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Modeling of Floodplain Inundation Process in Low-lying Areas

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A simulation model, which covers the Mekong River from Kratie in Cambodia to Tan-Chau in Vietnam, the Bassac River down to Chau-Doc in Vietnam, the Tonle Sap River and Tonle Sap Lake, was developed by using a Finite Element Method with depth averaged 2D shallow water equations. Simulation was applied to typical flows of the years 2000 and 2003 (as representatives of recent largest flood and drought years) in the river and flood plain systems. Based on 100m grid-sized DEM data of the study area, refined unstructured-triangular meshes of 62,965 nodes and 124,997 elements were generated. Inflow discharges of 12 tributaries around the Tonle Sap Lake, and measured water levels at Kratie, Tan-Chau and Chau-Doc gauge stations were set up as boundary conditions of the simulation. Moving boundary problem was treated by applying a threshold technique, where a thin water depth is reset in dry nodes of all moving boundary elements every time. Furthermore, main roads, dikes and waterway-opening works were considered by assigning their elevations on mesh nodes in the simulation. Simulated results and observed water-levels and discharges at Kompong-Cham, Kompong-Luong, Prek-Dam, Koh-Khel and Neak-Luong gauges were compared to verify the model simulation. The results of the model such as flooded area, inundation-depth, inundation-time and flow-field, can be used as a tool to produce un-gauged hydrologic data of the basin as well as to evaluate the effects of the basin management on floods and agricultural water uses.

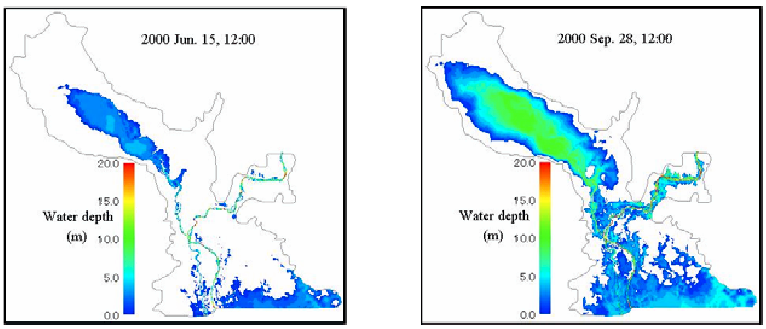

Figure 1. Water depth and flooded area predicted by the model on Jun. 15th and Sep. 28th, Year 2000

References

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