

The Preliminary Study for the Applied to Geological Survey using the Landsat TM Satellite Image of the Tanggung Area of Southern Part of the Bandung, Indonesia

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Abstract: The purpose of this preliminary study is the applied to geology using the Landsat TM satellite image of the Tanggung area of southern part of the Bandung, Indonesia to provide basic information for geological survey. For this, topography, geology and satellite image were constructed to spatial database. Digital elevation, slope, aspect, curvature, hill shade of topography were calculated from the topographic database and lithology was imported from the geological database. Lineament, lineament density, and NDVI were extracted the Landsat TM satellite image. The results showed the close relationship between geology and terrain and satellite image. Each sedimentary rock seldom corresponds with geology and analyses of topography but as a whole for sedimentary rocks coincide with them. Tuff and volcanic breccia in the volcanic rocks correspond with the result of terrain analyses. Talus deposits is well matched with the analyses of topography/satellite image.

Keywords: Indonesia, terrain and satellite image analysis, GIS, remote sensing, spatial database.

1. Introduction

The study area is located in Java island, Indonesia (Fig. 1). The geology of the Tanggung area comprises Cenozoic sedimentary rocks such as tuffaceous sandstone, mudstone, limestone and breccia, pyroclastic rocks, andesite and Quaternary talus deposit. Sandstone Formation has a well-developed bedding plane, and predominantly composed of unconsolidated tuffaceous sandstone, mudstone, calcareous mudstone, conglomerate with subordinately crystal tuff, pumiceous tuff. Tuff Formation is distributed in the northern, eastern areas and near Ankola village. The formation is composed of unconsolidated, well-bedded tuff or crystal tuff with intercalated pumiceous breccia and breccia, sandstone. Volcanic breccia is characterized by andesitic breccia, tuffaceous breccia, lapilli tuff intercalated with sandstone and mudstone. The Formation is distributed in the western part of Geuneung Subang, the northeastern part of Pasirangin, the east of Tanggung, and nearby Ankola village. Andesite is widely distributed in the survey area with a small intrusive. Andesites are divided into three major mode of occurrence in the area: boulder type andesite with onion structure in soil, massive type

andesite and andesite with well-developed sheeting structure. Andesite contains phenocrysts of randomly oriented orthopyroxene, clinopyroxene and plagioclase and matrix of mainly plagioclase. According to geochemical classification, it belongs to basaltic andesite and andesite (Koesmono et al., 1996 and Kaltili, 1989). The altitude of the study area is 200m to 1,440m, and is well developed to cliff. The main river flows to south, but on the other hand small river flows to.

The purpose of this preliminary study is the applied to geology using the Landsat TM satellite image of the study area. With this, slopes, aspect, curvature, hill shade of topography were calculated from the digital topographic map (1:25,000 scale) (Fig. 2). Lineament, lineament density, and NDVI were extracted the Landsat TM satellite image (Fig. 3).



Fig. 1. Location map of study area.

2. Relationship between the Analyses of Terrain/Satellite Image and Characteristic Geology

The result of terrain and satellite image and geological survey are as follows and is shown in Fig. 2. The geology of the Tanggung area comprises Cenozoic sedimentary rocks such as tuffaceous sandstone, mudstone, limestone and breccia, pyroclastic rocks, andesite and Quaternary talus deposit. Sandstone Formation has a well-developed bedding plane, and predominantly composed of unconsolidated tuffaceous sandstone, mudstone, calcareous mudstone, conglomerate-

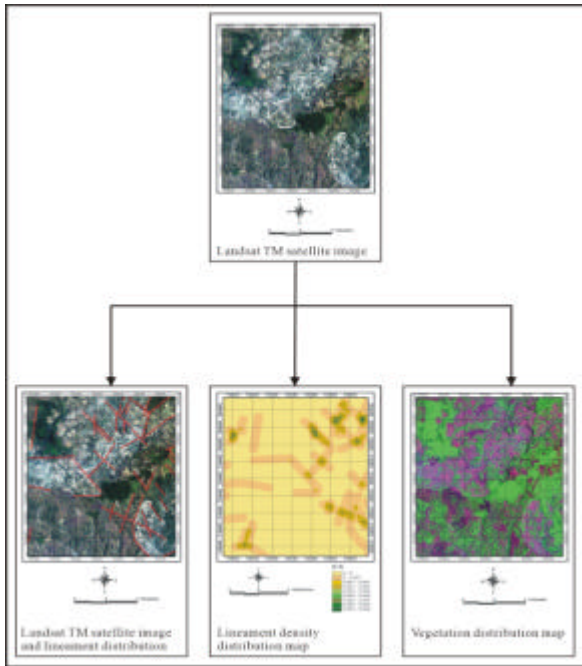


Fig. 2. Flow and results of terrain analysis.

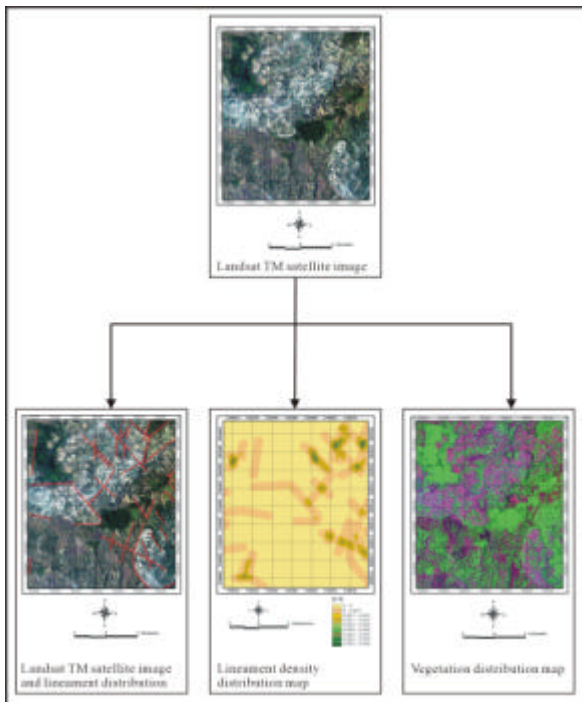


Fig. 3. Flow and results of satellite image analysis.

rate with subordinatly crystal tuff, pumiceous tuff. The rocks are distributed in the south of Ankola area and in the northwest of Pagelaran area and consist of conglomerate, sandstone and mudstone. The rocks are intercalated with lapilli tuff, tuffaceous breccia and mudstone containing fossils. Mudstone is distributed in the west of Tangueng area and is composed of claystone, mudstone and tuffaceous mudstone and intercalated pumitic tuff, lapilli breccia and andesitic breccia. The rock is observed to fossils of *Mollusca* and plant in some places. The approximate thickness of this rock

sequence is 80 meters. Limestone is distributed in Subang Mountain and west of Tanggung area and is observed to many fossils of *Mollusca*, *Algae* and *Coral*. Each sedimentary rock seldom corresponds with geology and analyses of topography but as a whole for sedimentary rocks coincide with them as see in and of Fig. 4.

Tuff is distributed in the north and east of study area and around of Ankola area. The rocks consist of tuff/crystal tuff intercalated pumitic breccia/breccia and sandstone in some places. The rock is distributed in the west of Subang Mountain, near the Pasirangin area, east of the Tanggeung area and near the Ankola area, and is altered to bentonite in near Neglasari area. Volcanic breccia is composed of andesitic breccia, tuffaceous breccia and lapilli tuff intercalated sandstone and mudstone in some places. Andesite is distributed in the near Subang Mountain and south of the Ankola area. The rock is composed of orthopyroxene, clinopyroxene and plagioclase. The volcanic rocks also seldom correspond with geology and analyses of topography but as a whole for volcanic rocks coincide with them as see in , , and of Fig. 4. Tuff (and of Fig. 4) and volcanic breccia (and of Fig. 4) in the volcanic rocks correspond with the result of terrain analyses.

Talus is distributed in the southeastern part of the study area and is formed to collapse of tuff. The rocks consist of breccia, lapilli tuff, andesite and breccia tuff. These rocks are well matched to result of geology and topographic analysis as see in and of Fig. 4.

Therefore, the results of geology and topographic analysis as see in Fig. 4 is poor matched to, as detailed geological classification but is well correspond to concerning volcanic and sedimentary rocks. Talus deposits is well matched with the analyses of topography/satellite image and is known by decoding of Landsat TM satellite image. The results showed the close relationship between geology and terrain and satellited image in the study area.

3. Results

This preliminary study is the applied to geology using the Landsat TM satellite image of the Tanggung area of southern part of the Bandung, Indonesia to provide basic information for geological survey. For this, topography, geology and satellite image were constructed to spatial database. Digital elevation, slope, aspect, curvature, hill shade of topography were calculated from the topographic database and lithology was imported from the geological database. Lineament, lineament density, and NDVI were extracted the Landsat TM satellite image. The results showed the close relationship between geology and terrain and satellite image.

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