

RIVER DISCHARGE – WATER LEVEL RELATIONSHIP AT WIDE FLOODPLAINS

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The relationship of the river discharge and water level of a river flow can be explained by Manning's equation. However, in case of a flood situation, when overbank flow occurs, the flow cross-section related to the flow will be changed. The rating curves which give the discharges at the gauging stations are usually derived for the water levels below the flood level. Therefore, extending the same rating curve for water levels higher than the flood level will give an underestimated discharge value because the additional flow area of the floodplain is not accounted.

For this study, Hanwella floodplain of the Kelani River Basin and Manampitiya floodplain of Mahaweli basin were chosen because of the availability of wide floodplains at the gauging stations. A two-dimensional HEC-RAS hydrodynamic model-based study was carried out to check the inconsistencies of the water level - discharge data at these wide flood plains.

The flow hydrographs were used as inputs at the upstream boundary of the model and the simulated water levels were monitored at gauging stations. The water levels obtained were not in the order of recorded water levels and it confirmed the inconsistency of the discharge data which were obtained by using the rating curves. The discharge values were varied until a satisfactory water level distribution was obtained at the gauging location and the model was verified with manually calculated flow discharges using the Manning's equation considering the wide flood plain cross sections.

This study confirmed the inconsistency of the available discharge data and the existing rating curves at Hanwella and Manampitiya were rectified with the corrected discharges. About 58% increase in the discharge was estimated at 10 MSL at Hanwella gauging station and a 72% increase in the discharge was estimated 36 MSL at Manampitiya gauging station when compared to the discharges estimated using the existing rating curves.

Keywords: Kelani-River floodplains; rating curve; water level; discharge; HEC-RAS

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