Hydrological Simulation And Sediment Transport Estimation to Assess the Impact of Kaeng Sue Ten Dam Construction in the Yom River Main Channel

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Abstract

In 1980, Large dam project "Kaeng Sue Ten" was proceeded under the cabinet-council’s conclusion. It was planned to be located at Song district in Phrae province on the upstream of the Yom River, Thailand. The purposes of this dam are irrigation and flood mitigation. Unfortunately, the troubles had occurred before the dam was built. The inhabitant who suffered from this project and Non-governmental organization (NGO) protested the construction of the dam. Accordingly, Kaeng Sue Ten dam has not been built yet. It is therefore necessary to examine the effect of a new dam construction on the Yom River. In this study, we evaluated the impact of the Kaeng Sue Ten dam on seasonal water discharge and suspended sediment transport using hydrological simulations of target year 1995 (representative year of the great flood in the Yom River) and 2001 (representative year of the normal flow in the Yom River). Our study area is the main channel of the Yom River in northern Thailand. We used the 1-km distributed flow routing model (1K-FRM) and the Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS) to calculate seasonal change of water discharge at seven points. Sediment load was calculated from a regression equation between sediment load and water discharge, using suspended sediment concentrations in monthly river samples taken at three gauging stations. Finally we estimated annual sediment load along the study reach using from both of simulated annual hydrograph and the regression equation. Our simulation results show that after construction of dam, there was moderate decrease in peak discharge volume during rainy season (maximum decrease is 30%) and corresponding increase in the subsequent season (maximum increase is 40%). The impact of dam construction to the annual maximum discharge in high-water year was significantly larger than in water year 2001, indicating that the KST operation will provide more effect on a high-flow year than a low-flow year. Accordingly, after dam construction, the sediment transportation decreased about 2% to 9.7% from its former value at upper regime stations. Whereas the sediment transport at lower regime station increased about 1% to 2.2%.

Keywords : Yom River Basin, Kaeng Sue Ten Dam, 1K-FRM, HEC-HMS

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