

Evaluation of Land cover change and Flow regime change in upper area of Dong Nai river basin, Vietnam

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Vietnam is considered as one of the top countries to be severely affected by climate change, particularly in coastal areas. That by 1 m sea level rises, Vietnam would lead to flooding of up to 20,000 km² of the Mekong river delta and more than 1 million people would be directly affected in there and it is also predicted economic loss up to 10% GDP (Dasgupta *et al.*, 2007). In rainy season a combine of SLR and rainfall increase to make a serious impact on low-lying coastal areas. It is also predicted that 40,000 km² of coastal delta region, 90% of the Mekong delta will flood (Eastham *et al.*, 2008) and temperature is more significantly rise in the plateau region (MONRE, 2012).

Dong Nai river and Mekong delta downstream are located in and supplied the major water resources to the whole Southern of Vietnam. Continuous changes in water resources due to climate changes and several controversies about the potential impact of sediment transport and river flows downstream due to either the cascade hydroelectric power plant system or dam construction in the upper of Mekong delta being continuous. In addition, water resources from Dong Nai river is the resource that only controlled by Vietnam. On the other hand, solving the problems of water shortage in the dry season and flood control in rainy season are also important for issues of water management at Dong Nai river basin. Therefore evaluation of flow regime change by the affect of climate change and human activities is an urgent issue in Vietnam.

That forest area decreased as a human activity is the big problem in Vietnam. In the period from 2002 to 2009, 620 km² of forest land lost on average per year and 250 km² of forest land was converted to other land use (Vietnam Forest Protection Agency, 2010). The main reasons of deforestation are unsustainable logging and agricultural land development (Hoang M. H. *et al.*, 2010). In most cases the forest vegetation lost, runoff increases conversely forest vegetation growing, runoff often decreases (Maita and Suzuki, 2008).

The river flow regime was analyzed from 1989 to 2009 runoff data at 3 observation stations in study area. The Landsat images in 2014 and 2005 were used to classify to 5 majors of land cover such as the dense-forest, spare-forest, crop-land, bare-land and water body.

Dong Nai river basin area is 14,713.5km² with the main land cover types are dense-forest 35%, spare-forest 26% and cropland 24% in 2005. From 2005 to 2014, the large area of forest (both in dense and spare) was converted to crop-land and bare-land; a part of spare-forest had became dense-forest. Especially the majority of bare-land (7%) had been converted into the other land cove types. The ratio land cover was dense-forest 33%, spare-forest 16% and cropland 39%. We can see that deforestation has occurred in the study area from 2005 to present.

As the inflow of Tri An dam, the flow regime at Tri An (basin outlet) slightly increased in all the flow rates of normal discharge, low-water flow and drought flow but slightly decreased in hosui flow. Flow regime of Ta Lai point, where affected by deforestation, hosui flow and normal discharge is slightly increased but change trend of low-water flow and drought flow were not observed. As the inflow of upper stream dam, the flow regime at Da Nhim increased in all the flow rates of hosui flow, normal discharge, low-water flow and drought flow.

Keywords: Dong Nai river basin, Flow regime, Land cover change