

## Estimating water budget in forested watershed flowing to Ariake-sea using SWAT model

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Ariake-sea, which is surrounded by northern Kyusyu island is typical enclosed sea area in Japan and produce plenty of sea products such as seaweed and shellfish. Recently, nutrient enrichment in Ariake-sea become critical problem and is decreasing the produce of fishery industry. One of the cause of this phenomenon is said that the discharged water from the land area, especially from farmland and industry because enclosed sea area is largely affected by the water quality of river. On the other hand, the positive effect of forest to water quality in the river, so-called green dam, is paid attention recently, and supposed to play important roll on improvement of sea environment. However, the effect of forest to water quality is not explained enough, and few research has conducted in watershed scale. In this study, we aim to estimate water budget and the contribution of forest to entire water budget using Soil and Water Assessment tool (SWAT) for the first step to understand the forest effect to Ariake-sea environment.

We chose Kikuchi-river as the model watershed, which locates in the middle of Kyusyu island and has the third largest area (996 km<sup>2</sup>) among the rivers flowing to Ariake-sea. This watershed is mainly covered by forest (about 70%). We collected land use data, soil data, climate data and 30m mesh digital elevation model (DEM) data of this watershed in order to establish the model, and observed data of daily stream flow from 2008 to 2015 to calibrate and evaluate the model performance. Parameters relating to water budget were modified according to the result of calibration.

The model performance was evaluated by 3 indices such as Nash-Sutcliffe index. The difference of estimated water budget between land-use indicated the function of forested area as decreasing surface flow and increasing groundwater recharge. In conclusion, modelling the water budget using SWAT model has potential to understand water system and the contribution of forested area to Ariake-sea environment.

Keywords: Ariake-sea, water budget, SWAT, forested watershed