The hydraulic habitat suitability of the Ganga River dolphin under anthropogenic influence

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The Ganga River ecosystem supports a diverse freshwater fauna of invertebrates, fishes, reptiles, and mammals. The upper Ganga itself lies within one of the biodiversity hotspots of India. Even so, it is under severe anthropogenic stress. Flow regulation and habitat fragmentation initiated by structural barriers are responsible for the degradation of the river’s biodiversity. Determining the ecological health of river habitats under contemporary modification is detrimental to riverine suitability and restoration practice. Habitat suitability of several reaches of the Ganga River is impacted by structural barriers through hydrological alteration leading to poor hydraulic condition and loss of lateral connectivity.

We study the hydrological and hydraulic habitat suitability of the Ganga river dolphin (Platanista gangetica), an indicator species of the Ganga, Brahmaputra- Meghna River system. This study is performed in the middle Ganga River between the Bijnor and Narora barrage which host an isolated Ganga river dolphin (GRD) population. The gauge discharge data downstream of the Bijnor barrage shows that the minimum flow required for biodiversity maintenance is available only during the Indian summer monsoon period (June- September). While the river reaches upstream of the Narora barrage has maintained the required flow for biodiversity throughout the year.

The channel hydraulics and flow characteristics influence the habitat selectivity in a river system. Channel depth is one of the limiting factors which determine the GRD population distribution and habitat selectivity. The minimum optimal mean depth for navigation and foraging activity of the GRD  2 m. Here we present an approach that utilizes an altimetry dataset with an At-a-station hydraulic geometry simulator to determine the temporal hydraulic habitat suitability of the GRD at varying flow conditions. We calculate the reach averaged hydraulic parameters of the Ganga River upstream of the Narora barrage using the Geomorphic instream flow tool (GIFT) and altimeter derived water level of different flow conditions. The results show the minimum required depth is available in the uptsream of Narora barrage.