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Riparian and Aquatic Plants as River Ecosystem Engineers

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The fluvial riparian and aquatic patch mosaic varies along rivers according to geomorphological setting, hydrological regime, sediment supply and surface-groundwater connectivity. This relation between physical processes and plants is not unidirectional but reflects a complex set of interactions. In particular, riparian and aquatic plants frequently act as physical ecosystem engineers, modifying their environment through the creation of landforms that contribute to rapid river channel adjustment. The plants trap and stabilize sediments, organic matter and propagules of other plant species. This process modifies the local sedimentary and morphological environment, driving the development of pioneer landforms and associated habitats, and facilitating the rapid establishment of other plants on these landforms, in turn reinforcing landform and habitat development. This process underpins the development of landforms such as river banks, islands and floodplains.

This paper reviews knowledge on the hydrogeomorphological significance of riparian and aquatic vegetation. It presents a conceptual model that links the development of pioneer landforms by engineering plants with river morphology and morphodynamics, with particular reference to humid temperate, mixed load, floodplain rivers. It demonstrates how different plants and pioneer landforms act at the interface between the plant-dominated and fluvial-disturbance dominated zones of the river corridor as river energy and vegetation colonisation and growth vary.