



## SEDIMENT DISCHARGE ON CULTIVATED SLOPE WHICH HAVE BEEN CONTRIBUTING TO MRICA RESERVOIR SEDIMENTATION, CENTRAL JAVA, INDONESIA

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**ABSTRACT:** Sediment discharge due to deforestation into cultivation land on steep slope at upper Mrica watershed has induced sedimentation in Mrica reservoir, Central Java, Indonesia. In order to mitigate the reservoir sedimentation and turbidity as well as to improve the water quality, it is necessary to develop an effective sediment discharge countermeasures method at the main sediment generation area in conformity with local socio-economic condition. To meet this objective, better understanding in process and mechanism of sediment discharge from the cultivated slope is required. The aim of this study was to proposed experimental erosion velocity equation for the study field in the Mrica watershed. Hydrological observations were carried out at the study field to reveals actual situation of sediment discharge under natural rainfall. For this purpose, observation-plot spaced  $0.5 \times 16 \times 25$  m<sup>2</sup> in planted area (vegetation cover ratio about 30%) was determined to observes and measures the sediment discharge volume, sediment concentration, discharge, soil moisture, rainfall intensity and grain size distribution. Results of the hydrological observations were used as basis for developing concept of the proposed erosion velocity equation. In this relation, laboratory experiments using *single-shear surface test* was conducted to examine the soil surface cohesion. Next, erosion velocity and friction velocity were evaluated using *flume test*. For these laboratory experiments purposes, some amount of soil samples from the study field were imported into Japan. Sediment discharge hydrograph at observation-plot shows good response; rise sharply near to peak of rainfall. Erosion type at the study field was identified as surface erosion due to overland flow. Erosion velocity was estimated from the soil piles distribution is approximately 0.01 to 0.03 cm/min. Soil fraction of the study field contains 40-60% of cohesive materials (Silt and Clay). The relation between soil surface cohesion of over-saturated layer and water contents at 5 mm depth revealed that; as the water content increased, the soil surface cohesion fell exponentially. Conversely ratio of cohesion rise gently as the water content increased. The flume test result shows that when the cohesion increased, the erosion velocity decreased. In contrast erosion velocity increased sharply as the friction velocity increased. The experimental equation from laboratory test,  $E = 0.0002(u_* - 0.021)(c_{osc} / c_{os})^{0.66}$  was proposed as erosion velocity equation for cohesive soil and steep slope at the study field in the Mrica watershed.

**KEYWORDS:** cultivated slope, erosion velocity, hydrological observations, Indonesia, sediment discharge, soil erosion.