Flood Prediction for the Tam Nong District in Mekong Delta Using Hydrological Modelling and Hydrologic Remote Sensing Technique

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Abstract

There has been an increasing attention to the large trans-boundary Mekong river basin due to various problems related to water management and flood control, for instance. Vietnam Mekong delta is located at the downstream of the river basin where is affected most by this human-induced reduction in flows from the upstream. On the other hand, the flood plain of nine anastomosing channels is increasingly effected by the seawater intrusion due to sea level rising of climate change. This results in negative impacts of salinization, drought, and floods, while formerly flooding had frequently brought positive natural gain of irrigation water and alluvial aggradation. In this research, our aim is to predict flooding for the better water management adaptation and control. We applied the model HEC-SSP 2.1 to analyze flood flow frequency, two-dimensional unsteady flow calculations in HEC-RAS 5.0 for simulating a floodplain inundation. Remote sensing-based water level (Jason-2) and inundation map were used for validation and comparison with the model simulations. The results revealed a reduction of water level at all the monitoring stations, particularly in the last decade. In addition, a trend of the inundation extension gradually declined, but in some periods it remained severe due to water release from upstream reservoirs during the rainy season (October-November). We found an acceptable agreement between the HEC-RAS and remote sensing flooding maps (around 70%). Based on the flood routine analysis, we could conclude that the water level will continue lower and lead to a trend of drought and salinization harsher in the near future.

Keywords: Mekong delta, flood control, inundation, water management, hydrological modelling, remote sensing