

EGU22-1552, updated on 13 Aug 2022

<https://doi.org/10.5194/egusphere-egu22-1552>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Geomorphic Heterogeneity in River Corridors as a Source of Resilience to Changing Climate

Ellen Wohl

Colorado State University, Fort Collins, United States of America (ellen.wohl@colostate.edu)

A river corridor includes the active channel(s), floodplain, and underlying hyporheic zone. Geomorphic heterogeneity refers to the spatial distribution of geomorphic units within the river corridor. Heterogeneity can be conceptualized at different spatial scales, from bedforms such as pools and riffles in the active channel, to the distribution of subsurface paleochannels across the entire floodplain. Essentially, geomorphic heterogeneity describes the extent to which the river corridor is spatially non-uniform in the three dimensions of vertical, lateral, and longitudinal. Heterogeneity results from erosion and deposition caused by temporal and spatial variations in both inputs and boundary resistance, as well as modifications created by biota such as riparian vegetation or beavers (*Castor* spp.). In many river corridors, these variations and biotic influences reduce longitudinal connectivity but enhance lateral and vertical connectivity within the river corridor. Resilience is the ability to absorb disturbances without diminishing or changing river corridor function. Resilience can be conceptualized as occurring along a continuum dependent on time and space scales, especially when applied to a system such as a river corridor that includes individual components with different levels of resilience. Changing climate will affect averages and extremes such as floods and wildfires. I use case studies from mountain streams in Colorado, USA to illustrate how a geomorphically heterogeneous river corridor is more resilient to extremes of high and low flow and large inputs of either sediment or solutes. Geomorphic heterogeneity promotes resilience because the spatial non-uniformity of the river corridor provides more opportunities for transient storage over diverse timespans, which attenuates downstream fluxes, and diffuses the energy inputs resulting from a disturbance.