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Building flood inundation modelling capability in river system models for water resources planning and accounting

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Abstract We have presented two conceptual approaches for building flood inundation modelling capability in river system models. The first approach is a simple method suitable for data limited environments. In this approach during any flood event, flow in a river reach within a floodplain is partitioned into two components, in-stream and overbank flow, based on the in-stream capacity. A flood volume-area relationship derived from the flood inundation time series, which is generated by analysing daily MODIS satellite imagery and SRTM DEM, is used to estimate flooded area for the overbank flow. The losses due to evaporation and groundwater seepage from the floodplain are calculated using the estimated flooded area. This approach can be integrated with a more detailed approach for flood inundation dynamics. This second approach is more comprehensive and suitable for areas with high resolution topography data such as LiDAR based data. LiDAR DEM is used to divide a floodplain into multiple storages based on pre-defined thresholds of flood inundation heights. The storage characteristics, including disconnected storage volume and hydraulic connectivity between floodplain storages and a river reach, are derived from the LiDAR DEM using a spatial data processing technique. This information is used to estimate flood inundation area for overbank flow. This paper introduces the two approaches and presents the results of their applications in the Murrumbidgee floodplain. The results are compared with the observed flow data and the hydrodynamic modelling results for two selected recent flood events.

Key words flood inundation modelling; river system model; wetlands; LiDAR; Murray-Darling Basin; Murrumbidgee Basin; water resource planning; water resources accounting