

Modelling Surface and Shallow Groundwater Interactions in Cimanuk Catchment Area using the SWAT Model

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Cimanuk River with total catchment area 3.752 km² that flow from Garut Regency to Indramayu Delta is the longest river in West Java Province. Cumulative effects of climate change, increased population, agribusiness, and fish farming in the coastal area are continuing to put pressure on availability of water resources. Furthermore, the construction of Cipali toll road and Kertajati are expected to generate more extensive settlement growth, leading to increased demand for land conversion from agricultural into settlements. This study aimed to analyze the availability of water in coastal areas of Indramayu influenced by Jatigede Reservoir, the second largest reservoir in Indonesia, using SWAT model. SWAT is physically based distributed hydrological model that can be used for many purposes, particularly in the simulation of water balance and watershed management. This study was conducted using flow record (2005 –2008), and land use data (2010 –2011). The result of this study show values of calibration for the upstream area was $R^2 = 0.7$ and The Nash Sutcliffe efficiency (NSE) of 0.6, whereas in the downstream R^2 (0.52) and NSE (0.44). The modeling period show that the main sources of water in Cimanuk catchment area are total surface runoff and lateral flow (60.9%). Base-flow contributes 39.1% to the total runoff and the recharge value to deep aquifer is 24.96 mm/year. The predicted values of water balance in the coastal area illustrate a minimum percentage of base flow were 6 % in January (wet season) while in the dry season the river flow dominated by 91 –96 % of base flow.

Keywords: SWAT model, Catchment, Hydrology, Cimanuk river