

The Effects of Climate Change and Upstream Dam Development on Sediment Distribution in the Vietnamese Mekong Delta

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Abstract : Located at the downstream of the Mekong Delta, the Vietnamese Mekong Delta is well-known as 'rice bowl' of Vietnam. The Vietnamese Mekong Delta experiences widespread flooding annually where is habitat for about 17 million people. The economy of this region mainly depends on the agricultural productivities. The suspended sediment load in the Mekong River plays an important role in carrying contaminants and nutrients to the delta and changing the geomorphology of the delta river system. In many past decades, flooding and suspended sediment were considered as indispensable factors in agricultural cultivations. Although flooding in the wet season caused serious inundation in paddy field and affected livelihoods, it is an effective facility for flushing acid and saline to this area - alluvial soil heavily contaminated with acid and salt intrusion. In addition, sediment delivery to this delta contained rich-nutrients distributed and deposited on the fields through flooding process. In recent decades, the changing of flow and sediment transport have been strongly and clearly occurring due to upstream dam development and climate change. However, effects of sediment delivery on agricultural cultivations were less attention. This study investigated the impacts of upstream flow on sediment distribution in the Vietnamese Mekong Delta. Flow fluctuation and sediment distribution were simulated by the Mike 11 model, including hydrodynamics model and advection-dispersion model. Various scenarios were simulated based on anticipated upstream discharges. Our findings indicated that sediment delivery into the Vietnamese Mekong Delta come from not only Tien River but also border of Cambodia floodplains. Sediment distribution in the Vietnamese Mekong Delta is dramatically changed by the distance from the main rivers and the secondary channels. The dam development in the upstream is one of the major factors leading a decrease in sediment discharge as well as sediment deposition. Moreover, sea level rise partially contributed to decrease in sediment transport and change of sediment distribution between upstream and downstream of the Vietnamese Mekong Delta.

Keywords : sediment transport, sea level rise, climate change, Mike Model

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