As we try to protect biological diversity for the future, a perpetual challenge is ensuring that the strategies we adopt today will continue to work in the face of changing conditions. How can we design conservation approaches that will be resilient in the face of environmental challenges that will only become more severe in coming years?

In a newly published article, we* ask whether our network of rivers might provide a solution. We examine the possibility that a Riparian Conservation Network (RCN) could leverage existing riparian corridors by connecting existing protected areas into a more resilient system.

The Challenge

In the United States, many of our national parks, wilderness areas, and wildlife refuges were set aside primarily to preserve scenic geological wonders, migratory birds, and game species. Along with other types of protected lands, these spaces form the core not only of the public land system, but also of the nation's conservation infrastructure (landscape attributes resulting from actions designed to foster biological conservation, including protected areas, conservation easements, and so forth). That is, we are implicitly depending on these lands as a crucial resource for conserving biodiversity, even though they were not designed with this function in mind.

A key limitation of the protected lands system is that they are by and large spatially static. This is important for resource management because in the face of stressors like climate change and habitat fragmentation many species will either move, adapt, or die. Increasing habitat connectivity, for example by adding additional corridors along which species can migrate, could provide avenues for movement, potentially adding resilience to our conservation infrastructure. Developing such habitat connectivity through individual projects is expensive and time consuming, and arguably cannot be scaled sufficiently to connect protected lands into a resilient network.

A Solution?

A Riparian Conservation Network envisions an interconnected system of protected lands, enabled by protecting riparian corridors to enable species to move as they adapt to changing conditions. Our interdisciplinary analysis examined existing spatial relations of protected and riparian areas and explored current governance

tools, with two overarching findings.

Figure 1: Riparian connectivity emerging from current policy. The map shows the concentration of easements near or within the floodplain along the Mississippi and Red Rivers, which collectively start to form a de facto corridor.

First, spatial analysis confirms that the riparian network could connect existing protected lands. More importantly, after considering a range of protections afforded to riparian areas, our analysis suggests that the backbone of an RCN may already be emerging in the U.S. (Figure 1), even if it is not uniformly distributed (Figure 2). While protecting riparian corridors certainly isn't an ecological panacea, the potential benefits of riparian protection and restoration could extend beyond each local reach of river if a network to be actualized.

Second, existing laws and policies may already align to support riparian protection. Riparian lands are not managed under any uniform system, but streams already have greater protection than other areas. The net effect of mechanisms including protected lands management (e.g., wilderness and forest management), regulatory and agency actions based on existing statutes (e.g., the Clean Water Act, the Endangered Species Act), and incentive-based programs (e.g., USDA's Conservation Reserve Program) all have significant positive effects on riparian management even if that is not their primary goals. Private actions also hold promise as part of the solution, both through incentives such as conservation easements, and actions by NGOs such as The Nature Conservancy. It is worth noting also that riparian management is often an effective way to meet the goals of these statutes and programs, such as where increased riparian connectivity contributes to flood risk management goals.

The Importance of Coordination

Figure 2: Percent of stream length protected within NHDplus 8-digit HUC watersheds across the contiguous US. Protection of stream and riparian areas in the western US is far greater

than in the Midwestern states and to a lesser degree the Eastern states. Protection is defined as lands with GAP status codes 1–2 and conservation easements.

The point is not that all the pieces are in place for effective governance of an RCN – they are not – but our research does suggest a natural confluence of conservation objectives. These elements could in concept be combined to accelerate the realization of a conservation network. An effort to establish an RCN could leverage an existing suite of administrative, state, and federal policies that already protect riparian areas. Crucially, such coordination could conceivably be actualized without new legislation. What is missing is formal coordination aspiring towards nation-wide or regional goals of resilience. Without any illusions about the challenges that such coordination would entail, it would nevertheless likely be a lighter lift than novel legislation to achieve the same end.

The upshot is a policy challenge: to coordinate restoration actions, conservation easements, and other conservation-related actions associated with existing policies to foster large-scale habitat connectivity at a continental scale.

Conclusion

In short, our research suggests several conclusions. First, it appears that an RCN is an emerging property of the stream network, meaning we may already have a nascent backbone for the RCN. Second, scientific evidence supports the conservation value of an RCN to help mitigate the impacts of climate change and habitat fragmentation. Third, although an RCN may be more easily implemented than other connectivity approaches from policy and management standpoints, conservation is better served if riparian connectivity is part of a larger landscape connectivity strategy.

Ultimately, rivers should be part of a broader conversation about conservation resilience. Next steps could be to explore unanswered scientific questions, to examine how existing governance systems could be coordinated in practice, and to test the RCN concept in local settings.

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*This post is based on a collaboration between Alexander K. Fremier, Michael

Kiparsky, Stephan Gmur, Jocelyn Aycrigg, Robin Kundis Craig, Leona K. Svancara, Dale D. Goble, Barbara Cosens, Frank W. Davis, and J. Michael Scott, published recently as "A riparian conservation network for ecological resilience," Biological Conservation (2015) **191**: 29-37. (subscription required, or contact me for a copy).