Meet the Plants

How well do you know your neighbors? Not the people next door, but the plants in our yards, mountains, and along our streams and coastlines? Hawai‘i’s native flora is among the most threatened in the world, and as good neighbors, we all share a responsibility to protect it. NTBG invites you to join our Meet the Plants campaign to increase awareness about what threatens Hawai‘i’s native flora, and how together we can save plants and people. To get involved, visit ntbg.org/meettheplants

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ON THE COVER

Passport stamps reflect breadfruit’s travels under a collaboration that spans the globe. The map image was adapted from a breadfruit suitability study showing geographic regions with the best growing conditions, modeled from WorldClim data of rainfall and suitability (Matthew P. Lucas and Diane Ragone, ArcNews, 2012)

The Bulletin is a publication for supporters of the National Tropical Botanical Garden, a not-for-profit institution dedicated to tropical plant conservation, scientific research, and education.

We encourage you to share this publication with your family and friends. If your household is receiving more than one copy and you wish to receive only one, please inform our Development Office at our national headquarters at: members@ntbg.org.

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ISSN 1057-3968
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OUR MISSION

To enrich life through discovery, scientific research, conservation, and education by perpetuating the survival of plants, ecosystems, and cultural knowledge of tropical regions.

The National Tropical Botanical Garden was chartered by an Act of United States Congress in 1964. The objectives of the institution were set forth in the Charter:

• to establish, develop, operate and maintain an educational and scientific center, with libraries, herbaria, laboratories, and museums...to encourage and conduct research in basic and applied botany;

• to foster and encourage fundamental research in tropical plant life and study the uses of tropical flora in agriculture, forestry, horticulture, medicine, and other sciences;

• to share knowledge acquired relative to basic and applied tropical botany through publications and other media;

• to collect and cultivate tropical flora and to preserve for the people of the United States species of tropical plant life threatened with extinction;

• to provide a facility which contributes to the education, instruction, and recreation of the people of the United States.

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Become an NTBG Fellow and join a special group of tropical plant enthusiasts

The Council of Fellows was established in 1985 as NTBG's leadership membership group to advance NTBG's core programs in tropical plant conservation, research, and education. This exceptional group of philanthropists has been instrumental in helping NTBG to become one of the most important tropical botanical gardens in the world. Annual membership dues begin at the $1,500 level and continue up to the $20,000 Chairman's Circle level. In addition to enjoying general membership benefits, Fellows are invited to NTBG's bi-annual Board of Trustees meetings and also have the opportunity to participate in specially arranged travel programs, which include visits to private and public gardens and explorations of botanical hotspots around the world.

Become a Member of NTBG and support tropical plant conservation

Your membership dues directly support tropical plant conservation and research, provide the resources to protect and cultivate our living collections, and educate the public about the importance of tropical plants at NTBG's five gardens and preserves. Membership levels range from $90 to $500 with a level to fit everyone from individuals to families. Contact: members@ntbg.org

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THE BULLETIN OF NTBG  | SPRING 2022
KAHANU GARDEN AND PRESERVE, MAUI

4 5
posted on a wall in the office of the Breadfruit Institute at National Tropical Botanical Garden headquarters, a world map is marked by a bright green band indicating where breadfruit grows best. That band represents the potential to improve food security, increase reforestation, and bolster economic self-sufficiency.

One of the Breadfruit Institute’s most successful partnerships is with the Trees That Feed Foundation (“Trees That Feed”). Co-founded in 2008 by wife and husband Mary and Mike McLaughlin, two Jamaican-born breadfruit enthusiasts, Trees That Feed was established as a non-profit organization with the encouragement and support of NTBG Trustee Emeritus Douglas McBryde Kinney who also introduced Mary and Mike to Dr. Diane Ragone, director of the Breadfruit Institute.

Mike and Mary wanted to do something about climate change, environmental degradation, and global hunger, while creating economic opportunities. With breadfruit, they found they could address all.

As Trees That Feed grew, two promising breadfruit varieties—the Samoan Ma’afala and Tahitian Otea—caught Mary and Mike’s attention. After years of collaboration between Diane Ragone and Dr. Susan Murch, a plant chemist and tissue culture researcher at the University of British Columbia – Okanagan, Ma’afala and Otea were identified for their vigor, nutritional
value, and suitability for mass micropropagation and global distribution.

Diane, who has spent more than 30 years studying and collecting breadfruit varieties from 50 Pacific islands, built the largest, most diverse collection of breadfruit varieties in the world. Since establishing a partnership with the Breadfruit Institute, Trees That Feed has distributed tens of thousands of micropropagated breadfruit trees originating from NTBG’s conservation collection to at least 18 countries and territories. Since 2018, Trees That Feed has purchased breadfruit treelets from Tissue Grown, a California-based plant tissue culture company which grows the Breadfruit Institute-sourced Ma’afala that Mary and Mike have mostly donated to growers in Central America, the Caribbean, and Africa. A portion of the trees are sold commercially which helps support NTBG and the countries of origin.

SOUTH PACIFIC VIBE

Tissue Grown’s president Carolyn Sluis explains how the tissue culture-raised breadfruit treelets are grown in peat and vermiculite plugs without soil. After acclimatizing in the greenhouse for six weeks, they are distributed around the world in flats of 72 saplings. Before the plants can be shipped, Tissue Grown must complete complicated and time-consuming shipping protocols through their local agriculture department. Once approved, the trees are sent by air and hand-delivered to overseas destinations by operations manager Karin Bolczyk.

Despite two years of the COVID-19 pandemic, Tissue Grown grew more than 100,000 Ma’afala and Otea in 2020-21. Last December, they shipped 1,800 Otea to Kenya with another shipment of three flats to Guinea in January 2022.

Calling Diane Ragone’s enthusiasm “infectious,” Carolyn hopes breadfruit will gain a foothold in more countries. For a company more accustomed to growing walnuts, pistachios, and cherries, breadfruit is somewhat unusual, but Carolyn and Karin agree that Ma’afala and Otea, with their “South Pacific vibe,” make breadfruit an irresistible feel-good crop.

PACIFIC CONNECTION

One of the farmers Karin has delivered breadfruit to was Nate Olive, owner of the 130-acre Ridge to Reef farm on St. Croix in the U.S. Virgin Islands. In the aftermath of the category-5 Hurricane Maria which devastated the region in 2017, Nate shifted his focus to growing breadfruit to replace lost trees and which he says proved to be a great morale booster.

Coordinating with Trees That Feed and Tissue Grown, Nate has already distributed some 3,500 donated trees on St. Croix, St. Thomas, and St. John. In addition to local Caribbean White and Yellow varieties, Nate grows Ma’afala which he distributes to farms, home owners, and government properties in order to improve food security and local economic development.

Breadfruit was introduced to the Caribbean in the 1790s and has long been used in traditional dishes like callaloo, tostones, and monfongo. Although breadfruit is considered a local crop, Nate says, “We’re very respectful of the food and its identity...we feel connected with our brothers and sisters in the Pacific.”

BREADFRUIT FOR ALL

Five hundred miles southeast of St. Croix, on the island nation of Barbados, breadfruit is eaten with flying fish as a mash called coucou. Barney Gibbs, chairman for the Future Centre Trust, one of Barbados’s oldest environmental NGOs partners with Trees That Feed to provide for urban reforestation. Barney says importing breadfruit has allowed him to introduce greater horticultural variety to the island.

Since 2015, Barney has received three shipments of around one thousand Ma’afala which, he says, has proven to be popular for its compact, easy-to-manage size. He adds that the pandemic has only made breadfruit more popular as a nutritious, reliable crop, and for use in value-added products like flour, chips, and other foods.

Barney’s main project is urban reforestation along a nineteenth-century railway line that was converted into a biking and walking trail. The Barbados Trailway project is being lined with breadfruit and other fruit-bearing trees, providing food for anyone who needs it. Other trees are given to local schools and community centers.

NEW TO AFRICA

Meanwhile, across the Atlantic, Catholic nuns in Kenya are harvesting what they call in Swahili shelisheli (breadfruit). Unlike in the Caribbean, breadfruit is a recent introduction. Joseph Matara, founder and executive director of the non-profit Grace Project (and...
At its core, the Trees That Feed Foundation is about helping people. Mary recalls shipping one thousand breadfruit trees to Haiti in July 2021. Those trees arrived less than 24 hours before Haiti’s president was assassinated, an event that led to great instability. One month later, Haiti was rocked by a 7.2 earthquake and powerful tropical storm which soaked the nation already upended by political violence, poverty, and COVID.

Mary says that after last summer’s earthquake, trees they had imported in 2012 proved to be a lifesaver when other food sources were cut off. “The work of Trees That Feed, and other partners is a testament to the power of breadfruit. "We are ecstatic about being able to do this for the people immediately around the epicenter of the earthquake."

Mike adds the network between the Breadfruit Institute, Trees That Feed, and other partners is a testament to the power of breadfruit. “We are ecstatic about being able to collaborate with NTBG. We couldn’t do what we’ve done if they hadn’t helped us so much.”

Mary too says she’s grateful for the partnership. “If breadfruit can be the source of a job, an environmental benefit, and feed the world’s poorest people, then I think we’ve done a pretty damn good job.”

So you like to get your hands in the dirt?
Absolutely! I live in a townhouse now. Not enough dirt!

What most draws you to The Kampong?
I think it’s the chance to get a bit of peace and quiet. Once you get inside and away from the gate, you don’t hear the traffic. It’s just peaceful. I don’t have to go to the gym — I get plenty of exercise at The Kampong. I don’t have to go to yoga because I can meditate, it’s so quiet. On Wednesdays, I come home exhausted, but it’s fun.

What kind of wildlife have you seen at The Kampong?
Yesterday there was a pair of hawks calling back and forth. I haven’t heard them before. There’s always lots of parrots and raccoons and foxes.

Foxes?
Yes! Foxes. And manatees in the canal. When it’s cold the manatees like the warm water closer to shore. Also, the occasional crocodile.

The Kampong is famous for fruit trees. Do you have a favorite?
Mangos! Lots of mangos. My friend goes for a preliminary graze before we work. She picks up all the fruit off the ground.

Can you describe the contributions of The Kampong and why you think it’s important to support NTBG?
Well, David Fairchild used it for introducing all sorts of things. These days it gives children a chance to see food growing on trees. Kids have no idea where their food comes from. That’s very useful. For adults it offers a bit of peace and quiet.

Also, a huge amount of the world’s biodiversity is in the tropics. There’s an awful lot we don’t know about those plants even now. Opening one’s eyes to the possibilities is a major role for NTBG. With the International Center for Tropical Botany at The Kampong going up next door, it will be an invaluable resource. I think that will be very important.

What do you do as a volunteer at The Kampong?
I visit once a week on Wednesday mornings with another volunteer, Eleanor. We do a little bit of everything: a lot of weeding, trimming, pruning, and that sort of thing. Last week I was mending a fence and transplanting.
How a Garden Can Save a Stream

By Dr. Uma Nagendra, Conservation Operations Manager, Limahuli Garden and Preserve with Puakea Moʻokini-Oliveira, Conservation Technician

Puakea Moʻokini-Oliveira snorkeling in the Limahuli Stream to gather data. Opposite page: Matthew Kahokuloa Jr. taking notes along the Limahuli Stream. Photos by Kassandra Jensen
In the middle of Limahuli Stream, cold mountain water cascades down boulders into a hip-deep pool. I am grateful for the wetsuit keeping me warm. Small river stones slick with algae slip beneath my tabis (water shoes). If I stay still, I might feel the dull pinch of Tahitian prawns nibbling my toes. Looking up at Limahuli Valley, I can see both sides of the cliffs where koʻaʻe (white-tailed tropic birds) dart into their nests. I don my snorkel mask, nod to lead technician Puakea Moʻokini-Oliveira, who is standing on the bank with a timer and waterproof datasheets, take a deep breath, and dunk myself into the frigid water to enter the aquatic world of freshwater fishes.

Immediately, several ʻoʻopu nākea¹ dart away along the stream bottom, leaving silty clouds in their wake. As I step in their direction, I can see an ʻoʻopu alamoʻo resting on a dark stone, its bright orange tail curled slightly against the rock contours. I almost miss the crowd of ʻoʻopu nōpili grazing on a patch of green algae because they are so close to the waterfall cascade.

This underwater survey is a component of The Hāʻena ʻOʻopu Restoration Project, a two-year project funded by the Hawaiʻi Fish Habitat Partnership in order to enhance stream health and ʻoʻopu population numbers in Limahuli Stream. Freshwater aquatic species like ʻoʻopu were once a major food source, although now few Hawaiʻi residents have ever seen one.

While this underwater world may feel completely removed from the terrestrial world we inhabit at NTBG, they are actually intricately intertwined. Limahuli Stream is the thread connecting all parts of the watershed from mauka to makai (mountains to the sea). From

⁠¹ ʻOʻopu are species (genus Awaous) of goby native to Hawaiʻi. The three most common ʻoʻopu in Limahuli stream are ʻoʻopu nākea (Awaous guamensis), ʻoʻopu alamoʻo (Lentipes concolor), and ʻoʻopu nōpili (Sicyopterus stimpsoni).
Dr. Kawika Winter was director of Limahuli Garden and Preserve from 2005 to 2018. Although Limahuli Stream is considered “pristine,” with high levels of biodiversity and among the least disturbed stream systems on Kaua‘i, it is home to far fewer ‘opu than neighboring Hanakāpī‘ai Stream. A past comparison of the two suggests that the amount of sunlight reaching the streams could be a major contributing factor to the lower population in Limahuli. Native green algae are the foundation of the riparian food web, and thrive in high light conditions.

One of the main activities of this project was the selective trimming of Schefflera actinophylla, a highly-invasive tree species that threatens the health and resilience of the riparian ecosystem by preventing sunlight from reaching the stream, which limits green algae growth. The tree’s high evapotranspiration rates and inhibition of understory growth reduce groundwater penetration and storage, contributing to flash floods and erosion. Schefflera’s sprawling growth forms also threaten the integrity of valuable cultural resources. For this project, invasive trees were trimmed by an experienced local arborist crew (Halele‘a Tree Service), with the help of Limahuli Garden staff.

Afterwards, Puakea and I started planting on the freshly cleared stream banks, with the help of many other Limahuli staff, KUPU service members, and volunteers. We hand-carried and planted over 4,742 native plants like ko‘oko‘okohe‘ehe‘e (Hibiscus suurinamensis), hala (Pandanus tectorius), and many others.

The mix of species was selected in consultation with previous restoration managers and living collections experts at NTBG. These included species sourced from northwest Kaua‘i, quick to establish and grow in riparian areas, and which have strong root systems that will help prevent future erosion on a now-vulnerable stream bank. We also chose a few species that are likely pollinated by moths (scented, white, night-blooming flowers) in order to further promote moth habitat, including endemic Hypsomoconus and the ‘ope‘ape‘o (Hawaiian hoary bat) that feeds on them.

Throughout the project, Puakea conducted stream surveys to assess how the aquatic wildlife were responding to this change. The entire 1,500-foot restoration area was divided into three 500-foot sections where we swam for this change. The entire 1,500-foot restoration area was divided into three 500-foot sections where we swam for underwater census of the aquatic animals. We also surveyed a cross-section of different parts of the stream to document the algal growth, substrate composition, and stream characteristics like water temperature, flow rate, and canopy openness of the stream. Spending so much time along the stream banks allowed us to observe just how many other species enjoy this area as well. By investigating the lower stream, Puakea was able to note how hīhīwai⁴ migrated up the stream into our restoration zone — and even spotted their small pink eggs on the rocks. While we planted or weeded, we were often joined by an auki (Black-crowned Night Heron) standing statue-like to fish on a nearby boulder, or a pair of Koloa maoli ducks playing in the current.

One of the best parts of this project was working with school groups, volunteers, and partnering community organizations. Although COVID precautions limited our interactions after the first six months of the project, we were able to welcome two recurring classes from Kanuilapono Public Charter School, a work-exchange with the Waipā Foundation, and a new stream research collaboration led by the non-profit Nā Maka Onaono.

Our results indicated that canopy openness alone was not enough to boost ‘opu population numbers within the time frame of this project. Aquatic animal diversity remained high, however, and indicators of stream health such as temperature were unchanged. By restoring the stream banks to native habitat, the stream corridor should now be even more hospitable to native birds, bats, and invertebrates, and safer from the invasive tree falls that exacerbated flood impacts in 2018.

The completion of this project is just the start of this important new restoration area. In order to sustain those benefits, we will need to continue maintaining the stream corridor. Ongoing collaborative stream monitoring will also help improve our understanding of watershed resilience both in the Limahuli Valley and in freshwater systems all across Hawai‘i.

Editor’s note: The author wishes to thank those who contributed significantly to this project: Kawika Winter, Ashley Ramell, Sauri Umetu, Moku Chandler, Noah Ka’umoona, Pelika Andrade, Mackenzie Pagett, Lauren Pederson, Matthew Kahokuia Jr., Kassandra Jensen, Joshua Diem, Emma Stauber, and others. Funding for this project was provided by The Hawai‘i Fish Habitat Partnership, which is coordinated by the U.S. Fish and Wildlife Service.
The International Union for Conservation of Nature (IUCN) publishes the online resource, The IUCN Red List of Threatened Species, ranking taxa (species, subspecies, or varieties) in one of nine categories from ‘Not Evaluated’ to ‘Extinct’. The Red List is an invaluable tool for not only scientists, educators and policy makers, but for anyone seeking a better understanding of the conservation status of plants and animals around the world.

In recent years, conservation agencies, institutions, and organizations including NTBG have increased efforts to assess the nearly 1,400 native plant taxa in Hawai‘i. To date, nearly half have been assessed, reviewed, and published on the Red List, adding to the more than 58,000 plant taxa published through the latest update of the Red List worldwide.

**Species: Pipturus ruber (Urticaceae)**

**IUCN RED LIST CATEGORY: ENDANGERED (EN)**

*Pipturus ruber* is a strikingly beautiful Kaua‘i single-island endemic shrub in the nettle family that occurs in montane wet forest, bogs, and riparian habitats. An estimated 38,400 individuals occur among 12 subpopulations. Although those numbers are higher compared to most of the other Kaua‘i single-island endemic plants, *P. ruber* faces the same threats as all of our native plant species such as habitat degradation by non-native animals and competition by non-native invasive plant species.

Field botanists of NTBG have made seed collections of *P. ruber* over the years. Seeds are stored in NTBG’s Seed Bank and plants are maintained in NTBG’s McBryde and Limahuli Gardens and utilized in Limahuli’s restoration projects. – Seana Walsh, Conservation Biologist

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### Leaving a Legacy

When I first came to Kaua‘i, some 30-odd years ago, you couldn’t get me off the beach or out of the water. After the grey skies and freezing water of England, this was paradise, indeed. I had no inclination when my friends suggested we go hiking up in the cold mists and clouds of Koke‘e, but they insisted.

As we climbed the road along Waimea Canyon, I began to understand why they had been so keen; the scenery was spectacular. We eventually arrived at the Kalalau Valley look and I was awestruck. I had never seen anything so beautiful, so grand — from the jagged cliffs, all the way down to the sparkling blue ocean. It was like a cathedral. It took my breath away. After drinking in the view, we continued along Pihea Trail to the Alaka‘i Swamp “trail.” (This was long before the boardwalk, and to call it a trail was an extreme exaggeration!)

In the Alaka‘i, I was struck again by the beauty, power, and mystery of the place. Since then, I have returned to Kalalau and the Alaka‘i many times, and they have never lost their magic for me. Sadly, I have also noticed a decline, especially in the native forest birds and the flora on which they and so many other animals depend.

I became engaged in learning more about the issues facing Hawai‘i and other tropical ecosystems. This naturally led me to NTBG. On a visit to Limahuli Garden, Kawika Winter, former Limahuli Garden Director, explained the deep connection between the Native Hawaiians and the land and sea. They were able to live in balance, each benefiting from the other. He explained how these principles could be applied to solve many of the environmental and social challenges facing our world today, and how NTBG was furthering these efforts.

NTBG works to preserve remaining wild populations of native species, and to provide a “bank” against future extinction. This work is so important if these remarkable, unique tropical ecosystems are to survive. I have also seen that every dollar donated to NTBG is a dollar spent on the mission itself; it is used wherever it will do the most good.

My love for what I have experienced on Kaua‘i, and what I hope others will be able to experience a hundred years from now, has led me to leave a planned gift to NTBG. Even if I may not be around to see it, I know the money will go towards preserving these unique plants.

— Keith Evans, NTBG member
Marseille is France’s oldest city. It may also be its most patient. When the International Union for Conservation of Nature (IUCN) named the Mediterranean metropolis to host its World Conservation Congress (WCC), it was scheduled for June 2020, but as the COVID-19 pandemic swept the globe, the event was put on hold.

NTBG’s involvement with the WCC goes back to 2008 when the congress was hosted by Barcelona. At the time, those of us in Hawai‘i’s conservation community felt strongly that we had much to share with the world. Working with the Hawai‘i Conservation Alliance (HCA) Steering Committee, we urged our local leaders to pursue closer involvement with IUCN.

The movement gained momentum in 2012 at the WCC hosted by Jeju Island, South Korea. Following that congress (and eight years of hard work by many groups and individuals), we rejoiced when Hawai‘i was selected to host the 2016 WCC¹—the first time the event would be held in the United States.

¹ More than 10,000 delegates from 192 countries participated in the 2016 WCC in Honolulu, the largest attendance since the first congress in 1948.
Buoyed by this success, we knew Hawai‘i had many important contributions to make and so, like everyone in Marseille (and around the world), we waited patiently, and we planned. After being postponed twice by the pandemic, Marseille was finally able to host a hybrid in-person/virtual congress in September 2021. When Hawai‘i’s 36-person delegation arrived, we were a fraction of what we had planned to send, and we knew we had a lot to do. The three of us were representing not only NTBG, but all our colleagues, partners, and the IUCN Hawai‘i Hui (group) which includes around 100 conservation organizations and individuals who played a key role in planning our contribution to the WCC.

In preparing for Marseille, the Hawai‘i Conservation Alliance leadership committee studied the successes of the 2016 WCC. We recognized the importance of demonstrating Hawai‘i’s biological and ecological diversity as well as its unique cultural foundations that evolved in an island system, itself a microcosm of Earth. Importantly, our delegation contributed to a strong Indigenous global presence at the WCC.

One of our goals was to convey how Hawaiian culture flourished even as it maintained a remarkably low ecological footprint and developed a reciprocal relationship with the environment, regarding all life on land and sea as family. Because of Hawai‘i’s culture of mālama ‘āina (caring for the land), many cultural practitioners are also stewards of natural resources. This allowed us to offer Hawaiian protocols for the opening of the Oceania-Hawai‘i Pavilion where we prepared authentic Hawaiian mementos for IUCN partners. Our key message was one of biocultural conservation, rooted in the work of NTBG and like-minded partners across Hawai‘i.

Recognition of the critical role of Indigenous people in preserving the well-being of the world into the future was reflected in a motion to include Indigenous people’s representation in IUCN leadership. Also of note was the re-acknowledgment of the ‘Doctrine of Discovery’ as it relates to plants. Cultural activities such as weaving lau hala (pandanus leaf) bracelets proved to be immensely popular and we were thrilled there was so much interest in Hawai‘i.

**MĀLAMA ‘ĀINA CULTURE**

In presenting NTBG’s conservation activities to international delegates, we shared how our work contributes to biocultural conservation through the demonstration of mo‘olelo (stories) and mele (chants) as they relate to plants. Cultural activities such as weaving lau hala (pandanus leaf) bracelets proved to be immensely popular and we were thrilled there was so much interest in Hawai‘i.

**BIOCULTURAL CONSERVATION**

One of our most important functions in Marseille was to demonstrate how biocultural conservation is primarily driven by the deep connection between Hawaiian culture and the natural world. Ancient wisdom guided Hawaiians to live within the means of their environment. We shared how this wisdom continues to guide conservation and restoration work at NTBG, as exemplified in the documentation of native flora, fauna, and ecosystems in Limahuli Garden and Preserve and across the Hawaiian Islands.

In presenting NTBG’s conservation activities to international delegates, we shared how our work contributes to biocultural conservation through the demonstration of mo‘olelo (stories) and mele (chants) passed down over generations. This rich biocultural heritage helps perpetuate the understanding and appreciation of Hawai‘i’s deep ties between people and nature. By finding and describing kīoō lā‘au (physical manifestations of natural deities), NTBG strengthens links from ancient stories to modern cultural practitioners.
We shared the notion that daily acknowledgement of ancestral wisdom makes a positive difference in the perpetuation culture within the framework of NTBG’s conservation efforts. Doing so requires an intentional and deep knowledge, both inherited and learned. Sharing our heritage and putting these relationships in context resonated with WCC attendees from other parts of the world, many of whom recognized our struggle to preserve our own ancient Indigenous knowledge as a familiar theme. It was a valuable forum to bring the stories, culture, history, and the world views of Native Hawaiians to a global audience.

BEYOND MARSEILLE

Today we face a world inexorably headed to a tipping point marked by a dramatic loss of biodiversity. Many scientists believe this will result in a cascading impact on the climate, imperiling human civilization and our fundamental well-being. Looking beyond Marseille, guided by the compass of wisdom and experience, we must act with speed, clarity, and vision.

The scale and complexity of the challenges before us demand global commitments. As the world’s largest conservation organization, the IUCN is positioned to help shift the current trajectory toward a more sustainable future. Between now and the next congress in 2024, NTBG, our partners throughout Hawai‘i, as well as all who share the same values, hold the opportunity and responsibility to play a positive and influential role helping chart the course ahead. Our ability to listen, learn, and lead has never been more important. The time for patience is over.

ADMINISTRATION/FINANCE

Two chairs for front office - $500

BREADFRUIT INSTITUTE
Ergonomic office chairs - $700
Monochrome laser printer - $250
Work boots for BFI Agroforestry Technician - $200

KAHANU GARDEN
Thirty pots for rare indigenous crop cultivars - $400
Shindaiwa T242 Weed eater - $450
Kitchenware and cutlery - $350

LIVING COLLECTIONS AND HORTICULTURE
Utility Nursery Cart - $500
Laptop for Plant Records - $600
Grow Lights for Fern Lab - $450

MCBRYDE AND ALLERTON GARDEN
Push mower - $600
Batteries for 2-way radios - $400
Hand Pruners - $200

SCIENCE AND CONSERVATION
Extra drone batteries - $300

THE KAMPONG GARDEN
Work boots for staff - $300
Greenworx battery-powered hedge trimmer - $300
New desk for Operations Manager - $600

VOLUNTEER PROGRAM
Polyester fiberfill to stuff animals - $30
4mm polyester braided cord - $30
Batik or Hawaiian cotton fabric - $50

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inviting habitat for seabirds which are now returning to take root and produce new plantings to create a more winter rainy season. Conservationists hope the seeds will be hand-scattered in select restoration sites on the remote islet. The dispersal was timed to coincide with the flowering of ahuʻawa (Fimbristylis cymosa) sedges like ahuʻawa (Cyperus javanicus), in the coffee family. A special clay formulated to hold the seeds includes the mega-diverse genus Solanum (tomatoes, potatoes, eggplants). Since the 1980s, Dr. Knapp has conducted extensive field work in Central and South America as well as in China and Uganda, with a focus on indigenous crop diversity, phylogenetics, and traditional uses of Solanaceae and other plant families.

In addition to describing more than 100 new plant species, Dr. Knapp has served as president of the Linnaean Society of London since 2018, a position she holds through May 2022. She is the author of more than 270 peer-reviewed scientific articles and has written, edited, or contributed to 30 scientific and popular books about plant exploration, discovery, and botany. Dr. Knapp also studied maiapilo seed dormancy, viability, and storage protocols for better conservation and possible use in native landscaping. As part of the research, she conducted a field study to determine the potential for introducing maiapilo into the Hawaiian Islands for better conservation and possible use in native landscaping.

Upon learning of her selection to receive the Fairchild Medal, Dr. Knapp said, “It was a real surprise. I thought, ‘What? This is crazy, there must be some mistake!’” adding that she felt incredibly honored. Dr. Knapp, the 23rd recipient of the Fairchild Medal, followed Dr. Ruth Kaw (2002) and Dr. Jan Salick (2020) as just the third woman to receive the medal since it was first awarded in 1999.

Born in California and raised in New Mexico, she said that her chance selection of a field botany elective as an undergraduate at Pomona College changed her life. After her first trip to examine plants under a microscope in the desert, she was hooked.

Reflecting on four decades of botanizing, Dr. Knapp says the increasingly collaborative nature of field work has been a force for good, strengthening relationships among colleagues, and making for a more inclusive approach to science. In response to the suggestion that scientists should avoid political or societal issues, Dr. Knapp disagrees. "Scientists are part of society and need to be concerned with societal issues," she says, "even when it is uncomfortable, which it often is."
Among the two dozen or so ‘canoe plants’ introduced to Hawai‘i by the first Polynesian voyagers, sugarcane is one of the most widely grown in the tropical world. Called kō in Hawaiian, elsewhere sugarcane is known as tó (Marquesas, Tonga), tolo (Samoa, Tuvalu), and dero (Fiji). This sturdy member of the Poaceae (grass family) may have been first cultivated in Papua New Guinea, possibly originating as Saccharum spontaneum, a relative of S. officinarum. Kō is valued for its sucrose-rich fibrous pulp which is used to sweeten food, drinks, and medicine or (as old-timers will tell you) cut fresh with a cane knife and chewed in the field. For early Hawaiians, kō was more than a sweetener. It provided thatching, mulch, compost, an ornamental wind break, and served as a soil stabilizer.

NTBG senior research botanist Dr. David Lorence first encountered sugarcane as a Peace Corps volunteer in 1970, working in a program of agricultural diversification with the Mauritius Sugarcane Industry Research Institute. Like Hawai‘i, the southwest Indian Ocean island nation supported a vibrant sugarcane industry before it turned toward tourism.

Dave Lorence notes that while sugarcane has played a central role in the economies and development of many tropical countries, it also bears a darker history based on slavery and indentured laborers. Fortunes were made and empires built on the backs of laborers who toiled in cane fields doing back-breaking work, cutting and stacking cane by hand in dirty, sometimes dangerous conditions. Furthermore, the industry was known for its insatiable (and often destructive) thirst for water, waste runoff, heavy fertilization, and industrial pollution. During harvest time, when drier, lower leaves were burned off the cane, Hawai‘i’s skies blackened with soot and ash.

Hawai‘i’s own industrial sugarcane industry began on Kaua‘i in the town of Kōloa and quickly spread across the islands, fueling the migration of workers from Asia, the Caribbean, and beyond, leading to cultural and societal shifts that remain today.

Despite its checkered past, many in Hawai‘i harbor deep affection for kō, and rue wistfully for the recent past when the days grew shorter, the cane grew taller, and its silvery tassels blew in the wind, signaling autumn harvest, the rising of the Pleiades (Na huihui o makali‘i), and return of the Hawaiian Makahiki season.

Earlier this year, NTBG hosted Dr. Noa Kekuewa Lincoln, a Hawaiian crop specialist at the University of Hawai‘i. Noa worked closely with NTBG staff to verify the provenance and identity of the Garden’s kō collection. Presently, NTBG has 11 sugarcane cultivars in McBryde Garden, eight at Limahuli Garden, and an estimated 27 at Kahanu Garden. Kahanu Garden director Mike Opgenorth worked with Noa to verify cultivars and identify duplicates among the garden’s collection. Mike says that Hawaiian kō varieties have adapted to thrive in very specific microclimates which can make growing them together in one collection a challenge. With its mix of traditional Hawaiian cultivars and other, more recent ones, Mike says Kahanu Garden is a great place for people to experience the splendor of sugarcane growing in robust clumps.

On Kaua‘i, NTBG curator of living collections Mike DeMotta, stresses the importance of NTBG’s kō collection as a repository of living scientific and cultural germplasm where scientists and educators like Noa Lincoln can do research and teach others. In January, Noa and Mike presented a kō workshop in McBryde Garden.

Mike spoke of the importance of the plants in perpetuating cultural knowledge, naming a little-known variety called Kō‘eli lima a ‘o Halāli‘i which translates as the hand-dug cane of Halāli‘i, a rare white-stalked cane known to grow in the sandy dunes along Halāli‘i, a seasonal lake on the island of Ni‘ihau. When exposed to the sun, the cane’s stripes turn lime green and iridescent pink. Nourished by Ni‘ihau’s freshwater springs and periodic rainfall from Mt. Pān‘au, the legendary kō is mentioned in the centuries-old stories and chants of Ni‘ihau.

“The Hawaiians name everything and have a reason for doing that. Every wind and every rain has a name. Every cultivar of every canoe plant also has a name,” says Mike. “But if you don’t know the name, you don’t know what you can do with it.”
NTBG STAFF, VOLUNTEERS, AND COMMUNITY PARTNERS CAME TOGETHER TO IMPROVE THE HEALTH OF THE LIMAHULI STREAM, ONE OF THE MOST BIODIVERSE IN HAWAIʻI. READ MORE ON PAGE 12. PHOTO BY UMA NAGENDRA