Pongrat Onlamun 2013: The Study on Flood Forecasting in SongKram River Basin by An Application of Mathematical Model. Master of Engineering (Irrigation Engineering), Major Field: Irrigation Engineering, Department of Irrigation Engineering. Thesis Advisor: Mr. Wisuwat Taesombut, D.Eng. 122 pages.

SongKram river basin is a subbasin of the Mekong river basin. It occupies a catchment area of 13,146 sq km. and covers four provinces namely Sakhon Nakhon, Udon Thani, Nong Khai and Nakhon Phanom. The basin always faces with flood problem every year. Because of the lower portion of a basin has very flat slope around 3 - 4 cm/km. in conjugate with its river outlet faces with backwater effect from a confluence of Mekong river and flood water in SongKram river widely overflows its banks every year. This study is an application of MIKE11-NAM/HD/DA model package. First, NAM rainfall- runoff model with the selected data set during 2002 - 2009 were carried out for the calibration and verification model at two runoff stations namely Kh.74 and 022701. The NAM result was summarized as the statistical indices r values which have a range of 0.701 to 0.930. Second, HD hydrodynamic model calibration was carried out by steady state basis. The upper boundary was daily river flow in the SongKram river which was assumed in a range of 5 to 1500 cms, Yam river has flow with a range of 5 to 1000 cms, and all of Oun river, Huai Khlong and Huai Hee have flow with a range of 5 to 800 cms. The downstream boundary was rating curves at Kh.22 station. The water level calculated by HD model with a trial and error basis of the river roughness coefficient (Manning'n). It found that there are in a ranged of 0.033 to 0.067 and gave a computed rating curves from HD model was inline with the observed rating curves at the stations namely Kh.98, 022801, 022901,022601 and 022701, respectively. Finally DA flood forecasting model, the highest flood event in the period of September 2004 was chosen to determine the performance of DA - flood forecasting model. The runtime of DA model was setup that the hindcast period was three days backward, and forecast period was three days forward. The forecasts of water level by DA model were generated every three days and the time of forecast was started from 1st September to 28th September 2004. The results were found that DA model has shown its accuracy in forecasting flood hydrographs that close to the observed values at all two stations - Kh.98 and Kh.54 - located along the SongKram river basin. The average accuracy of forecasting results at all stations revealed that for first day forecast, second day forecast, and third day forecast were 99.228%, 99.067% and 99.008%, respectively.

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