



Modeling the effect of terraces on land degradation in tropical upland agricultural area

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Java, the most populated Island in Indonesia, in the past view decades suffer land degradation do to extreme weather, population pressure and landuse/cover change. The study area, Serayu sub-catchment, as part of Serayu catchment is one of the representative example of Indonesia region facing land use change and land degradation problem.

The study attempted to simulate the effect of terraces on land degradation (Soil erosion and landslide hazard) in Serayu sub-catchment using deterministic modeling by means of PCRaster[®] simulation. The effect of the terraces on tropical upland agricultural area is less studied. This paper will discuss about the effect of terraces on land degradation assessment. Detail Dem is extremely difficult to obtain in developing country like Indonesia. Therefore, an artificial DEM which give an impression of the terraces was built. Topographical maps, Ikonos Image and average of height distribution based on field measurement were used to build the artificial DEM. The result is used in STARWARS model as an input. In combine with Erosion model and PROBSTAB, soil erosion and landslide hazard were quantified. The models were run in two different environment based on the: 1) normal DEM 2.) Artificial DEM (with terraces impression). The result is compared.

The result shows that the models run in an artificial DEM give a significant increase on the probability of failure by 20.5%. In the other hand, the erosion rate has fall by 11.32% as compared to the normal DEM. The result of hydrological sensitivity analysis shows that soil depth was the most sensitive parameter. For the slope stability modeling, the most sensitive parameter was slope followed by friction angle and cohesion. The erosion modeling, the model was sensitive to the vegetation cover, soil erodibility followed by BD and KSat. Model validations were applied to assess the accuracy of the models. However, the results of dynamic modeling are ideal for land degradation assessment. Dynamic modeling software such as PC Raster[®] which is open source and free are reliable alternative to other commercial software