**Estimation of water surface level using digital terrain model in data sparse environment**

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**Abstract**

Flood vulnerability assessment is very important to prepare for a pre-flooding event and to reduce the impact of a post-flooding event. But in the absence of in-situ river bathymetry data, how the assessment could be possible? To address this issue, a methodology has been proposed in this study. The main objective of this study was to estimate river Water Surface Level (WSL) in the absence of in-situ river bathymetry data by using Digital Terrain Model (DTM). The study was conducted at a part of Sungai Lebir, Kelantan, Malaysia. River geometry was calculated using in DTM of 3m resolution as a reference terrain in Mapper. The proposed methodology was applied to improve the geometry obtained from the DTM. Hydrological modeling was conducted in modelling by using DTM and improved DTM’s geometries. The output of modelling was compared and validated with in-situ WSL data. The study reveals that the standard deviation of WSL between in-situ and DTM river geometries was 1.6m overestimation which is reduced by the proposed methodology up to 0.4m overestimation. Overall, the proposed methodology predicts reasonably well the WSL in the absence of in-situ river bathymetry data.

**Keywords**: River bathymetry, hydrological modeling, digital terrain model, flood vulnerability