

EGU22-9159

<https://doi.org/10.5194/egusphere-egu22-9159>

EGU General Assembly 2022

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Investigating the short-term ecomorphological evolution of a gravel-bed river

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European watersheds have been subjected to different anthropic disturbances affecting their sediment budget and the morphodynamic asset in the last century, such as extensive mining, flow regulation, damming, land-use change, and embankment. As a response, gravel-bed rivers went through planform shifts, typically from multi- to single-thread configurations, and dramatic bed degradation.

The regulation of mining activity and the occurrence of major floods can (partially) restore river dynamism by redistributing sediments in the floodplain and reactivating secondary channels. Since the flood pulsing is an intrinsically random process, the overall behaviour of mined gravel-bed rivers is not always straightforward to understand, therefore hampering river management and restoration.

This work focuses on the Orco River (northwest Italy) case to study its short-term response to anthropic and hydrological forcing. For this purpose, we performed extensive field measurements and Light Detection and Ranging (LiDAR) data acquisition, integrating these data to reconstruct the morphological configuration of the selected site from 2019 to 2021 and map riparian vegetation biomass. Exploring the river plano-altimetric evolution, the sediment budget and the biomass variations, we investigated the prevalent eco-morphological processes to provide valuable indications for the Orco River management and a general benchmark for studies on gravel-bed rivers.