

Water quality index for determining the development threshold of urbanized catchment area in Indonesia

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Abstrak

The findings of numerous studies on the responses of stream quality indicators to different levels of watershed development have been integrated into an impervious cover model. The focus on one development stressor, namely the impervious cover, allows the decision makers to use the impervious cover model as a watershed planning tool to forecast stream response. In evaluating stream quality, the studies used various indicators such as pollutant loads, habitat quality, aquatic species diversity and abundance, and others. This study aims to test the applicability of the impervious cover model as a tool to set the threshold of catchment area development based on the targeted water quality index. The model is represented by a linear relationship between the water quality index as a response variable and catchment area imperviousness as an explanatory variable. The study area is an urbanized catchment area of a cascade-pond system located at the campus of Universitas Indonesia, Depok, West Java. Estimation of catchment area imperviousness is based on digital globe imagery and digitized based on identified rooftops. The water quality data to compute the water quality indices are collected from previous studies and related reports. The targeted water quality index is determined based on water use suitability referring to the Indonesian government regulation number 82/2001. Based on the available data, an increasing tendency of temporal variation of catchment area imperviousness for each pond can be recognized, while water quality index of each pond tends to decrease over time. In accordance with land cover distribution, spatial tendency indicates that imperviousness is decreasing in downstream direction, while water quality index is increasing in downstream direction, in line with the characteristics of cascade ponds. The results demonstrate that despite the fact that the available data are very limited, it is possible to use the linear relationship between catchment area imperviousness and water quality index as a tool to set the threshold for future development on the catchment area of the cascade-pond system at the campus of Universitas Indonesia with a minimum water quality index suitable just for recreation activities.