

# Tools for Integrated River Flood Management (Hydraulics Modeling and Logical Framework Analysis)

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Hydraulics simulation can be used as a supporting tool for planning and developing a framework, such as Integrated Flood Management for river management. To demonstrate this, a hydraulics model for the Sarawak River Basin was run using InfoWorks RS software by Wallingford Software, UK. InfoWorks River Simulation (RS) was chosen because its applicability has been proven and widely used to model Malaysian rivers. The extraction of computed floodwater level and flood maps for different time intervals would produce the rate of floodplain submergence from river bank level. This information could be incorporated into a logical framework to support decisions on flood management measures. Thus, hydraulics models can be used as tools to provide the necessary decision parameters for developing logical frameworks which would act as to guide the planning when it involved various stakeholders' participation.

**Key words:** Hydraulics simulation; integrated river management; Sarawak river basin, supporting tool; flood warning; stakeholder participation; monitoring; evaluation

Managing a river basin so that it meets the needs of various stakeholders is a daunting task. The management of a river basin in an integrated and holistic manner is the current trend towards meeting these needs and provide solutions for problems related to water resources. Implementing an integrated approach requires tools that could act as an interface to communicate effectively between these various stakeholders. In developing the communication interface, data and information from various stakeholders is needed and a computer model such as a hydraulics model could be used to help visualise the system under study so that it is understandable amongst all the stakeholders.

Various agencies and stakeholders are involved in looking towards solutions for the flood problems in the Sarawak River Basin. To utilize the efficiency of these various stakeholders, it would be wise to approach the problem in an integrated way by adopting Integrated Flood Management (IFM). Logical Framework was adopted as the designing tool for outlining the proposed set of action plans for achieving the Integrated Flood Management settings and objectives for a collaborative network among the responsible agencies.

This paper demonstrates how the supporting tool Logical Framework was used as the communication interface and hydraulics model as to provide the necessary information

for decision making in developing the Logical Framework. For carrying out this purpose, the development of the Logical Framework for Integrated Flood Management (IFM) for the Sarawak River Basin was discussed and a hydraulic model using InfoWorks River Simulation (RS) software was applied to the basin to provide inundation analysis. Results from the hydraulics simulation would provide the necessary data for the sub-logical framework to serve an early flood warning system.

The developed Logical Framework from this paper could facilitate workshops in the future towards integrated development and management of the Sarawak River Basin. It could help to convince various stakeholders to meet and participate actively in the discussions towards an integrated approach. It could also help in monitoring and evaluating whether the planned and implemented management and development plan was moving in the right direction and take the necessary actions when the unexpected happened.

## BACKGROUND OF THE SARAWAK RIVER BASIN

The Sarawak River Basin as shown in Figure 1 has an area of 2459 km<sup>2</sup> and consists of two main tributaries, namely

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