

Assessing the Impact of Upland Catchment Management on Runoff and Sediment Yield Reduction

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Numerous river systems (5590 river catchments) are found in all parts of Indonesia; the biggest rivers are located in the large islands of Sumatera, Kalimantan, Java, and Papua. Geographical location of Indonesia causes most of the islands have experiencing with high rainfall and numerous active volcanoes. Having those characteristics, Indonesia is found to have high vulnerability to various natural disasters such as flood and sediment disasters. These types of disaster have restricted water resources function and coastal environment in many catchments. Therefore, the integrated sediment management approach to river catchment and coastal areas is crucial. Herein, analyses of hydrological and sediment transport processes in the upland river catchment and coastal ecosystem through a modeling system have been intended to simulate the impact of upland catchment management on runoff and sediment yield reductions. Thus, the objective of this study is to evaluate the effectiveness of various control strategies on reduction of runoff and sediment yield loads, both in the upland river catchments and their coastal ecosystem. Linking hydrological and hydrodynamic models of the upland catchment and coastal area have been developed. A distributed sediment runoff model incorporates soil erosion, shallow landslide, and sediment transportation processes. It used to evaluate the effectiveness of various best management practices (BMPs) scenarios to manage hydrological response and sediment yield in the upland area. Varieties of BMPs scenario were employed here to control hydrological responses and to trap sediment. A hydrodynamic sediment transport model has been run to estimate the behaviour and role of sediment yield in the coastal ecosystem. The proposed method was applied to the selected important rivers such as the Mahakam in Kalimantan; the Membramo in Papua; the Batanghari in Sumatera; and the Citarum, the Kali Brantas, and the Citanduy in Java.

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