

Assessment of the effect of land cover changes on hydrological process in the Jobaru river basin, Japan

Jeffry Swingly Frans Sumarauw¹, Koichiro Ohgushi², Hiroto Nakashima² and Naoto Ogata²

¹Dept. of Civil Engineering, Faculty of Engineering, Sam Ratulangi University, Indonesia

²Dept. of Civil Engineering and Architecture, Faculty of Science and Engineering, Saga University, Japan

Jobaru River basin is one of the most important rivers in Saga Prefecture, Japan. During 1948 to 2005, due to the increasing needs of residential area, the Jobaru River basin has been affected by the changes in land cover; especially the decreasing of paddy fields and the increasing of urban. Changes from paddy fields to urban areas will likely continue. It is feared that it will affect the flow of Jobaru River. The MIKE SHE modeling system was applied to investigate the basin-scale hydrologic effect of land cover changes within the 87.5 km² Jobaru River basin. The rainfall on 2005 is applied to land cover 1948, 1975, and 2005. The result shows that the changes of land cover from 1948 to 2005 caused the increasing of daily discharge 13% and water flow volume 3%. During the period 1948 to 2005 there were increases in total overland flow, on the other hand there were decreases in infiltrations and evapotranspiration as a response to the land cover change. Percent increase in average total overland flow was 7.0% over a period between 1948 and 1975, and 3.5% over a period between 1975 and 2005. This situation was due primarily to the expansion of impervious surface in urban areas. The amount of impervious areas primarily controlled the amount of runoff generated from the watershed by decreasing the rates of infiltration and evapotranspiration.

Biography

Jeffry Swingly Frans Sumarauw, He received Bachelor Degree in Civil Engineering from Sam Ratulangi University, Indonesia, 1992 and Master Degree in Water Resources Engineering from Gadjah Mada University, Indonesia, 2001. From October, 2009 to present, he is a Doctoral student at Department of Civil Engineering and Architecture, Faculty of Science and Engineering, Saga University, Japan. Since 1993 up to now he is a lecturer at Dept. of Civil Engineering Sam Ratulangi University, Indonesia.

jeffrysumarauw@ymail.com