



The Role of Botanic Gardens In Biocultural Conservation: A new conservation imperative

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Our Mission

Cultivation
Conservation
Education

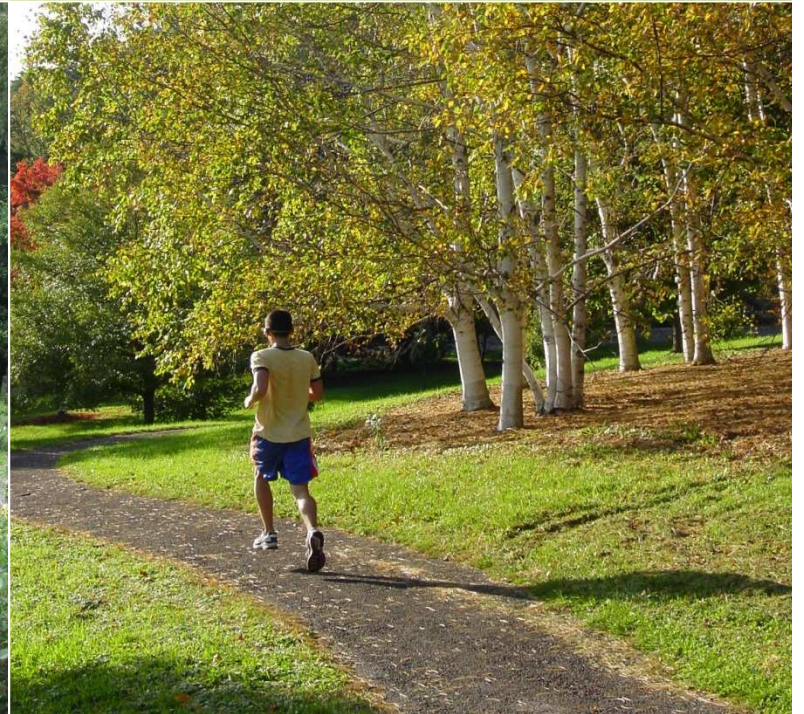
Gardens as living museums



Bowers Rhododendron Collection



Rhododendron 'Lavender Queen'



Bioswale Garden





Victoria lily



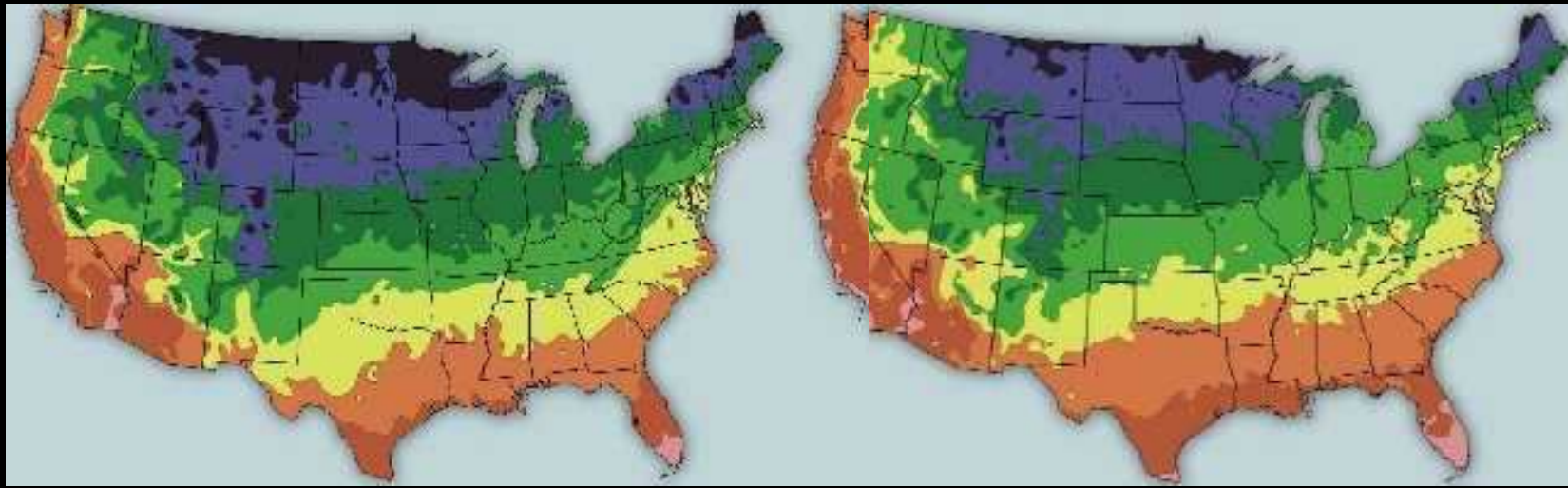
Amorphophallus foetidus





Climate Change and Garden(ing)

Plant hardiness zones



1990

2006

From: Marris, 2007

Flowering dates of *Narcissus pseudonarcissus*



From: Royal Botanic Gardens, Kew (2006)

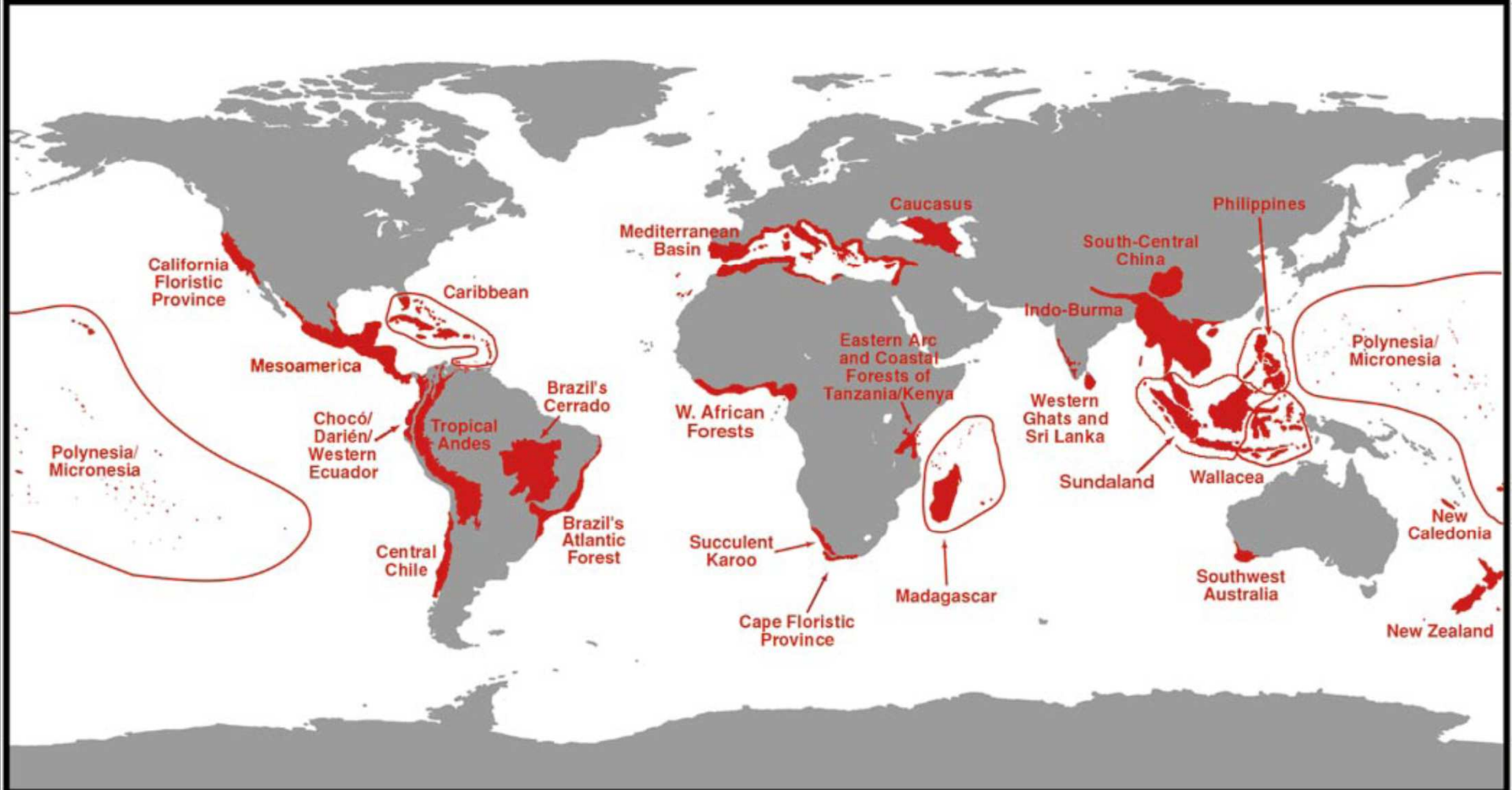
Extinction Risks

- 15-30% of all species “committed to extinction” by 2050, worldwide
- For plants:

Amazonia	53-87%
Cerrado	40-50%
S. African <i>Proteaceae</i>	24-34%
Europe	4-17%

From: Thomas et al., *Nature* 427: 145-148 (2004)

Biodiversity Hotspots



From: Myers et al., *Nature* 403: 853-858 (2000)

Category	Critical	Endangered	Vulnerable	Extant	%CEV
Birds	182	321	680	9797	12
Mammals	180	340	610	4630	24
Languages	438	506	732	6809	25

Modified from: Sutherland, *Nature* 423: 276-279 (2003)

Language Endangerment

6900 extant languages

50% endangered

Losing one language
every 2 weeks (long-
term trend)

Source: UNESCO



Language Extinction Hotspots

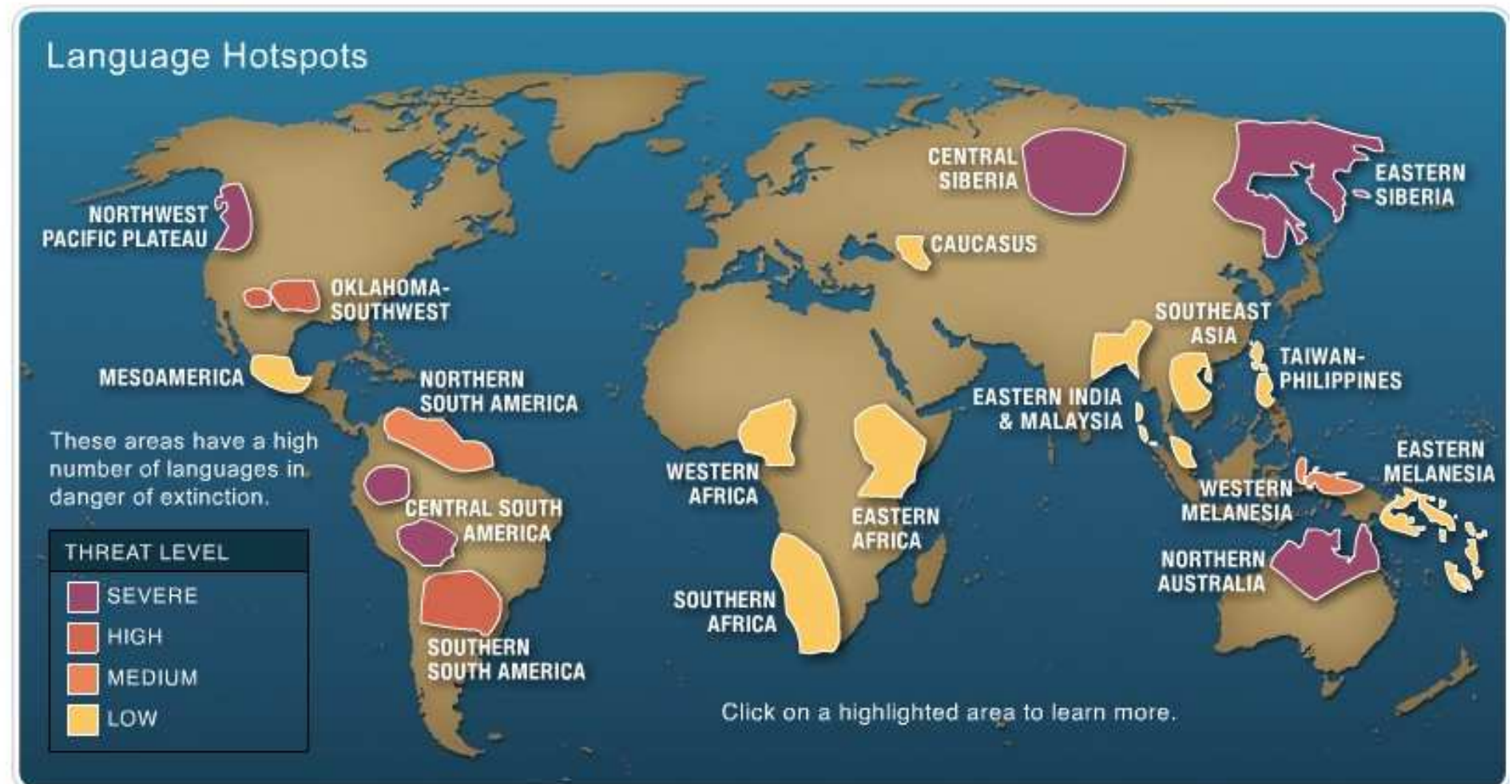
Enduring Voices

Saving Disappearing Languages

[ABOUT THE PROJECT](#)

[GLOSSARY](#)

[RESOURCES](#)



Source: Living Tongues Institute for Endangered Languages

Biocultural Conservation

**Extinction of culture
and/or language
results in lost:**

IEK about plants,
animals, etc.

art, music, dance

perceptions of time
and nature



Culturally Significant Plants in Hawai'i

'ōhia lehua
*Metrosideros
polymorpha*



kalo (taro)
*Colocasia
esculenta*



koa
Acacia koa



Preserving Biocultural Diversity

Taro

sacred and linked to
identity and ancestry

Vanua Lava

“we do not cultivate
taro to live, but live to
cultivate taro “

From: Caillon and Degeorges, *Biodiversity and
Conservation* 16: 2919-2931 (2007)





Republic of Kiribati:

32 flat coral atolls (1.5 – 2m elevation)

1,350,000 square miles of ocean

Kiribati

Negotiating to buy up to 5000 acres in Fiji

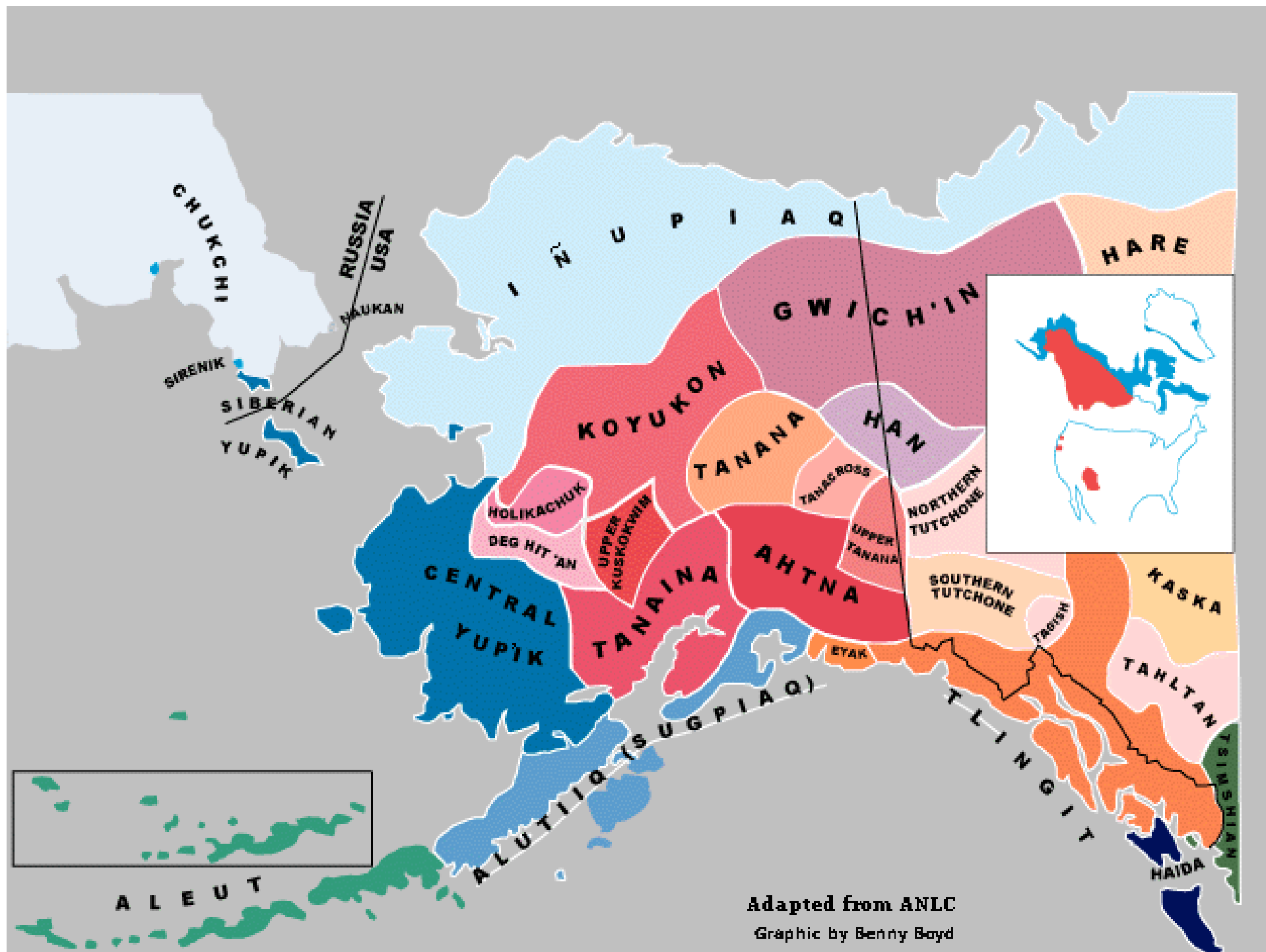


A flooded road in Tebikenikoora
on South Tarawa (national capital)



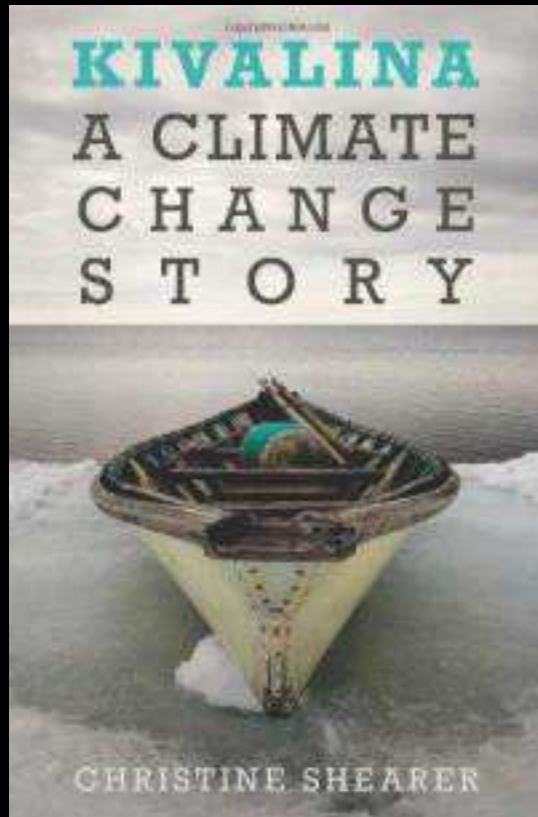
Once surrounded by trees, this small
village now lies unprotected

Photos by Ciril Jazbec





The Iñupiat of northern Alaska



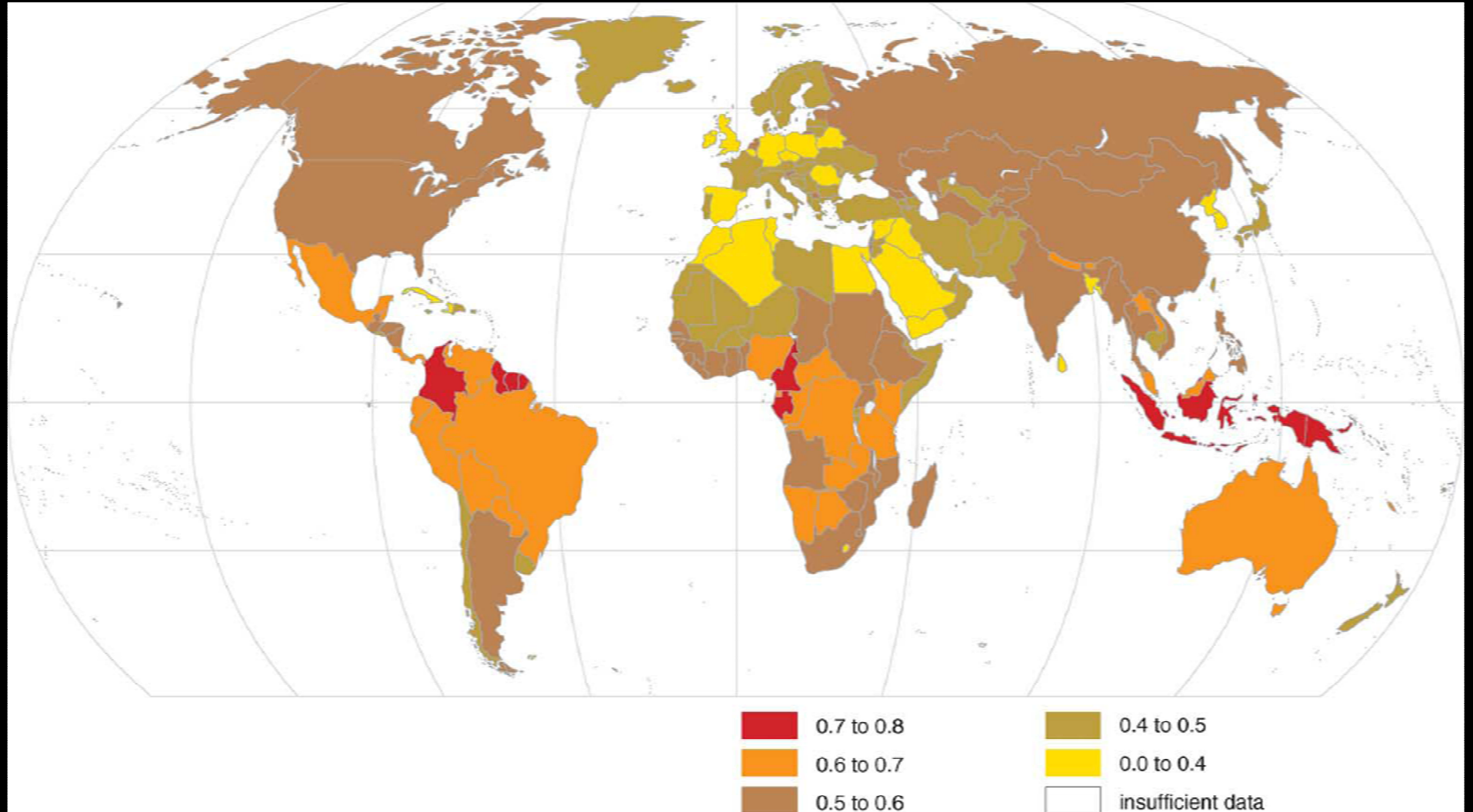
© Haymarket Books, 2011



Climate change is pushing whales further north.

Environmental shifts threatening the culture's fundamental roots.

Hotspots of Biocultural Diversity



From: Loh and Harmon, *Ecological Indicators* 4: 231-241 (2005)



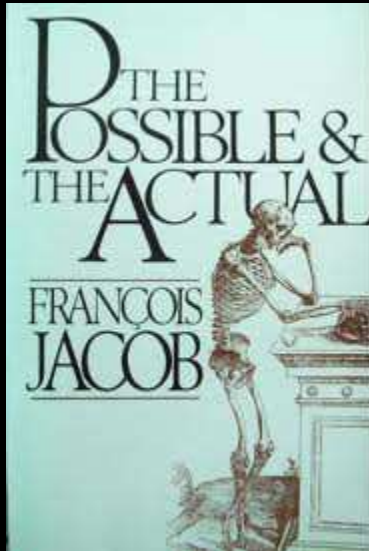
Cyanea truncata in tissue culture
Lyon Arboretum, University of Hawai'i
Extinct in the wild

“Diversity is a way of coping with the possible. It acts as a kind of insurance for the future.

In humans, natural diversity is further strengthened by cultural diversity.”

François Jacob, *The Possible and the Actual* (1982)

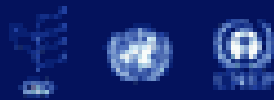
Nobel Prize in Medicine, 1965





Article 8j :

respect, preserve
and maintain
knowledge,
innovations and
practices of
***indigenous and
local communities
... for the
conservation and
sustainable use of
biological diversity***



Global Strategy for Plant Conservation



Target 13:

Halt the decline of
plant resources, and
***associated indigenous
and local knowledge,
innovations and
practices***

Royal Botanic Garden of Jordan



الحديقة النباتية الملكية
Royal Botanic Garden



HRH Princess Basma bin Ali

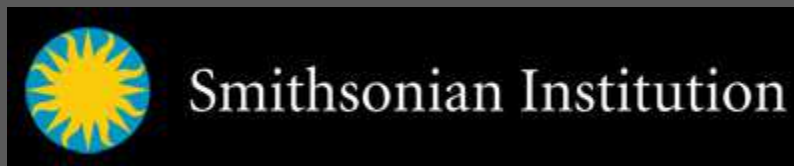


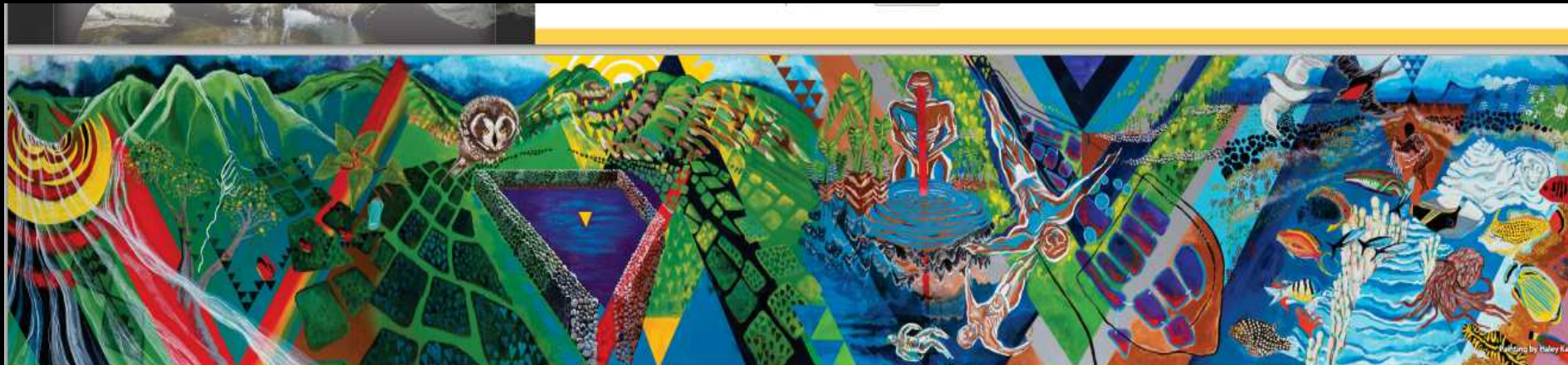
Center for Biocultural Studies

University of Hawai'i at Mānoa



International Partnerships and Capacity Building





Welina Mānoa*

Welina is a greeting of affection, similar to aloha. Used alongside Mānoa, the indigenous name for the place, this phrase can be understood to literally mean "greetings to you, Mānoa" and is often used by people from or tied to Mānoa to introduce themselves to another place or group of people from outside Mānoa. The Mānoa to Waikīkī watershed extends from the slopes of the Koʻolau to the shores and outer reefs of Waikīkī. Traditionally, this watershed was part of the larger Waikīkī ahupuaʻa, a Hawaiian division of land that contains enough resources from both the land and ocean to sustain the community that lives within its boundaries. While some ahupuaʻa, like Waikīkī, extend from mountain to sea and contain one or more watersheds, others do not. Each ahupuaʻa on every island is unique, determined by the flow of the landscape and the available resources of that particular place.

The University of Hawaiʻi at Mānoa has three place-based science centers within the Mānoa to Waikīkī watershed community: Lyon Arboretum, Ka Papa Loʻi ʻo Kānewai Cultural Garden, and Waikīkī Aquarium. With our partner the Mānoa Heritage Center we developed a Hawaiian and English language, culture-rich series of learning experiences that are grounded in an intersection of Native Hawaiian knowledge and contemporary scientific knowledge of water and land/ocean resources, as well as management and ecosystem

Our banner is an artistic expression of the ʻāina (the land and all that feeds us) of Mānoa and Waikīkī and the aloha (love, mahalo (gratitude), and kuleana (responsibility)) we feel for this place. There are lessons embedded in the banner that teach about wai (water), ʻāina (land), and the relationship kānaka have to them through moʻolelo (story, history). In this foldout, you will learn about these themes that connect each center and tell the rich story of Mānoa.

In this series, children (ages 0-8 years) and their family members are asked to follow pinnae at the site and from one site to the next. Pinnae points out important geographic spots, challenges learners to search for endemic and indigenous species, asks families to discuss critical questions about the land and its natural resources, and encourages learners of all ages to have fun! As you journey through each location we encourage you to use your smartphone, iPhone for other device) to access our website using the QR code on the back of each foldout. Here you can listen to the moʻolelo (stories) of the place, read up on its history, locate more information and references about Mānoa and each of the four sites, and access more learning activities.

Mahalo for picking up this learning map! We hope you enjoy your learning journey! Please let us know about your

1 Lyon Arboretum

Lyon Arboretum is a tropical rainforest botanical garden that serves as a biological field research site for tropical botany, ecology and community learning. The arboretum's mission is to increase the understanding and appreciation of tropical systems, traditional knowledge and to celebrate the intersection of biological and cultural diversity.

Wai - This is the site of the kumu wai, the source of water, in Mānoa Valley. High in the sky you see the clouds forming, in the mountains you can hear the waterfalls and feel the rain, all which feed Mānoa Stream.

Kuleana - Here we learn that what we do i uka affects the ʻāina, wai, and kai below.

Moʻolelo - This place tells the moʻolelo of water and verdant plant life. The moʻolelo also tell of the many changes to the land and of the people now working together to bring back Hawaiian culture and plants.

ʻĀina - Many types of plants are able to grow here because of the fertile ʻāina and abundant water of Mānoa Valley. The ʻāina produces

2 Mānoa Heritage Center

Mānoa Heritage Center promotes the understanding of Hawaiʻi's natural and cultural heritage through preserving and interpreting a unique historic property. The Center includes a garden of Hawaiian native plants, an historic home, and an ancient Hawaiian heiau. Kūkaʻōʻo Heiau is thought to be an agricultural site and is one of the few traditional Hawaiian structures that still exists in our urban Honolulu landscape.

Wai - From the hilltop look up to see wai in the aiehue, or rainbow, and look across the valley at the many forms of wai that create a lush, green landscape.

Kuleana - Here we are reminded to take care of our kūpuna by continuing their moʻolelo, asking permission, and giving thanks.

Moʻolelo - We learn many lessons by listening to the moʻolelo of events that took place here in Mānoa and of the place-names and features of this land.

ʻĀina - From this ʻāina we are able to see the mountain ridges and valley floor of Mānoa

3 Ka Papa Loʻi ʻo Kānewai

Ka Papa Loʻi ʻo Kānewai is an experiential learning center. Its purpose is to engage visitors in traditional Hawaiian farming methods and preservation of Hawaiian varieties of kalo. Kānewai is a puʻuhonua (safe place) that maintains and perpetuates Hawaiian language, practices and values such as laulima and mālama ʻāina.

Wai - This is where wai is skillfully diverted from the kahawai, channeled through the ʻauwai to the loʻi to feed the kalo, and directed to return to the kahawai.

Kuleana - Here we practice taking care of our land because she is our ancestor and keeps us healthy.

Moʻolelo - Moʻolelo tell us that Kānewai receives its name from the work of Kāne and Kānaloa who created springs and sources of water. Moʻolelo also teach us how Kānewai continues to be a spring of life and serves as a valuable source of food, culture and language.

ʻĀina - Here at Kānewai we can see how the ʻāina and the wai work together to cultivate

4 Waikīkī Aquarium

The Waikīkī Aquarium is committed to education, research and conservation of Pacific marine life. Internationally noted for coral husbandry and propagation, the Waikīkī Aquarium houses endangered Hawaiian monk seals, unique marine species, endemic fishes and diverse coastal native plants.

Wai - This is where the wai meets the kai and creates a place of nutrient-rich brackish water. This area where the water from the uplands pours into the ocean is known as the mulwai or river mouth.

Kuleana - Here we meet many living things who need us to keep both the fresh wai from the mountains and springs as well as the ocean wai both flowing and clean.

Moʻolelo - This site is rich in the moʻolelo of plants, fish, and animals native to Hawaiʻi. The moʻolelo also tells us how the mixing of fresh and salt water creates a place abundant with life.

ʻĀina - The ʻāina here has looked very different over time. It once had many



Lyon Arboretum

1

Nane: You can use my fruit as a paintbrush, a lei, and to clean your teeth. What am I?

Why is it important to keep our water clean?

Draw a picture of what you want this place to look like in the future.



'Āina - 'Āina is the land or earth. The root word of 'āina is 'ai, which means to eat, so 'āina can refer to how the land feeds us. By caring for the land, we care for ourselves; we must respect the land and its resources so that we do not harm our environment or take more than what is needed. This is important to maintain ecological balance and sustain 'āina. It is our kuleana to mālama the 'āina.

Plant Usage Symbols



Plants used for medicine and healing.



Plants used for fishing.



Plants used for games and recreation.



Plants used for clothing and the making of kapa.



Plants used in hula and music.



Plants used for food.

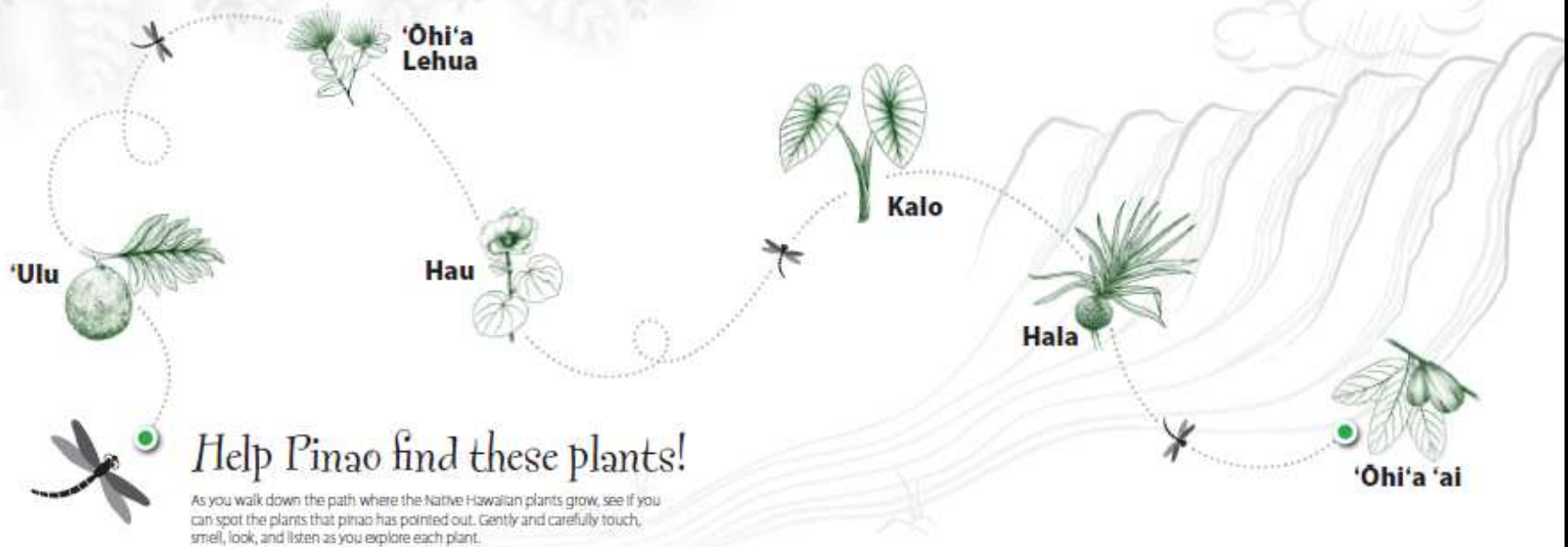


Plants used for canoe building.



Plants used for the construction of hale and other buildings.





Help Pinao find these plants!

As you walk down the path where the Native Hawaiian plants grow, see if you can spot the plants that Pinao has pointed out. Gently and carefully touch, smell, look, and listen as you explore each plant.

- **'Ulu** – The 'ulu, or breadfruit, is a tree whose fruits are used for food. The wood of the 'ulu tree is used for surfboards, medicine, and poi pounding boards.
- **'Ōhi'a lehua** – The 'ōhi'a lehua is a tree endemic to Hawaiian islands. Its hard wood is used for poles in house building, carving, and canoe building and its flowers are used for lei. Lehua flowers come in a number of colors including red, pink, yellow, orange and white.
- **Hau** – The hau is a lowland tree that comes from the hibiscus family. In olden times, its wood was used for outriggers for canoes, its bast fiber was used for rope and its sap and flowers were used for medicine.
- **Kalo** – Kalo, or taro, is the staple food of Hawai'i from ancient times. The cooked taro is pounded to make poi. There are numerous varieties of kalo plant, and each part of the plant can be used for food.
- **Hala** – Hala, or pandanus, is a tree whose leaves are used to weave mats, hats, bags and other accessories. The fruits of the hala are used for food and brushes, and other parts of the tree are used for medicine.
- **'Ōhi'a 'ai** – The 'ōhi'a 'ai, or mountain apple, is a tropical tree that often grows wild and is commonly found in shady mountain valleys. Various parts of the 'ōhi'a 'ai were used traditionally; the strong wood from the trunk was used in house-building, roots and bark were used for dyes, and leaves and bark were used in various ways for medicinal purposes.

Mo'olelo

The back of Mānoa Valley is famous for the wai ua, the rain water. The misty ua near the mountain is called Kauanoë. When the ua begins to move with the Haukani wind, it is called the Tuahine rain. This wai ua fills the waterfalls throughout the valley and also feeds the plants that grow in the valley.

Long ago, when only Hawaiians lived in Hawai'i, they farmed kalo throughout the valley and the wai ua was very important for the life of the lo'i kalo. The wai ua also helped to feed the Hawaiian forests in the area, with trees like koa, 'ōhi'a, and 'ilahi. But later, foreigners allowed cattle to run through Mānoa and the cattle stomped on all the baby Hawaiian plants so

they couldn't grow tall. With no trees or lo'i anymore, the wai ua couldn't be absorbed back into the earth.

Big trees were planted to catch the wai ua so that it could trickle back into the ground. But these big trees took over the valley and no Hawaiian plants could be grown.

Today, people are removing the big invasive trees and re-planting Hawaiian plants in Mānoa, which help to capture the wai ua and also are useful in many different ways. Let's go find some of these plants!

Hawaii.edu



mauimagazine.com



Kapiolani.hawaii.edu



"The kids here, they get to work in the lo'i. They get to pull taro, pound it, make poi, eat it...we have Hawaiian games...we like to use a lot of the Hawaiian values...malama 'āina (care for land), lōkahi (haramony), and we do teach about the ahupua'a...[so] we're quite immersed in Hawaiian things"
(Environmental educator, personal communication, July 19, 2012).

The Tree of the Great Long Leaves



Eagle: Sits atop of the tree, chosen for its superior vision to watch for the signs of aggression and unhealthy mind.

Pine Cone: Model for leadership: Male chiefs and female clanmothers.

Branches: Spread outwards to provide shade/shelter for those individual and nations seeking protection under the message of peace.

Needles: A symbol of the union between the original Five Nations (Mohawks, Oneidas, Onondagas, Cayugas and Senecas).

Trunk: A symbol of confederacy chiefs as they support the nations and individuals; as well as a symbol of singlemindedness or unanimity.

Roots: Four white roots of peace spreading in four directions towards other nations and individuals sharing or willing to accept the message of peace.

Uprooting: To bury the weapons of war underneath the tree and allow the stream below to take them away from future generations.

One touch of nature
makes the whole world kin
— William Shakespeare (*Troilus & Cressida*)





www.cornellplantations.org