

ABSTRACT

Uncontrolled erosion and sedimentation will cause to substantial losses, either in the form of declining productivity of land as well as hydro structure damage and the occurrence of sediment in reservoirs. This is because the availability of sediment discharge data is quite limited, a number of models for the prediction of surface erosion and sediment discharge have been widely developed. The application of the model requires the availability of input data is sufficient, diverse and extensive, both for calibration and verification. The process of soil surface erosion and sediment discharges in watersheds affected by rain and surface runoff can be represented in the type of storage. In this research it conducted the approach uses Tank Model. The objective is to develop tank model for prediction of sediment discharge a Watershed.

The steps are setting experimentation field for data acquisition as input data model, and setting model analysis by making the structure and formulation of the tank model. There are four proposed tank models: Tank Model 1 (three tank 1, series and cascade), Tank Model 2 (two cascade tanks), Tank Model 3 (three cascade tanks), and Tank Model 4 (one tank) model, with the input data model includes hypothetical data, observation data (Kreo sub watershed), and other watershed data (Lesti River sub Watershed of East Java, Hirudani sub Watershed of Japan). The parameters of the model are determined by using the Genetic Algorithm method optimization approach program in MatLab.

The results of the analysis show that 4 tank models can be developed for the prediction of sediment discharge in the Watershed. A good tank model configuration for the prediction of sediment discharge in a watershed is Tank 4 Model, the model composed of 1 (one) tank consists of 2 (two) side holes, and 1 (one) bottom hole, applied in Kreo sub Watershed, Lesti River Sub watershed of East Java, Hirudani sub Watershed of Japan. This is based on the value criterion precision models in Kreo sub Watershed, the value of R between 0.77 - 0.88, the value of VE between 8.32 - 24.60%, the value of RE between 315.54 - 485.64%, the value of RMSE between 358 , 11 - 501.77, in Lesti River sub Watershed of East Java, the value of R = 0.8, the value of VE = 4.40%, the value of RE = 94.10%, and the value of RMSE = 1222.64, then in Hirudani sub Watershed of Japan, the value of R = 0.9, the value of VE = 11.48%, the value of RE = 68.33%, and the value of RMSE = 5.08. But the values of the parameters in the Watershed have different values according to the conditions of the Watershed observed. And the result of this analysis there is still the range of difference between simulated and measured sediment discharge value of varying magnitude, it is possible cause is the pattern of rain dispersion in the hydrological process, synchronization of measurement process and length of data and possible assumption of model parameters

Keywords: sediment discharge, runoff, rainfall, tank model