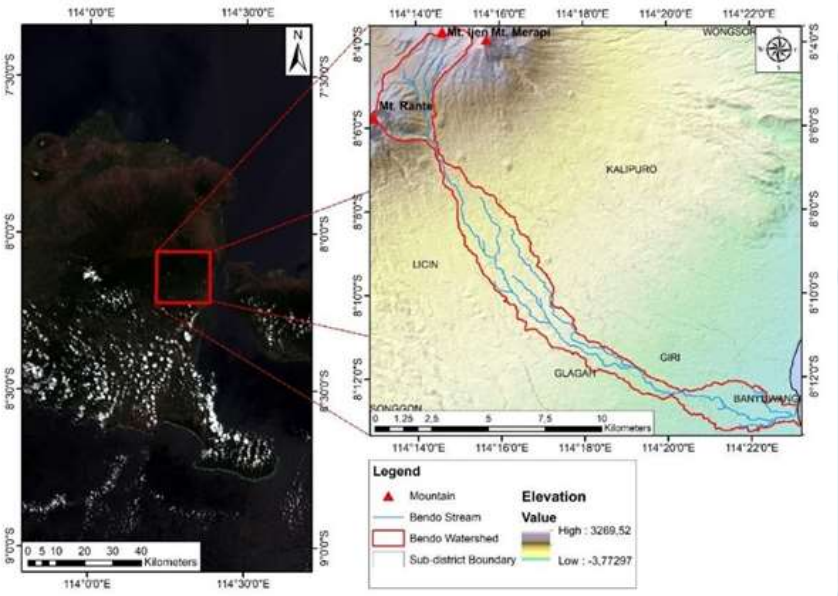

Figure 1. Study area

This research uses secondary data types namely remote sensing products such as Sentinel-2 and Digital Elevation Model (DEM) data. Surface rock information was obtained from the Ijen Geological Sheet Scale 1: 50,000 which was obtained from the Center for Volcanology and Geological Disaster Mitigation (PVMBG) in 1988. While the primary data used were process observations and several land characteristics in the field. The Sentinel-2 product used is Sentinel-2B with the acquisition date of August 13, 2018 in the Banyuwangi area which has been processed to level-1C.

TPI which has a negative value indicates that the area is lower than the surrounding area, in the Bendo watershed in the form of valleys and basins. (Figure 2) This study uses the TPI study with a 25 m analysis scale to obtain micro-morphological results from the area around the mapping. The greater the scale of analysis, the greater the generalization. Selection of the scale of the TPI conditional analysis according to the research period [2].

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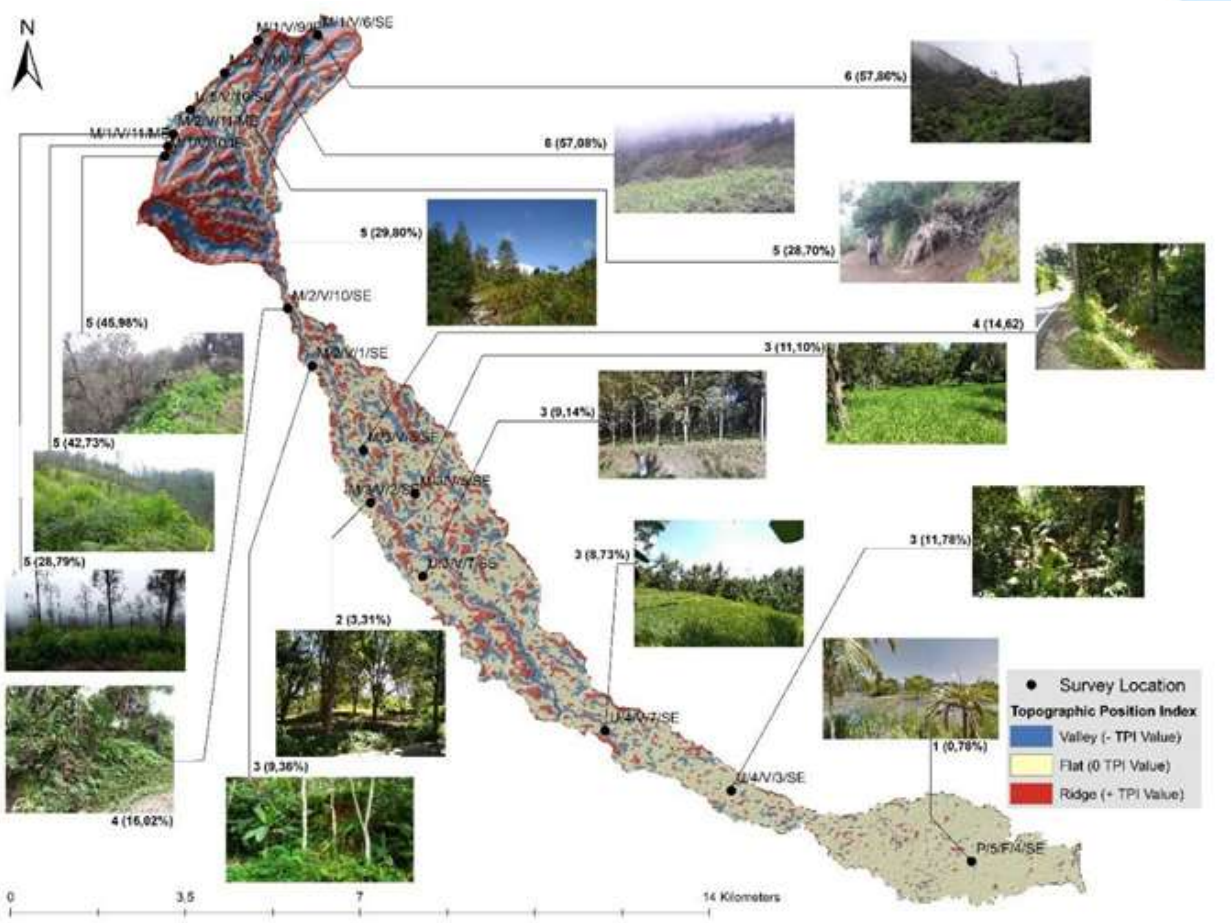

Figure 2. Topographic position index with hillshade appearance and field conditions, there is a description of the slope class and the slope percentage in each image showing slope information.

CONCLUSION

The remote sensing technology play an important role to study geomorphological fiture within study area. From all aspects offered, the detailed digital elevation scale model provides detailed information on morphology through topographic modeling. Within analysis of slope, TPI, and hillshade morphological information can be easily mapped. In addition, theres is still need survey on geomorphological information in the field to adjust the results of remote sensing processing. Field surveys are considered to be an important step in this study. There are 16 units of landforms based on morphological, morphocronological, morphoarrangement and morphoprocess analysis. In general, Bendo watershed is a water catchment area that represents the toposkuen of the Ijen Mountains Complex. The Litologydominated by volcanic and fluvial material with a dominant process of erosion and landslide. Comprehensive analysis of geomorphology can be used as basic information on the analysis of various landscape studies.

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