



## **River Self-Restoration: Interactions between Plants and Fluvial Processes**

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This paper presents evidence from European rivers of the nature and consequences of plant-fluvial process interactions. While the examples are representative of different climates, riparian and aquatic plant species, and river geomorphological types, they are linked by a general conceptual model of plant-fluvial process interactions that can be adapted to local conditions.

Riparian and aquatic plants both affect and respond to fluvial processes. Their above ground biomass modifies the flow field and retains sediment, whereas their below-ground biomass affects the hydraulic and mechanical properties of the substrate and consequently the moisture regime and erodibility of the land surface. At the same time plants are disturbed, removed and buried by fluvial processes. Thus the margins of river systems provide a critical zone where plants and fluvial processes interact to produce a diverse mosaic of dynamic landforms that are characteristic of naturally-functioning river ecosystems.

It is important to understand these interactions between aquatic and riparian plants and fluvial processes, and to recognize how they contribute to trajectories of natural river channel recovery from human interventions. The interactions have a significant influence on river systems across space scales from individual plants to entire river corridors. Plant-scale phenomena structure patch-scale geomorphological forms and processes. Interactions between patches contribute to larger-scale and longer-term river geomorphological phenomena. Furthermore, the influence of plants varies through time as above and below ground biomass alter within the annual growth cycle, over longer-term growth trajectories, and in response to drivers of change such as climatic and hydrological fluctuations and extremes. If river management and restoration works with these natural interactions and recovery processes, outcomes have the best chance of being cost-effective and sustainable.