Duangrutai Mongkolkaha 2012: SWAT Model Application for Potential Streamflow Evaluation of Samui Island, Surat Thani Province. Master of Science (Watershed and Environmental Management), Major Field: Watershed and Environmental Management, Department of Conservation. Thesis Advisor: Associate Professor Wicha Niyom, Ph.D. 121 pages.

The purpose of this study was to evaluate the potential streamflow by SWAT model application for Samui Island, Surat Thani Province. The meteorological data from Samui Island climatic station and eight streamflow measurement stations in Samui Island were used to calibrate and validate model. Eight parameters were applied for run model as rainfall amount, streamflow, temperature, relative humidity, evaporation, wind, soil series group and landuse. The results were calibration by parameter adjustment method with measurement data. Four procedures were used for verify model as relative difference the percentages, root mean square relative error (RMSE), coefficient of determination (R^2) and model efficiency. Spatially potential streamflow was calculated in term of volume.

The results of this research found that SWAT Model can devided Samui Island to 20 subwatersheds with 40.02 MCM. annual streamflow average while measurement data was 40.95 MCM. The result from SWAT model found that streamflow of the 7th subwatershed was hightest with 10.05 MCM. and the 20th subwatershed was lowest with 0.47 MCM. The annual rainfall amount of Sumai Island was 1,945.9 mm. with potential streamflow 139,800 m^3/km^2 of Samui Island or total annual streamflow 47.81 MCM. The hightest potential streamflow per unit was appeared at 17th subwatershed with 841,000 m^3/km^2 and lowest potential streamflow per unit was found at 10th subwatershed with 23,800 m^3/km^2. The hydrological characteristics described as streamflow per rainfall was 7.18%, the hightest value in 17th subwatershed with 43.26% and 1.22% lowest at 10th subwatershed.

The results of calibration and validation model were showed as follows: the relative differences during 2003-2005 were -0.82 -2.30 and-3.63, respectively. The root mean square relative error (RMSE) ranged 0.01 to 0.56, the coefficient of determination (R^2) ranged 0.814 to 0.986 and model efficiency was 0.98

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