

Recreation and Tourism

Climate Vulnerability Assessment and Adaptation Strategies for Maui, Lānaʻi, and Kahoʻolawe

ECOSYSTEM SERVICE DESCRIPTION

Maui Nui's native ecosystems and cultural landscapes provide a diversity of tourism opportunities. The islands' distinct mountainous, forested, and coastal habitats provide both mauka (upland) and makai (seaward) recreation opportunities. Cultural tourism (e.g., visiting historic sites), ecotourism (e.g., enjoying scenic views/forested landscapes), and geotourism (e.g., visiting volcanic areas) occur across the mauka to makai continuum.



ECOSYSTEM SERVICE VULNERABILITY

Recreation and tourism are sensitive to climatic factors that reduce the integrity or naturalness of native systems, affect the health and behavior patterns of wildlife, or that limit access and activities (e.g., physical beach loss, access loss in burned or flooded areas). Additionally, insects and disease can pose a health hazard to visitors. Non-climate stressors threaten recreation and tourism by impacting the integrity and availability of native ecosystems and species, reducing water quality, and affecting access, quality, and safety. Recreation and tourism comprise a significant part of Maui Nui's economy, and are highly valued by the public. However, recreation and tourism can degrade other ecosystem services (e.g., aesthetic values, cultural services).



Low Moderate High

Drivers of Ecosystem Service Vulnerability

- **Climatic factors and disturbance regimes:** Sea level rise, shoreline change, coastal flooding, sea surface temperature, tropical storms/hurricanes, extreme precipitation events, drought precipitation amount & timing, streamflow, riverine flooding, air temperature, wind and circulation, wildfire, insects, disease
- **Non-climate factors:** Residential & commercial development, agriculture & aquaculture, pollution & poisons, energy production, roads/highways/trails, groundwater development, water diversions, recreation, invasive species (parasites/pathogens, flammable grasses, reptiles/amphibians, ungulates, trees & shrubs, fish, social insects)

PROJECTED FUTURE CHANGES	POTENTIAL IMPACTS ON RECREATION AND TOURISM
Sea level rise; shoreline change; increased coastal flooding	<ul style="list-style-type: none"> • Reduced coastal and nearshore areas available for recreation and tourism • Impaired drainage along coastal roads and increased infrastructure damage
Increased air temperatures & sea surface temperatures	<ul style="list-style-type: none"> • Increased visitation and associated crowding in Haleakalā National Park • Uncomfortable conditions and increased disease risk (e.g., dengue fever) • Warmer sea temperatures promote coral bleaching and harmful algal blooms
Increased frequency & strength of tropical storms/hurricanes; uncertain change in extreme precipitation events; increasingly variable riverine flooding	<ul style="list-style-type: none"> • Increased damage to recreation/tourism infrastructure and increased risk to visitor health and safety due to flooding and wind/wave damage • Degraded water quality due to runoff, erosion, and contaminant loads • Increased establishment of invasive plants in canopy openings
Changes in precipitation; variable drought risk; changes in wind & circulation	<ul style="list-style-type: none"> • Reduced streamflow available for waterfall tourism and water-based recreation; reduced water supply for tourism industry • Degraded health and integrity of native ecosystems and species
Increased wildfire	<ul style="list-style-type: none"> • More area closures and reduced visual quality of recreation areas
Increased insects & disease	<ul style="list-style-type: none"> • Increased nuisance and potential disease risk to people and keystone species • Potential closures of beaches, parks, and other areas

ADAPTIVE CAPACITY

Factors that enhance adaptive capacity:

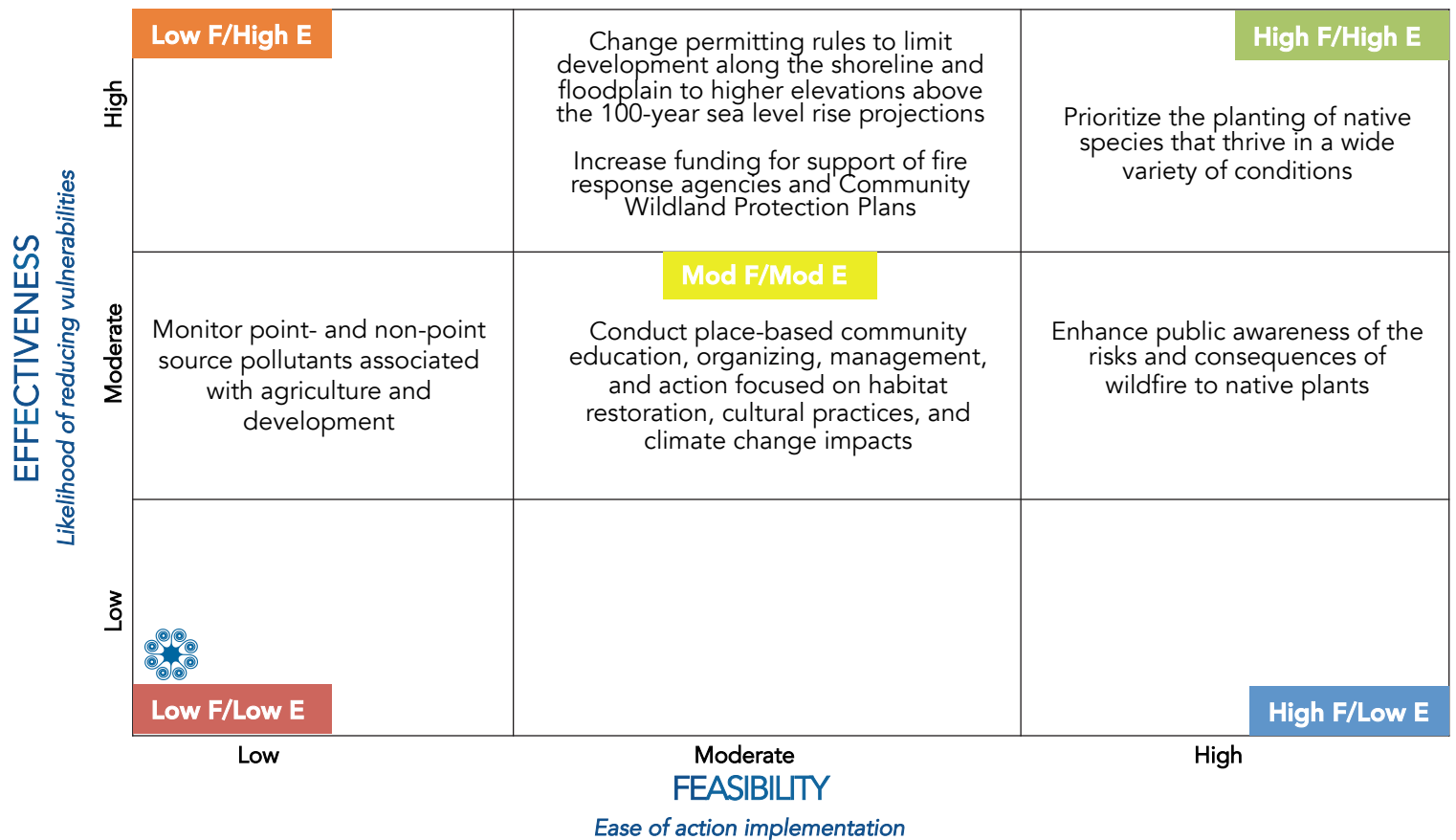
- + High public value: tourism is the largest economic sector on Maui
- + Recreation personally benefits residents
- + Supports biodiversity, land preservation, and environmental stewardship by emphasizing value of open space and biocultural landscapes

Factors that undermine adaptive capacity:

- Limited willingness to change behavior to maintain service provisioning
- Difficult to manage sea level rise and coral bleaching
- Some conflicts with cultural values, fresh water, and commercial agriculture
- May displace local communities and/or reinforce stereotypes

ADAPTATION STRATEGIES FOR RECREATION AND TOURISM

Types of Adaptation Approaches	Adaptation Strategy	Specific Action
Resistance: Prevent climate change from affecting a resource. <i>Near-term approach</i>	Improve fire prevention and response	<ul style="list-style-type: none"> Enhance public awareness of the risks and consequences of wildfire to native plants Increase funding for support of fire response agencies and Community Wildland Protection Plans
Resilience: Help resources weather climate change by avoiding the effects of or recovering from changes <i>Near- to mid-term approach</i>	Ensure no new development occurs in areas that will likely be inundated in the future	<ul style="list-style-type: none"> Change permitting rules to limit development along the shoreline and floodplain to higher elevations above the 100-year sea level rise projections
Response: Intentionally accommodate change and adaptively respond to variable conditions <i>Long-term approach</i>	Facilitate transition of species into new areas as climate regimes shift	<ul style="list-style-type: none"> Prioritize the planting of native species that thrive in a wide variety of conditions (e.g., generalists, resilient species)
Knowledge: Gather information about climate impacts and/or management effectiveness in addressing climate challenges <i>Near- to long-term approach</i>	Monitor pollutants to protect water quality	<ul style="list-style-type: none"> Monitor point- and non-point source pollutants associated with agriculture and development
Collaboration: Coordinate efforts and capacity across landscapes and agencies <i>Near- to long-term approach</i>	Increase community participation in place-based restoration	<ul style="list-style-type: none"> Conduct place-based community education, organizing, management, and action focused on habitat restoration, cultural practices, and climate change impacts



Further information and citations can be found in the Hawaiian Islands Climate Vulnerability and Adaptation Synthesis and other products available online at www.bit.ly/HawaiiClimate.

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