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Hydrodynamic modelling to assess habitat suitability of the Ganga River

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We perform hydrodynamic modelling using a 2D HEC-RAS model to assess the hydraulic habitat suitability in a data-constrained reach (7 km) of the Ganga River. This reach of the Ganga River is located within two structural barriers of the upper Ganga plain, namely the Bijnor barrage in upstream and the Narora barrage in downstream. It is an active river dolphin and gharial habitat. To setup and run the 2D flow simulation in HEC-RAS, we used topographic data from a LiDAR drone survey, channel bathymetry from field campaigns, time-series river stage (to define the boundary conditions of the model domain), and water surface slope from using the real-time kinematic GPS. We use water level time series data from a satellite altimeter (downstream) and discharge measured in the field using an ADCP for model calibration and validation, respectively.

We found that the study reach has poor habitat suitability at low flow, which improves at median flow. The use of altimeter datasets for model calibration is quite handy when the in-situ data is not readily available. This study provides a methodological framework to assess the hydraulic habitat suitability in rivers near structural interventions.