A Cultural Context for Preserving Hawaii’s Diverse Ecological Landscape

The west coast of the island of Hawai‘i contains four national parks with a wealth of cultural resources in diverse ecological landscapes. Since the Hawaiian islands first rose from the ocean, these natural habitats have been changed by lava flows, earthquakes, and tsunamis. Since Polynesians arrived, there has been a close link between the ecological landscape and human inhabitants. From the late 1700s, western influences changed traditional Hawaiian life to ranching and plantation agriculture. Today, threats from rapid development and invasive species provide a challenge to the unique cultural and natural features of these Hawaiian national parks.

Changes to Cultural Resources

Between first Polynesian settlement in ~300 AD and the arrival of Europeans in 1778, the Hawaiian population had grown to between 200,000 and 1,000,000 people. The traditional system of taboos and resource use, kapu, ended in 1819 due to western influences and brought many new diseases, reducing the native population to <25,000 over the next century. Traditional land divisions, ahupua‘a, were replaced with extensive cattle ranching and sugar cane agriculture. Due to the declining local population, workers were brought from Asia and Portugal.

Changes to Natural Resources

With ahupua‘a in place, fishponds and irrigated crops were integrated with the natural ecology. In the mid-1800s, however, the increasing number of cattle and goats required shrubs and trees be cut in favor of grasslands. The rise in tourism since the 1950s has increased the pace and scale of development.

The National Parks of West Hawai‘i Island: agents of change

The national parks of west Hawai‘i share several primary stressors on their natural ecosystems. The common stressors shown here are from both human and natural sources, as well as local and global agents of change. These stressors affect many ecosystems, and can represent potential threats to human health or safety.

Common Stressors

- invasive plants and animals
- development, traffic, and groundwater withdrawal
- natural and man-made fires
- visitor recreation impact
- volcanic eruptions, cyclones, and tsunamis
- rising sea temperatures and sea level rise

1. Ala Kahakai National Historic Trail
2. Kaloko-Honokohau National Historical Park
3. Pu‘ukohola Heiau National Historic Site
4. Pu‘uhonua o Honaunau National Historical Park
The National Parks of West Hawai‘i Island

**Ala Kahakai National Historic Trail:** walking in the ancestors’ footsteps

The arrival of Polynesians via ocean trails, around 1,500 years ago, resulted in large changes to the flora and fauna on the west side of the island of Hawai‘i: partial clearing of dry land vegetation (such as sandalwood and loulu palms), planting of crops such as coconuts and taro, and the introduction of pigs, dogs, and chickens. The development of the *ahupua‘a* system of land use, however, meant that the island population lived for many centuries on the island’s natural resources. Established in 2000 for the preservation, protection, and interpretation of traditional native Hawaiian culture and natural resources, the **Ala Kahakai National Historic Trail** is a 175-mile trail corridor full of this cultural and natural heritage.

**A Vision for the Trail**

Because much of the coastal trail remains under private ownership, the largest threat to its cultural and natural resources is rapid development (cattle ranching, hotels, houses, golf courses, marinas, light industry, and roads), bringing with it a multitude of invasive plant and animal species. Securing the **Ala Kahakai National Historic Trail** as land accessible to the public will provide an opportunity for future generations to learn about and preserve Hawaii’s unique cultural and natural resources.

**Kaloko-Honokōhau National Historical Park:** keeping the spirit of Kaloko-Honokōhau alive

*Nä wai ʻo Kane* (life-giving waters of the god, *Kane*) provides the life essence in this dry district of West Hawai‘i Island. Native Hawaiian conservation values protect the use of the land, sky, and sea by laying out specific guidelines for interactions between humans and nature. **Kaloko-Honokōhau National Historical Park** contains visible reminders, such as *heiau* (temples), *loko i‘a* (fishponds), and *kiʻi pohaku* (petroglyphs), that speak of the spirit of this place. Today, changes of population, resource use, and development alter the environment by compromising groundwater flow, marine life, and native species. The current challenge for this fragile national park is to keep the spirit alive by preserving these cultural and natural resources in the face of a rapidly developing landscape.
Pu‘ukoholā Heiau National Historic Site: preserving Kamehameha’s legacy in today’s world

At Pu‘ukoholā Heiau National Historic Site, many key features of this culturally significant park are influenced by waters flowing from Makeāhua and Pōhaukole Gulches. In 1790 when the Pu‘ukoholā Heiau was constructed, the bay supported abundant limu (seaweed) and fish in clear waters, and Hale o Kapuni Heiau (shark temple) was visible. Centuries of cattle ranching and feral pig and goats have spread invasive plants and increased erosion. Recent damming of the stream has increased sediment flow, and the adjacent port, built on landfill, has reduced sediment flushing from the bay. As a result, Hale o Kapuni Heiau is now buried, and many native fish can no longer be found.

Pu‘u‘honua o Hōnaunau National Historical Park: a place of refuge for cultural and natural resources

Pu‘u‘honua o Hōnaunau National Historical Park has an incredible wealth of cultural and natural features shaped by early Hawaiian settlement patterns. Post-contact land management included historic ranching, recreational use, and vegetation removal. Today, many of these features are threatened by prolific, invasive plants, sea level rise, and other natural and human-caused disturbances. Introduced, fast-growing, invasive plants continue to out-compete native plant species and damage historic and prehistoric structures. Once a sanctuary of life, the park is now a place of refuge to the cultural and natural resources within, where they are preserved for present and future generations.
The National Parks of West Hawai‘i Island: understanding, protecting, and managing important resources that share cultural and natural values

The historical link between native Hawaiian culture and the natural environment means that all natural resources (native species, water features, and landscapes) also have cultural significance. This inseparable link underscores the importance of maintaining both the natural and spiritual value of west Hawai‘i parks.

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<thead>
<tr>
<th>Common Stressors</th>
<th>Threats and Human Impacts</th>
<th>Management Responses</th>
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<tbody>
<tr>
<td>Invasive Species</td>
<td>Invasive species not only displace native species, but can alter the whole ecological balance within parks.</td>
<td>Identify new introductions through monitoring and target programs of invasive removal and replacement with native species.</td>
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<tr>
<td>Adjacent Land and Resource Use</td>
<td>Rapid, urban, industrial, and tourism-based development adjacent to parks may increase nutrients, impact groundwater withdrawal, and increase invasive species.</td>
<td>Monitor park resources and participate in cooperative efforts with adjacent land users for best management practices.</td>
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<tr>
<td>Fire</td>
<td>Human activity has greatly increased fire frequency which enhances grasses over woody vegetation, promotes invasive species, and increases erosion.</td>
<td>Monitor non-native species spread by fire in an effort to prevent, detect, rapidly respond to, and manage invasions, and educate visitors about fire safety.</td>
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<tr>
<td>In Park Use</td>
<td>Visitor use can negatively impact parks by promoting non-native species introduction, disturbing plants and animals, and damaging historic sites.</td>
<td>Educate visitors about the reason for designated trails, and protecting the unique, but fragile natural and cultural resources within the parks.</td>
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<tr>
<td>Natural Hazards</td>
<td>Volcanic activity, tropical cyclones, tsunamis, and earthquakes pose threats to local populations of native species and may enhance non-native species invasions.</td>
<td>Monitor and restore natural resources and cultural sites within parks that are impacted by natural events.</td>
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<tr>
<td>Climate Change</td>
<td>Increased sea surface temperature, rising sea levels, and increased storm frequency from global climate change may cause species loss, flooding, and coastal erosion.</td>
<td>Provide long-term monitoring in diverse habitats to understand the effects of climate change and provide learning opportunities for the public.</td>
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Facilitated by the Integration and Application Network (IAN) of the University of Maryland Center for Environmental Science (UMCES), the Pacific Island Network provided west Hawai‘i Island Parks with an understanding of how conceptual diagrams can be constructed and used to communicate complex ecological principles, and held workshops to identify key issues and features of the four parks.

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The National Park Service is implementing Inventory & Monitoring programs (http://science.nature.nps.gov/im) nationwide though a series of 32 networks. The Pacific Island Network (PACN) is based at Hawai‘i Volcanoes National Park and coordinates biological and abiological inventories and long-term monitoring of natural resources found within the Pacific Island parks. Additional information on the Pacific Island Network can be found at http://www1.nature.nps.gov/im/units/pacn/.

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Nine university/research institutions and six federal agencies comprise the Chesapeake Watershed Cooperative Ecosystem Studies Unit (CW CESU; http://cesu.al.umces.edu). These partners provide leadership in watershed science and stewardship.

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