

Reclamation and U.S. Geological Survey researchers:

1. Summarized expected changes in climate, hydrology, and water management.
2. Considered likely effects of those changes on riparian plants, animals, biotic interactions, and soil processes.
3. Identified knowledge gaps that hinder predictions of riparian ecosystem responses and sound water management planning and adaptation measures.

Answers

Together, climate change and climate-driven changes in streamflow are likely to:

- Reduce the abundance of dominant, native, early-successional tree species
- Favor herbaceous species and both drought-tolerant and late-successional woody species (including many introduced species)
- Reduce habitat quality for many riparian animals
- Slow litter decomposition and nutrient cycling

Potential Actions

Climate-driven changes in human water demand and associated water management may intensify these effects. On some regulated rivers, however, reservoir releases could be managed to protect riparian ecosystems. Outcomes of adaptation measures can be predicted by linking models of future climate scenarios, land cover, water demand, and water management.

Human adaptation measures—actions that increase resilience and reduce vulnerability of natural and human systems—will also shape riparian ecosystem responses to climate change. Adaptation options for riparian ecosystems will vary across watersheds and may include both proactive and reactive approaches. Proactive management is aimed at maintaining or increasing system resilience to climate change in advance of changes occurring. Examples include:

- Increase the scale of protected area networks and connected private lands
- Secure water rights for environmental flows
- Implement water conservation measures or cropping pattern adjustments
- Restore riparian vegetation to increase habitat connectivity
- Promote linkages between aquatic and terrestrial ecosystems
- Expand thermal refugia for wildlife
- Protect genetic diversity

“Semiarid and arid Western North America is environmentally diverse. However, many climate-change effects will vary in size or direction across the region. Immediate research priorities include determining riparian species’ environmental requirements and monitoring riparian ecosystems to allow rapid detection and response to undesirable ecological change.”

Perry et al. 2011

More Information

Perry, L.G., D.C. Andersen, L.V. Reynolds, S.M. Nelson, and P.B. Shafroth 2012. Vulnerability of riparian ecosystems to elevated CO₂ and climate change in arid and semiarid western North America. *Global Change Biology* 18(3): 821-842.

www.fort.usgs.gov/Products/Publications/pub_abstract.asp?PubID=23228

Collaborators

U.S. Geological Survey

