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Parameter Sensitivity Test of SWAT Hydrological Model On Two Different Resolutions (Case Study: Sub-Das Cisadane Hulu, West Java)

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ABSTRACT

A sensitivity analysis of SWAT parameters conducted on different input resolutions. The analysis will determine the input parameters that have the most influence on the role of output.Resolution of different inputs in the SWAT analysis, parameters can produce different inputs so as to cause the effect on output. The purpose of this study was to identify the level of sensitivity of the parameters in the model SWAT on two different resolutions, i.e. 1: 100 000 and 1: 250 000. A sensitivity test wasconducted manually by using the method that is absolute sensitivity to change (either increase or decrease) in each data base SWAT model parameters one by one while the other parameters fixed. NSE value of calibration for both of scale resolution demonstrates the similar NSE value, with the category on a daily simulation quite satisfactory (values NSE 0.55 and 0.54), while the monthly simulation as very satisfactory (NSE value of 0.80 and 0.82). The level of sensitivity parameters is divided into three groups: sensitive, less sensitive and insensitive. Simulation daily and monthly for both of scale shows the parameter-sensitive parameters are the same that Alpha_BNK (baseflow alpha factor for bank storage) , CN2 (moisture condition II curve number), CH_K2 (effective hydraulic conductivity in main channel alluvium), CH_N2 (manning's "n" value for the main channel), ESCO (soil evaporation compensation factor), GW_Delay (groundwater delay), and GW_Revap (groundwater "revap" coefficient).

Keywords: Absolute method sensitivity, group parameter sensitivity, simulation daily and monthly

INTRODUCTION

Hydrological model is a mathematical model used to simulate the water balance in a region hydrology (DAS). Soil and Water Assessment Tool (SWAT) model is one of the popular model today. The model developed by Dr. Jeff Arnold. SWAT is a model that has a medium complexity and can be used for continuous analysis. Neitsch, et al. (2005) suggested that the SWAT model has several advantages.These advantages are built on processes that occur by gathering information on climate, soil properties, plant, and land management contained in the watershed. It also allows the user to evaluate the long-term impact in a watershed.SWAT process model consists of several early stages include data collection, database creation and simulation models. The next stage formodel running before calibration and validation is to analyze the sensitivity test. Analysis of sensitivity test hydrological model is the key to determining the uncertainty of quantification model (Xiaomeng et al. 2012). If a small change in the parameterleads to a drastic change in a solution, then the solution is very sensitive to parameter values. Therefore, it can be argued that sensitivity analysis refers to determination of individual input contribution forthe uncertainty in the model output.

A sensitivity analysis will be determined by input parameter that has amost influential role in the variability of output that can be seen include: 1) the input parameters are important, 2) parameters interact with one another; and 3) a constant parameter or insignificant to the output. Focus on a sensitive parameter can provide insight and value of forecasts to reduce uncertainty of the model. Thus, the sensitivity analysis aims to streamline the modeling of complex systems such as efficiency of time, effort, and costs for using models. Several studies have compared the use of SWAT model in different watershed and showed satisfactory results. However, comparing SWAT modelused in the same