

USE OF INFOWORKS RIVER SIMULATION (RS) IN SUNGAI SARAWAK KANAN MODELING

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ABSTRACT

The main purpose of this project was to reconstruct historical flood events at the flood-prone Sungai Sarawak Kanan to obtain flood hydrographs to provide explanation to the flooding of Bau town and surrounding areas. The Sungai Sarawak Kanan and its floodplains were modeled using one-dimensional hydrodynamic modeling approach, by utilising the Wallingford Software model - InfoWorks River Simulation (RS), coupled with its embedded GIS applications, to capture the hydraulic response of the river and its floodplains in extreme flooding conditions. InfoWorks RS was applied on 23 km of Sungai Sarawak Kanan between Buan Bidi and Siniawan. The model was calibrated with 3 storm events, verified with another 2 sets of storm data and applied on reconstructing 2 extreme events of February 2003 and January 2004 floods where the correlation of observed and simulated data at Siniawan were between 0.87 – 0.98. The differences of observed and modeled peak water levels were within the allowable limit of ± 0.10 m. Similar efficiency had been achieved in the interpretation on the simulation of reconstruction results through analysis of flood depths and flood watermarks. The model was managed to estimate the flood depths and flood watermarks within the observation range by Department of Irrigation and Drainage Sarawak. This shown that InfoWorks RS is an appropriate model for flood modeling in Sungai Sarawak Kanan.

Keywords: Flood, GIS, Hydrodynamic, InfoWorks RS, Sungai Sarawak Kanan

1.0 SUNGAI SARAWAK KANAN

Sungai Sarawak Kanan, located south-west of Kuching city, is a right hand side principal tributary of Sungai Sarawak which flow north-ward into South China Sea. The whole basin of Sungai Sarawak Kanan is 630 km². The upstream sub-catchment of Buan Bidi is about 225 km². Sungai Sarawak Kanan springs from Bungoh Range of Sarawak-Kalimantan border and flows 65 km downstream before confluences with Sungai Sarawak at Batu Kitang. Sungai Sarawak Kanan drains the upper catchment of Sungai Sarawak of mountainous region and passes through the rural townships of Bau, Siniawan and surrounding villages (see Figure 1). Due to the presence of the urban town of Bau in the middle valley and Siniawan at the lower reach, flood risk is significant (see Figure 2).

The Department of Irrigation and Drainage (DID) Sarawak regulates the hydrological monitoring system that consists of 5 rainfall measuring gauges and only 2 water level measuring gauges. Both water level gauges record data continuously each 30 minutes. No discharge measuring gauges exist in the basin but Buan Bidi water level gauging station had a developed

rating curve for discharge computation which has been developed based upon field measurements of velocity and channel geometry, and allow for the conversion of stage data into flow data [1]. The gauging station at Buan Bidi is sited upstream of the tidal limit of Sungai Sarawak. Siniawan gauging station only measures the water level due to tidal influences [1]. Table 1 highlighted the distribution of hydrological monitoring stations over the river basin.

The average yearly precipitation in the basin is about 3500 mm. The rainy season typically occurs during the end of the year, starting November – December and extending till the early of the next year, around February – March, brought by the North-East Monsoon experienced in the region.

Table 1: Measuring gauges available in Sungai Sarawak Kanan Basin

Measuring Gauges of Department of Irrigation and Drainage (DID) Sarawak [2]				
Station	Type	DID Station Number	Established Since	Remarks
Bau	Rainfall	1401005	1969	
Krokong	Rainfall	1301074	1970	
Siniawan W.W.	Rainfall	1402001	1983	
Kg Monggak	Rainfall	1301001	1990	
Kg Opar	Rainfall	1400001	1990	
Siniawan	Water Level	1402401	1990	
Buan Bidi	Water Level	1301427	1970	



Figure 1: Sungai Sarawak Kanan system