Characterizing geomorphological change to support sustainable river restoration and management (Grabowski et al 2014) [1]

The hydrology and geomorphology of most rivers has been fundamentally altered through a long history of human interventions includingmodification of river channels, floodplains, and wider changes in the landscape that affect water and sediment delivery to the river. Resultant alterations in fluvial forms and processes have negatively impacted river ecology via the loss of physical habitat, disruption to the longitudinal continuity of the river, and lateral disconnection between aquatic, wetland, and terrestrial ecosystems. Through a characterization of geomorphological change, it is possible to peel back the layers of time to investigate how and why a river has changed. Process rates can be assessed, the historical condition of rivers can be determined, the trajectories of past changes can be reconstructed, and the role of specific human interventions in these geomorphological changes can be assessed. To achieve this, hydrological, geomorphological, and riparian vegetation characteristics are investigated within a hierarchy of spatial scales using a range of data sources. A temporal analysis of fluvial geomorphology supports process-based management that targets underlying problems. In this way, effective, sustainable management and restoration solutions can be developed that recognize the underlying drivers of geomorphological change, the constraints imposed on current fluvial processes, and the possible evolutionary trajectories and timelines of change under different future management scenarios. Catchment/river basin planning, natural flood risk management, the identification and appraisal of pressures, and the assessment of restoration needs and objectives would all benefit from a thorough temporal analysis of fluvial geomorphology.

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