

Teerawat Suwanlertcharoen 2011: Application of the SWAT Model to Evaluate Runoff and Suspended Sediment from a Small Watershed: A Case Study of Mae Phun Subwatershed, Laplae District, Uttaradit Province. Master of Science (Environmental Science), Major Field: Environmental Science, College of Environment. Thesis Advisor: Associate Professor Kobkiat Pongput, Ph.D. 119 pages.

The objective of this study is to evaluate runoff and suspended sediment from the Mae Phun subwatershed, to evaluate runoff and soil erosion distribution in the watershed and to simulate the effects of land use on runoff and suspended sediment through the application of the SWAT model. Mae Phun is a small watershed which still has no observed runoff and sediment stations installed in the area, so the data of runoff and suspended sediment were collected by weirs and sampling. The collected data were used for calibrating with the model.

The results showed that the model calibration between observed and simulated flows at Thounnaklang and Failuang weirs. The results were stated as; the coefficient of determination (R^2) varies from 0.574 to 0.704, Nash-Sutcliffe efficiency coefficient (NSE) varies from 0.447 to 0.645, and the relative difference ranges from 0.769% to 4.661%. For the model calibration of suspended sediment at Failuang weir. The results were stated as; the R^2 is 0.690, NSE is 0.685 and relative difference is 9.298% which can be acceptable statistically. The assessment of runoff and suspended sediment was done during November 1, 2009 to October 31, 2010 that indicated the total annual runoff volume is 32.209 MCM and total suspended sediment from the Mae Phun subwatershed is 13,564.897 tons. The highest runoff and suspended sediment are occurred on August which resulted from rainfall in the watershed area. The total average of soil loss in the Mae Phun subwatershed is 5.436 t/ha/y. Severity levels of soil loss can be categorized into slight, moderate and severe levels with shares of 95.14%, 3.50%, and 1.36% of watershed area, respectively. For the land use simulation on runoff and suspended sediment, the result showed that the watershed with large forest land has increased runoff volume in the dry period, on the other hand, it has decreased runoff volume in the wet period. While suspended sediment is decreased both dry and wet periods, the amount of soil loss in watershed area is also decreased.

Student's signature

Thesis Advisor's signature