

Impact of Understory Coverage and Tree Height on Sediment Transport Activity in Tenryu Artificial Forest, Japan

*Kautsar Qurratul Aini Binti Mahyudin¹, Fumitoshi Imaizumi¹

1. Shizuoka University

Large-scale tree cutting that lead to deforestation could possibly lead to negative impact on ecosystem and the environment. Equivalent to the important factor of understory coverage in monitoring the overland flow and soil erosion, which include the soil particle detachment and transportation. In the interim, tree height could be considered as a parameter affecting energy of rain splash under canopy structure. In this study, we observed overland flow and soil erosion in 3 artificial forests with different tree height; tall tree, small tree and clearcutting sites. Within those sites, the effect of understory coverage on sediment transport activity was evaluated with different conditions of coverage: sparse grass understory grass, litter, fern densely understory, and without any understory coverage. We measured the soil type characteristic to figuring out the role of understory coverage and tree height in preventing soil erosion. We obtained the percentage of understory coverage (with understory) and monitored rainfall pattern overland flow and soil erosion annually in five replicated plots (approximately 1 X 2 m each) with and without understory. The highest overland flow occurred in the period with largest rainfall (total rainfall depth of 800 mm). In tall tree site (24 m), the prevention of overland flow and sediment transport activity by understory coverage were not essential due to capacity of overland flow was continuously high compared to without understory coverage. We found that the fern dense coverage at small tree sites (covered and uncovered understory) absorbed 95% of throughfall and stem fall, resulting in soil erosion activity compared to tall tree and small tree. Although the effect of tree cutting on amount of overland flow was clear, there was no relationship between understory coverage and amount of overland flow due to the crust formation induce in large amount of soil erosion activity. The tree height factor in small tree prevented 95% of high force of raindrop compared to tall tree that cause low dominant in soil detachment that lead to high sediment transport activity.

Keywords: Understory coverage, Tree height, Sediment transport activity, Overland flow