Beaver Dams & their Analogs are Natural Infrastructure in Dryland Streams (NIDS) – a Synthesis

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In this presentation, we describe the benefit of Natural Infrastructure in Dryland Streams (NIDS) in dryland fluvial ecosystems. These ecosystems are comprised of natural hydrogeomorphological and biogeochemical cycles that make them unique, yet vulnerable to land use activities and climate change. NIDS, which are structures naturally or anthropogenically created from earth, wood, debris, or rock, can restore implicit function of these systems. This talk further discusses the capability of and functional similarities between beaver dams and anthropogenic NIDS, documented by decades of scientific study. In addition, we present the evidence-based finding that NIDS can create wetlands in water-scarce riparian zones, with soil organic carbon stock as much as 200 to 1400 Mg C/ha in the top meter of soil. We identify the key restorative action of NIDS, which is to slow the drainage of water from the landscape such that more of it can infiltrate, be used to support wetland and riparian vegetation, and improve water quality by reducing sedimentation. Specifically, we assert that the rapid drainage of water from such environments can be reversed through the restoration of natural infrastructure that once existed. We then explore how NIDS can be used to restore the natural biogeochemical feedback loops in these systems and provide examples of such loops, lessons learned from installation of NIDS in the southwestern United States, how such efforts might be scaled up, and what the implications are for mitigating climate change effects. Our synthesis portrays how restoration using NIDS can support adaptation to and protection from climate-related disturbances and stressors such as drought, water shortages, flooding, heatwaves, dust storms, wildfire, biodiversity losses, and food insecurity.

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