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A conceptual connectivity framework for understanding geomorphic change in human-impacted fluvial systems

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Human-induced landscape change is difficult to predict due to the complexity inherent in both geomorphic and social systems as well as due to emerging coupling relationships between them. To better understand system complexity and system response to change, connectivity has become an important research paradigm within various disciplines including geomorphology, hydrology and ecology. With the proposed conceptual connectivity framework on geomorphic change in human-impacted fluvial systems a cautionary note is flagged regarding the need (i) to include and to systematically conceptualise the role of different types of human agency in altering connectivity relationships in geomorphic systems and (ii) to integrate notions of human-environment interactions to connectivity concepts in geomorphology to better explain causes and trajectories of landscape change. Underpinned by case study examples, the presented conceptual framework is able to explain how geomorphic response of fluvial systems to human disturbance is determined by system-specific boundary conditions (incl. system history, related legacy effects and lag times), vegetation dynamics and human-induced functional relationships (i.e. feedback mechanisms) between the different spatial dimensions of connectivity. It is further demonstrated how changes in social systems can trigger a process-response feedback loop between social and geomorphic systems that further governs the trajectory of landscape change in coupled human-geomorphic systems.