Land use and climate change impact assessments in humid tropics regions

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Conversion of forests to other land uses due to economic activities is increasing more rapidly in developing countries particularly in humid tropics. These issues are often blamed as the cause of the water disasters such as floods and droughts. Raised concerns of the impact of rapid deforestation urges policy maker to create a regional planning which allow economic growth as well as forest protection. On the other hand, studies on climate change projects that the risks will be higher in the future. A number of research assessing the risks of water disasters due land use and climate change are increasing recently. This study will discuss on the further review on the wide application of empirical based hydrological models (which were developed in temperate regions) to assess land use and climate change impact in the humid tropic region. The land use impact studies using empirical models can give misleading results if it is not calibrated to represent the right dominant flow pathway in the basin. Finally, this study suggests that the model selection, particularly for the land use impact studies, should not be solely selected based on good fit to observed hydrograph but should also represent the right dominant flow pathway in the basin.

Furthermore, this study also will discuss a preliminary results of dynamic link between the increasing water related hazard risks such as floods and forest fires due to land use and climate change and the land use change distribution at spatial scale and vice versa.

The study took the Batanghari River Basin (42,960 km2) in Sumatera, Indonesia as a study area. The whole river basin is categorized as humid tropics, with basin average annual rainfall of 2,021 mm and average temperature ranging from 22 ºC to 26.8 ºC. Prior studies show that soil layer in the basin ranging from 1,100 to 4,500 mm with high hydraulic conductivity up to 320 mm/h. Half of forest area in the basin was mainly converted agriculture between 1990 and 2015.

Keywords: Runoff generation, Land use change, Climate change, Land use model

