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“Development on the margin”

## Land Use Change and Hydrological Response in Code Watershed, Yogyakarta, Indonesia

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### Abstract

Uncontrolled land conversion from agricultural to non-agricultural area still remains one of the major problems in Yogyakarta, Indonesia. High population pressure and increasing demand for land cause the cultivation of marginal land and new settlements at risky sites such as Code River Area. This land use change has direct and indirect impact on hydrology such as a variability of stream discharges and infiltration processes, a change in water quality and it sometimes can even led to flood events at some parts along the river.

One of the environmental aspects which have affected by this land use change is hydrologic condition. The objectives of this study were to assess the impact on land use change in Code Catchment, in relation with the hydrological response. This response can be obtained by using available hydrological data mainly rainfall data and stream discharge data. Hydrological models can be used to predict the effects of the land use change on hydrological response of a certain catchment or region. In this case, change detection from satellite imagery was mapped using GIS software, and predicted for the next 15 year. Additionally, hydrological model SWAT (Soil and Water Assessment Tool) expected to quantify the effects from the land use change by using results from land use projection and several land use scenarios. This model is already used in several research projects to determine the effect of land use change and land cover on the water balance.

Based on the data, the value of the average flow coefficient is 52.56 % in the case study area in 2002. This means that nearly half of the rainfall amount changed into a surface flow. The high value of the flow coefficient resulted from the influence of physical conditions such as changes in land use pattern from agricultural land into non-agricultural land. The high flow coefficient in the upstream region indicates that land use changes have taken place and that these have an impact on the amount of surface flow. These conditions endanger the downstream areas, especially areas of densely populated urban settlements along the riverbanks.

**Keywords:** Code River, hydrological response, land use, Yogyakarta