

Suchewan Yoyrurob 2011: Development of Sediment Transport Model with Application to Songkhla Lake. Doctor of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Associate Professor Winai Liengcharernsit, D.Eng. 165 pages.

In the past few decades, rapid population growth in Thailand has resulted in excess utilization of natural resources and degradation of environmental quality. Deforestation in sloping areas for agricultural and residential purposes has resulted in soil erosion from deforested areas with subsequent sediment transport and deposition in receiving water bodies. In order to evaluate the severity of this problem, a mathematical model is developed to simulate sediment transport phenomena in a receiving water body. In model development, total sediment transport is classified as bedload transport and suspended load transport, which result in two interrelated transport models. Three-dimensional mass balance equation is used as a basic governing equation for the suspended load transport model, whereas two-dimensional mass balance equation is used as a basic governing equation for the bedload transport model. The finite element method is used to solve these governing equations. Since sediment grain size and specific gravity are important factors affecting sediment transport either in the form of bedload or suspended load, the simulation models are developed for each group of sediment grain size and specific gravity, then the simulated sediment concentrations of various groups are combined to obtain spatial distribution of total sediment load at each time step. Inflow sediment load along the water body boundary is classified into corresponding groups based on their grain size and specific gravity. The developed model is applied to simulate sediment transport pattern in Songkhla Lake which is one of the most important water resources in southern Thailand.

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Thesis Advisor's signature

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