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Landscape Variation Effect on Soil Infiltration in Bogowonto Watershed, Central Java Province, Indonesia

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The landscape of Bogowonto has been formed by complex geomorphologic processes. In the northern part, Sumbing volcano created volcanic landforms which have been disturbed by fault lines from central part up to upper part of the watershed. Those two processes influence soil characteristics in this area strongly. This paper is tried (i) to analyze the influence of selected soil properties such as bulk density and porosity in relation to water infiltration; (ii) to evaluate the effect of varying landscape position on soil characteristics.

This research is based on field survey and laboratory analysis. Landscape is understood to be represented through landforms. Thus, purposive sampling was applied at five points within different landforms. Bulk density was measured using a metal ring hammered into the soil in order to know compaction of soil particles. However, permeability was assessed through gauging the amount of water slipped off soil in a permeability ring.

Findings shows that soil at different landscape variation have different ability to infiltrate water. Soil positioned in the upper part of the watershed shows a higher bulk density than that in the central part. The soil particles in the upper part of the watershed are formed by volcanic material e.g. porous soil. The bulk density values were 1.120gr/cm3 and 1.112gr/cm3. The total pore space, i.e. porosity of these particles, is less than that of clay soil. Clay soil is found in the central part of the watershed. Central part of watershed is formed by structural-denudation processes. The content of clay derives from a highly weathered process of parent rock. The proof was shown by a number of landslide occurrences at mid slopes which was indicated clay forming the slip plane. Central part of the watershed has lower bulk density than that of in the upper part such as 1.063gr/cm3, 1.056gr/cm3, and 1.064gr/cm3. To conclude, the infiltration rate in the central part of the watershed is lower than the rate in the upper part. Bulk density and porosity take a crucial role determining the rate of water infiltration into the soil.