



The Dual and Synergistic Impacts of Climate Change & Invasive Species

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Examples of how climate change exacerbates the impacts of invasive species...

- Climate change is increasing the movement, establishment, and spread of new and existing invasive species
- Increased wildfire, drought, and storm severity due to climate change reduces the resilience of ecosystems, making them more prone to invasions
- 25% of introduced species will be novel (they are being moved outside their native range for the first time) as a result of climate change
- Warmer, more acidic oceans reduce coral reef resilience and their ability to buffer storms
- Increase in disease spread due to warmer temperatures



In native 'ōhi'a forests (top) that have been invaded by strawberry guava (bottom), there is a 27% reduction of water going into soils, streams, and groundwater systems—a 55% reduction in times of drought

Impacts from this confluence include:

- Increased impacts to soil moisture, infiltration capacity & rate, and recharge
- Increased biodiversity loss
- Accelerated loss of native ecosystems
- Impacts to agriculture and greater food insecurity
- Risks to public health
- Impacts to trade and the economy
- Damage to property and infrastructure
- Magnified disaster risk: landslides, floods, and fires
- Reduced efficacy of traditional weed control methods

Conversely, protecting forest and reef ecosystems from invasive species improves their resilience and ability to withstand climate change.

But how do we plan and manage natural resources in so much uncertainty? What does climate science tell us?



Miconia calvenscens

Formation of Regional Invasive Species & Climate Change Management Networks to:

- Bridge these two historically separate disciplines/networks
- Focus attention on research needs and findings
- Communicate research findings to managers and decision-makers



Regional Invasive Species & Climate Change (RISCC) Management Networks

Welcome!

The RISCC management networks reduce the joint effects of climate change and invasive species by synthesizing relevant science, sharing the needs and knowledge of managers, building stronger scientist-manager communities, and conducting priority research.

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The Pacific Regional Invasive Species and Climate Change (Pacific RISCC) Management Network facilitates research and practical communications on these interacting change drivers in Hawaii and US-Affiliated Pacific Islands

Example product: Monthly Manager Research Summary

Increasing the resilience of ecological restoration to extreme climatic events

Chela J Zabin^{1*}, Laura J Jurgens², Jillian M Bible³, Melissa V Patten⁴, Andrew L Chang^{1,4}, Edwin D Groszholz⁵, and Katharyn E Boyer⁴

Extreme climatic events (ECEs) are increasing in frequency and magnitude as part of global climate change, with severe consequences for both nature and human societies. While many restoration projects account for gradual climate change, ECEs are rarely considered. Through a literature search and the use of expert opinion, we reviewed the impacts of ECEs on habitat restoration projects, and the degree to which they were resilient. ECEs had overwhelmingly negative impacts on habitat restoration, although some projects also reported positive outcomes. The severity of impact varied among and within projects. Nearly all projects that included more than one focal species, life stage or genotype, restoration method, site, habitat type, or microhabitat reported better outcomes for at least one of these project aspects. We suggest that practitioners may be able to reduce risk from future ECEs through a portfolio approach, incorporating heterogeneity into project design, including in site selection and propagule choices.

Front Ecol Environ 2022; 20(5): 310–318, doi:10.1002/fee.2471

Extreme climatic events (ECEs) – statistically rare climate events such as severe storms and tornados, heat waves and extended drought, which can result in extreme ecological impacts (Smith 2011; IPCC 2012) – are increasing in frequency and severity with global climate change (Easterling et al. 2000; Herrero et al. 2014). ECEs can decimate the built

Ecological restoration, intentionally or unintentionally, has helped buffer some of the impacts of ECEs by reinstating conditions that enable greater resilience to large disturbances. For example, improved river–floodplain connectivity can mitigate flood impacts (Hey and Philippi 1995; Opperman et al. 2010) and restoring coastal foundation species can protect shorelines

Increasing the Resilience of Ecological Restoration to Extreme Climatic Events, Zabin, Jurgens, and Bible et. al. 2022

Management Considerations:

- Plan for Extreme Climatic Events (ECEs) by considering the potential impacts of extreme events most likely to impact your area, possibly exceeding historical events.

Take Home Points:

- ECEs can create major setbacks for restoration projects by destroying or damaging structures or sites, and by threatening restored species.
- To increase the resilience of restoration projects to ECEs, spread risk across time and space by using the portfolio approach.

Written, reviewed & edited by: Elliott Parsons, Jeff Burgett, & Nikki Read

Aloha, Hafa adai, Yokwe, Talofa, Alii, Mogethin, Ran allim, Kasefehlie, Hello from the Pacific Regional Invasive Species and Climate Change Management Network!

Manager Research Summary Series

Please read below for our monthly Research Summary for November, 2022. Pacific RISCC Research Summaries highlight interesting and relevant research at the nexus of climate change and invasive species for managers in the Pacific. Here we will highlight a publication, tool, or product that may be useful as well as management implications. Did you receive this from a colleague? Subscribe to the Pacific RISCC Listserv below!

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Extreme Climatic Events (ECEs) are rare, high-impact events such as hurricanes, heat waves, and extended drought, and they are increasing in frequency and intensity across the Pacific. Photo credit: www.fes.gov.

Research Highlight

Increasing the Resilience of Ecological Restoration to Extreme Climatic Events, Zabin, Jurgens, and Bible et. al. 2022

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Mahalo!

For more information, visit
www.PacificRISCC.org



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