Riparian Vegetation, Channel Migration, and Large Wood in Desert Rivers: A Biogeomorphic Feedback Loop

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Dryland rivers across the western U.S. are undergoing dramatic shifts in channel form and riparian structure due to changing flow regimes, sediment dynamics, and vegetation composition, particularly the spread of invasive species like tamarisk and Russian olive. This presentation explores how these vegetation changes influence meander migration, floodplain turnover, and large wood recruitment in desert rivers. Drawing from research on the White River in eastern Utah, we highlight how varying vegetation density and species composition can either accelerate or suppress channel mobility and wood input. Using a combination of repeat remote sensing, field measurements, and physics-based morphodynamic modeling, our team is developing new tools to predict where and when large wood enters the river and how vegetation transitions create thresholds in riverscape dynamism. These insights have critical implications for restoration design, especially in arid environments where wood is scarce but geomorphically significant. By understanding and modeling the nonlinear feedbacks between vegetation, wood, and channel change, we aim to inform restoration strategies that sustain dynamic, wood-rich desert river corridors.