

Flood is a natural phenomena which suffers people living within the low lying plain area. The study and planning of flood plain protection scheme by flood plain model can achieve better understanding and solve the problem more effectively.

The objective of this study is to develop the mathematical model using full form of fundamental hydraulic equations for flood plain analysis in the low lying plain area. The stability and accuracy of the model were testified by comparing the computed results with the exact solution from direct integration solutions. The Greater Mae Klong Project area was selected as study area for model application. The model was then, calibrated and applied to simulate flood events in the representative years: 1972, 1974, 1982 and 1983 in case with/without Khao Laem Dam and Srinagarind Dam in order to assess Flood conditions due to the dam construction comparatively.

As the result of study, the mathematical model can reproduce stable and accurate results. The value of weighting coefficient, θ equal to 1.00, gives the best stability. The value of Courant number not exceeding 0.1 is a practical guideline to be used to select time step size, Δt and distance between adjacent cells, Δx and Δy , so that the water level and discharge calculation give stable and accurate results. As the result of application in the case study, the model can simulate flood conditions in the study area and gives the result of flood area computation closed to the actual flood area when using Manning's roughness coefficient equals to 0.040. As the result of flood simulations under the studied conditions of the 4 years flood events, floods in the study area occurred when there is heavy rainfall over the upstream watersheds of dams or heavy rainfall over the study area and its western mountainous area. In the case of heavy rainfall over the upstream watersheds of dams, the development of dams reduced flood area for 86.6-95.1% and reduced flood duration of the Right Bank area and the Left Bank area for 21-29 days and 13-14 days respectively. But in the case of heavy rainfall over the downstream watersheds of dams, the development of dams reduced flood area for 37.2-38.1% and reduced flood duration of the Right Bank area and the Left Bank area for 17-32 days and 1-4 days respectively.

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