M?noa: Hybrid forest restoration benefits communities and increases resilience

9 October 2018

Credit: Cheryl Geslani

An interdisciplinary research team from the University of Hawai?i at M?noa and the National Tropical Botanical Garden (NTBG) demonstrated how collaboratively-developed forest restoration in Limahuli Garden & Preserve (Limahuli) can increase community benefits and improve resilience at lower cost than standard forest restoration programs. Because conservation managers are increasingly faced with making restoration decisions constrained by multiple goals and limited budgets, the research team collaborated with conservation professionals at Limahuli to co-design research that will directly inform adaptive management.

Specifically, authors of a newly published study in the journal *Conservation Letters* asked how manager-defined ecological, hydrologic and cultural metrics of success and long-term management costs vary across different restoration strategies. The researchers focused on the ahupua?a of H??ena on Kaua?i Island, and evaluated unrestored forest and forests restored to different states— ranging from a pre-human arrival state, to a "hybrid" state that includes mixes of native and non- native species of cultural importance. Their study site was Limahuli Valley, a 400-hectare nature preserve managed by NTBG in the most biodiverse ecoregion of the Hawaiian archipelago, which is home to dozens of endangered plants and birds found nowhere else on earth. They found that restoring forest to a hybrid state provided many of the same services that a restored 'pre-human' state can provide, but at a much lower cost. They also found it increased two important services: cultural value and resilience to disturbance such as hurricanes.

The paper "Restoring to the Future: Environmental, Cultural, and Management Tradeoffs in Historical versus Hybrid Restoration of a Highly Modified Ecosystem" has a diverse team of authors from the natural and social sciences as well as natural resource managers: Kimberly M. Burnett, Tamara Ticktin, Leah L. Bremer, Shimona Quazi, Cheryl Geslani, Christopher A. Wada, Natalie Kurashima, Lisa Mandle, Pua?ala Pascua, Taina Depraetere, Dustin Wolkis, Merlin Edmonds, Thomas Giambelluca, Kim A. Falinski, and Kawika B. Winter.

"Restoring forests to a pre-human state on a landscape scale has been idealized, but—given the amount of functional diversity that has gone extinct in Hawai?i—such an approach is almost impossible, ecologically speaking. Beyond that, our research has shown that goal is economically impractical, and it isn't the best way to engage community in restoration efforts," said Kawika Winter, a multidisciplinary ecologist and research associate at NTBG who is the anchor author of the new study. "These results can be used by conservation practitioners to guide management actions, and to bring the community back into the forest while improving multiple ecological and social benefits; and do all this at lower costs than programs focused solely on historical restoration goals."

The methods also have applications far beyond Hawai?i, particularly as conservation managers working in places with a history of cultural engagement with forests, and who are increasingly faced with decisions on how to fund and approach restoration efforts. This new research provides a framework to help managers identify restoration strategies addressing multiple goals in regions where restoration is challenging—areas where invasive species or other issues limit natural regeneration of native species, and/or where local populations depends on natural resources. Lower costs also offer the possibility of scaling-up, a critical consideration since island conservation is underfunded compared to continents.

Kimberly Burnett, specialist with the University of Hawai?i Economic Research Organization and lead author of the study, said: "While conservation managers cannot make realistic decisions without considering costs, these type of tradeoff analyses are rare in restoration research. Our study provides a framework to consider these costs and benefits, while providing specific management direction for Limahuli and generalizable lessons for restoration strategies around the world."

Tamara Ticktin, co-author on the study, professor of botany at UH M?noa, and principal investigator on the National Science Foundation grant that funded the research, added: "Like any restoration strategy, hybrid forest restoration also has its limitations. Our study concluded that hybrid forests can be an excellent strategy within a landscape mosaic that also includes more expensive restoration strategies needed to preserve the most endangered species. The value of our multidisciplinary approach is that it provides a powerful tool for resource managers to take into consideration the different metrics that are important to them, and to make more informed decisions about what that landscape mosaic of restored forest could look like."

More information: Kimberly M. Burnett et al. Restoring to the future: Environmental, cultural, and management trade-offs in historical versus hybrid restoration of a highly modified ecosystem, *Conservation Letters* (2018). DOI: 10.1111/conl.12606

Provided by University of Hawaii at Manoa