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Hydrological and Suspended Sediment Concentration Study in a Small Rainforest Catchment (a Case Study in Nopu Catchment in Central Sulawesi, Indonesia)

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Abstract

Hydrological and SSC characteristic in the Nopu catchment is strongly related to the land use changing, topographical condition and the rainfall intensity. Forest conversion and land clearing, leads to higher overall runoff and SSC particularly during the rain events.

The aims of the study are to foresee the effect of land use changing on the hydrological pattern, to investigate the suspended sediment concentration and total output in temporal and spatial basis.

Three weirs have been constructed at the outlet of each river-section but we focus only at weir 2 and 3 represent the slash and burn and natural rainforest sub-catchment. In order to understand good relation between land-use changing, hydrological processes and suspended load, a number of hydrometric sensors were installed. The data were used in this study are water level, turbidity in relation to the discharge and total suspended sediment in respective time. Moreover, the suspended sediment samples were taken automatically at weir 2.

Higher SSC exist in weir 2 by 1.4 to 1.5 times higher than at weir 3. The total annual runoff in weir 2 and 3 at year 2002 and 2004 shows, despite lower rainfall amount in 2004, there was an increasing in runoff of about 219 mm at weir 2.

Soil compaction processes, fast growing of *imperata* and young secondary forest in the study area results on higher runoff but lower SSC in comparison at weir 2 and 3 in year 2002 and 2004. The highest discharge at weir 2 was $1.821 \text{ m}^3\text{sec}^{-1}$ (with $h = 0.529 \text{ m}$) with the highest turbidity of 962 NTU, whereas at weir 3, the highest discharge was $0.440 \text{ m}^3\text{sec}^{-1}$ ($h = 0.384 \text{ m}$) with the turbidity value of 515.5 NTU.

TSS at weir 2 was $\pm 186.5 \text{ ton}$ (1.61 tha^{-1}) whilst at weir 3 was $\pm 3.54 \text{ ton}$ (0.043 tha^{-1}). In 2002, higher output due to the higher overall rainfall intensity and the ratio between the SSC output at weir 2 in 2002 was ± 13 -folds higher than one at weir 3 and in 2004 the ratio was jump to 37 times

Keywords: Rainforest catchment, runoff, suspended sediment concentration [SSC], total suspended solid [TSS], turbidity