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Insights to integrated river management from a geomorphological viewpoint

Manousos Valyrakis and Da Liu
School of Engineering, University of Glasgow, Glasgow, United Kingdom (manousos.valyrakis@glasgow.ac.uk)

In the context of increasing magnitude and frequency of extreme hydrologic events, eco-hydraulic engineers have a dual role of providing novel designs that both help stabilise river systems, as well as help effectively route floodwater safely downstream, though the catchment.

One of such soft and green measures commonly used in engineering to protect channel banks and flood-plains, is riverbank vegetation. Riverbank vegetation can be of high importance both in preserving the form (morphology) and function (ecology) of our natural as well as engineered river systems.

Here the results of an experimental flume study, investigating riverbank hydrodynamics are presented. The effect of different riverbank vegetation densities on flow hydrodynamics across the channel are reported and discussed. Flow diagnostics including mean and turbulent intensity flow profiles along the streamwise and lateral directions, are being assessed via acoustic Doppler velocimetry (ADV) both at the main channel and within the riverbank. The configuration of vegetation elements follows a linear or staggered arrangement as vegetation density is progressively increased.

Implications for sediment transport are discussed by considering the change in near-bed shear stresses at the main channel (increasing) and riverbank (decreasing) as the riverbank density increases. As such processes have the potential to affect both the form and function of the river system, the insights from this study are of significant importance to geomorphologists and hydraulic engineers, as well as ecologists.