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Morphological steering by dredging and deposition in large rivers

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Modifying the riverbed by dredging and deposition is a flexible way of steering the morphological evolution of a river into a desired direction, for instance to improve navigability, mitigate riverbank erosion or improve ecological connectivity. The world’s largest rivers, however, pose limits to the distances and relative amounts of sediment that can be dredged and deposited. The braided-anabranching Brahmaputra-Jamuna river in Bangladesh is 10 km wide and transports about 500 to 1000 million tonnes of sediment per year. We evaluate the effectiveness of two attempts to close channels of this river by dredging and deposition. Closure of a channel at Nolin Bazar in 2012 was annihilated by migration of a large meander bend. Closure of a channel at Sirajganj in the same year, accompanied with the dredging of a new pilot channel, triggered a natural development in the desired direction. We conclude that the success of such interventions depends on the large-scale alignment and evolution of channels upstream, confirming the adage that river engineers should work with the river rather than against it. We recommend giving due account to the large-scale situation, as well as implementing the intervention over a sufficiently long channel stretch to create a buffer for unforeseen erosion.