

# Cultural Knowledge & Heritage Values

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

## ECOSYSTEM SERVICE DESCRIPTION

Natural resources and Native Hawaiian culture are closely interwoven. The fabric of cultural knowledge is tied to the provisioning of food, clothing, and shelter, crop cultivation, plant propagation, and general stewardship of natural resources and the land. Many cultural practices are dependent on natural resources, such as the gathering of native plant and animal species for food, medicine, carving, weaving, hula, and ceremonial practices.



## ECOSYSTEM SERVICE VULNERABILITY

Cultural knowledge and heritage is vulnerable to climate changes that affect the ecosystems and native species with significant cultural value. Changes in precipitation, drought, and air and water temperatures impact forests, streams, and wetlands, while sea level rise and ocean acidification degrade coastal and marine habitats. Disturbance events can damage large areas and place localized populations of culturally significant species at risk of extirpation. Non-climate stressors have contributed to large-scale habitat loss and/or alterations, pollution, and overuse of natural resources.

PROJECTED FUTURE CHANGES	POTENTIAL IMPACTS ON CULTURAL KNOWLEDGE & HERITAGE VALUES
<p>Reduced <b>precipitation</b>, changes in <b>wind and circulation</b>, and increased <b>drought</b> risk</p> <p><i>Except for precipitation and drought on windward slopes</i></p>	<ul style="list-style-type: none"> <li>• Reduced health and integrity of valued native ecosystems due to water stress, as well as shifts in habitat distribution</li> <li>• Lower streamflow and increased likelihood of wildfire</li> </ul>
<p>Increased <b>air and water temperatures</b></p>	<ul style="list-style-type: none"> <li>• Increased stress in native species and shifts in species distribution</li> </ul>
<p>Increased <b>ocean acidification</b></p>	<ul style="list-style-type: none"> <li>• Reduced calcification in marine organisms of cultural value</li> </ul>
<p><b>Sea level rise</b>, increased <b>coastal flooding</b>, and <b>shoreline change</b></p> <p><i>+0.4m (1.3 ft) to +3.3m (10.8 ft) of sea level rise</i></p>	<ul style="list-style-type: none"> <li>• Altered habitat availability and distribution and saltwater intrusion</li> <li>• Impacts to significant cultural/historical sites (e.g., structures, burials)</li> </ul>
<p>Increased frequency and strength of <b>tropical storms/hurricanes</b> and increasingly variable <b>riverine flooding</b></p>	<ul style="list-style-type: none"> <li>• Extensive damage to coastal areas, forests, and other valued landscapes and cultural/historical sites</li> <li>• Possible extirpation of highly localized/endemic populations or species</li> </ul>
<p>Increased <b>wildfire</b></p>	<ul style="list-style-type: none"> <li>• Habitat loss and reduced forest access for gathering traditional materials</li> </ul>
<p>Increased <b>insects and disease</b></p>	<ul style="list-style-type: none"> <li>• Damage and mortality to native species, which may impact large areas</li> </ul>



### Drivers of Ecosystem Service Vulnerability

- **Climatic factors and disturbance regimes:** Precipitation, air and stream temperatures, ocean acidification, sea level rise, coastal flooding, shoreline change, drought, wind and circulation, tropical storms/hurricanes, wildfire, riverine flooding, 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, mammalian predators, ungulates, trees/shrubs, fish, social insects)

## ADAPTIVE CAPACITY

### Factors that enhance adaptive capacity:

- + Protecting core habitat areas and potential climate refugia may reduce climate impacts
- + Valued by natural resource managers and increasingly incorporated into management and decision-making processes

### Factors that undermine adaptive capacity:

- Largely unsupported by society and often appropriated by the public
- Native Hawaiians continue to be impacted by ongoing effects of colonialism
- Access and connection to forests can conflict with Western ideas of land ownership and resource use

# ADAPTATION STRATEGIES FOR CULTURAL KNOWLEDGE & HERITAGE VALUES

Types of Adaptation Approaches	Adaptation Strategy	Specific Action
<b>Resistance:</b> Prevent climate change from affecting a resource. <i>Near-term approach</i>	Protect cultural practices (e.g., fishing, gathering, farming)	<ul style="list-style-type: none"> <li>Protect/create dedicated spaces for cultural practices</li> <li>Protect water rights and public access to the shoreline and forest</li> </ul>
<b>Resilience:</b> Help resources weather climate change by avoiding the effects of or recovering from changes <i>Near- to mid-term approach</i>	Prioritize and pair habitat restoration with cultural resource management	<ul style="list-style-type: none"> <li>Restore culturally significant habitats from mauka to makai (e.g., lo'i, forests, beaches)</li> <li>Implement ahupua'a practices to encourage geographically based restoration and a sustainability mindset</li> </ul>
<b>Response:</b> Intentionally accommodate change and adaptively respond to variable conditions <i>Long-term approach</i>	Anticipate and facilitate habitat migration	<ul style="list-style-type: none"> <li>Acquire land for mauka migration in anticipation of sea level rise (e.g., conservation easements)</li> </ul>
<b>Knowledge:</b> Gather information about climate impacts and/or management effectiveness in addressing climate challenges <i>Near- to long-term approach</i>	Increase understanding of cultural resources in need of protection	<ul style="list-style-type: none"> <li>Collect data from the community in order to better protect cultural resources</li> </ul>
<b>Collaboration:</b> Coordinate efforts and capacity across landscapes and agencies <i>Near- to long-term approach</i>	Increase direct community restoration	<ul style="list-style-type: none"> <li>Conduct place-based community education, organizing, management, and action focused on habitat restoration, cultural practices, and climate change</li> <li>Increase cultural community input on water use decisions</li> </ul>

	Low F/High E		High F/High E	
EFFECTIVENESS Likelihood of reducing vulnerabilities	High	<p>Protect/create dedicated spaces for cultural practices</p> <p>Create policies that maintain water rights and public access to coastal, forest, and wetland areas</p>	<p>Implement ahupua'a practices to encourage geographically-based restoration and a sustainability mindset</p>	
	Moderate	Mod F/Mod E	<p>Restore culturally-significant habitats from mauka to makai (e.g., lo'i)</p> <p>Conduct place-based community education, organizing, management, and action focused on habitat restoration, cultural practices, and climate change impacts</p>	<p>Collect data from the community in order to better protect cultural resources</p> <p>Increase cultural community input on water use decisions</p>
	Low	Low F/Low E		High F/Low E
	Low	Moderate	High	
	FEASIBILITY Ease of action implementation			

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](http://www.bit.ly/HawaiiClimate).

Hilberg LE, Gregg RM. 2018. Cultural Knowledge & Heritage Values: Vulnerability and Adaptation Brief for Maui, Lāna'i, and Kaho'olawe. EcoAdapt, Bainbridge Island, WA.

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