Abstract

Kreo sub catchment is situated in Central Java Province. Due to its position near by Semarang, the capital of the province, the sub catchment has land use change problem for municipality development. Negative effect is experienced by Semarang City as the lower part of the sub catchment where flood occurs nearly every year. It was supposed that the land use changes happened in the sub catchment as the trigger of the disaster. Thus, in order to give understanding about the land use change effect on the runoff in this area which can lead to peak discharge as the initial of flood event, this research was carried out by applying a physically based model, LISEM rainfall runoff model. Land use changes during period of 1994-2006 were assessed using multitemporal images, and several land use change scenarios as well as rainfall size scenarios were generated.

The result shows that during period of 1994-2006 land use change happened in the sub catchment with forest, dry land farming, and shrub/ brush as the largest changes by -25,9%, 63,5%, and -69,3% respectively. They are relatively close to the main river, hence runoff coming from these land use changes should have great effect on the discharge because they might infiltrate little runoff along the way. But with such alteration and location, it gave little effect on the discharge by increasing peak discharge only 1,7% and reaching time to peak only one minute faster. Land use change scenario simulations reveals that by changing the sub catchment entirely into agricultural practices and settlement areas, total discharge and peak discharge increased while time to peak was faster. Positive response was given if the sub catchment was converted entirely into forest where peak and total discharge decreased significantly, while time to peak discharge was delayed. Rainfall size scenarios were simulated with return period of 5, 10, 20, and 50 years, and the result concludes that peak discharge and total discharge of each land use scenario increased with increases in magnitude of the rainfall events. In other word, compare to the amount of rainfall, the land use configuration including the changes between 1994 and 2006 have almost no effect. It is the rainfall that dominates the response in the catchment.

Sensitivity analysis indicates that LISEM is very sensitive to manning's n, saturated soil moisture content, saturated hydraulic conductivity, and initial soil moisture content related to land use change parameters.

Key Word: Runoff, LISEM, Kreo sub catchment, land use change scenario, rainfall size scenario, sensitivity analysis.