As I balanced on one rubber boot while pouring chocolate-colored water out of the other, I had to admire the surefootedness of our field assistants. Members of the Maijuna indigenous group, these men regularly venture into Peru’s Amazonian palm swamps, where we are conducting our research, to collect plant material or hunt for their families—and they do so without constantly sinking to their knees in mud as I did! The Maijuna are important collaborators with our fledgling research project. Having banned logging on their traditional lands, local people are searching for ways to earn sustainable incomes while remaining good stewards of their land. Our research in the aguaje palm swamps just may help them and conserve Amazonian wildlife at the same time.

High in beta-carotene, aguaje fruit is an important part of Amazonian diets for people and parrots like blue-and-gold macaws. Several tons of this fruit are sold in markets each day.
The Applied Plant Ecology Division’s project focusing on aguaje *Mauritia flexuosa* is a case study of a regional problem in the Peruvian Amazon. With a range stretching across most of the Amazon Basin and growing in a variety of wet habitats, aguaje is one of the most widespread palms in South America. Yet in some areas of Peru, the palm population has been decimated by local people cutting down trees to collect fruit for markets. The extensive palm forests may not always appear damaged, and aguaje may still dominate the canopy, but closer examination reveals that these forests are composed of only male palms. Aguaje is a dioecious plant, which means male and female flowers are produced on different individuals. Only female trees produce fruit, so only females are cut down.

A decline in female aguaje affects more than the palm population. Many animals depend on aguaje fruit as a major food source, including macaws, other parrots, primates, and tapirs. Even fish take advantage of floods to access fallen fruit. While animals do not necessarily make the swamps their home, they do use the swamps as resource patches, a place to visit when the aguaje fruit craving hits.

People, including the Maijuna, also use aguaje palm swamps as important resources. The fruit is a good source of nutrition and serves to draw in game for subsistence hunting. Aguaje swamps include a plethora of useful plants, such as *aña cajo* for treating snakebites and *yototoñi* from which the Maijuna cut sections of the impressive buttress roots to make canoe paddles. Along with these traditional uses, people sell forest products, including aguaje fruit, in order to buy food, medicine, and school supplies.

With such dependence on this palm species, it is easy to see why the prospect of aguaje management excites the Maijuna. A vital first step in resource management is knowing the current state of the resource, both ecologically and economically. We sought to gain this understanding during our first research trip in July, using both ecological research methods (trudging through swamps identifying and measuring trees) and social science methods (interviewing local people). This is a collaborative project between our team, the Maijuna, and Dr. Michael Gilmore of George Mason University in Virginia.

Intensive harvesting in the 1990s has taken its toll. Male palms now outnumber female palms by almost four to one. Fortunately, destructive harvesting has not been going on for too long; most sites we visited retain an understory dense with young palms just waiting for a gap in the canopy to continue growing.

Having banned logging on their traditional lands, local people are searching for ways to earn sustainable incomes while remaining good stewards of their land.

Many parts of aguaje plants are opportunistically used by Maijuna community members. This man is quickly making a basket from a palm frond that will be used to hold fruit.

Our team treks through palm swamps to measure the impact of destructive harvesting on aguaje, a key palm resource. FRONT ROW (LEFT TO RIGHT): Applied Plant Ecology Director Dr. Bryan Endress, local botanist Elvis Valderrama, and Maijuna guide Alberto Mozoline Mogica. BACK ROW: Local botanist Victor Vargas, Maijuna guide Victorino Rios Torres, Applied Plant Ecology researcher Christa Horn, and Maijuna guides Elvio Mogica Rios and Duglas Rios Vaca.
Meet a Conservation Researcher

CHRISTA HORN, Senior Research Technician, Applied Plant Ecology

Christa Horn grew up in a small Mojave Desert town called Ridgecrest and became a first-generation college graduate in her family. Smart, bright, and determined, Christa left her windswept hometown to attend Stanford University. She earned her bachelor’s degree in the Earth’s Systems Program, an interdisciplinary environmental science major, with a minor in Anthropology. It appealed to her broad range of interests, including how to investigate complex environmental problems caused by human activities and natural changes in the Earth’s systems. “I loved this course of study as it taught me a range of skills in science, economics, and policy, all of which are needed to help solve environmental problems. My emphasis was in biology, but I really gleaned a sense of the ‘big picture’ in the program,” Christa said. She went on to earn her master’s degree in the same program. “It’s important to mesh the human aspect with ecology and conservation,” she added. “That’s why I love my job here at the Institute—it is a great use of my skills and knowledge base, while also being a challenge.”

Christa is a key player with the many conservation projects undertaken by the Applied Plant Ecology Division at the Institute. For instance, she took the lead on a conservation project in the Peruvian Amazon to assess the health of aguaje palm swamps. The fruit of this palm is in high demand for both wildlife and people, and only the female palms grow the fruit. Unfortunately, the fruit-bearing part of the tree can reach over 100 feet high, so people often cut down the trees to harvest the fruit, a practice recognized as ecologically and economically unsustainable. This project focuses on evaluating the health of palm populations. It will also explore propagation and restoration actions to evaluate alternative forms of harvest, which can promote biodiversity conservation as well as meet the needs of local communities.

It’s important to mesh the human aspect with ecology and conservation....

Current harvest levels are not very intensive, and harvesters sometimes use climbing harnesses, allowing them to collect fruit without cutting down palms. However, the intimidating height of some aguaje palms—stretching above 115 feet!—and limited availability of harnesses prevent a complete halt to destructive harvesting.

From our initial study, some management decisions are clear, such as making climbing harnesses more available. But it is also clear that the time to act is now. A few sites show signs of heavy harvesting, with males outnumbering females eight to one. More active restoration, such as planting seedlings or opening gaps by cutting down male palms, might be called for at these sites.

Although we have recommendations from this initial trip, our research will not stop here. Monitoring recovery of managed aguaje swamps, setting cameras to document how wildlife species use impacted and pristine swamps, and studying more sites are all in our upcoming plans. Forests with female aguaje providing enough fruit for both wildlife and a sustainable resource for the Maijuna community should be the end result of this exciting new project.

Many Amazonian animals, including tapirs, depend on aguaje fruit as a food source.
The global population of `alala dropped to a low of approximately 20 birds in the early 1990s, including the small flock that had been established in captivity. The San Diego Zoo has been involved in conserving the `alala since 1993, initially through its collaboration with The Peregrine Fund. Today, the San Diego Zoo Institute for Conservation Research manages the Hawaii Endangered Bird Conservation Program, a unique partnership with the U.S. Fish and Wildlife Service and the Hawaii Division of Forestry and Wildlife. The goal of the program is to prevent extinction and promote recovery of critically endangered Hawaiian forest birds, with a primary focus on the `alala.

Almost the entire population of `alala is maintained at the Keauhou Bird Conservation Center on the Big Island and the Maui Bird Conservation Center. Our multitalented team of research associates performs a multitude of duties ranging from bird husbandry, veterinary care, and aviary maintenance to the science-based management of behavior and reproduction.

The only `alala residing outside of Hawaii is a rather special character named Kinohi, who lives long-term at the Paul Harter Veterinary Medical Center (based at the San Diego Zoo Safari Park), where the Institute’s Reproductive Physiology staff visit him daily, in an attempt to collect semen samples. Unfortunately, due to behavioral problems, Kinohi has little probability of breeding with female `alala and requires a helping hand if he is to have any chance of passing on his genes to future generations.

The Institute’s Wildlife Disease Laboratories staff also plays a vital role in supporting the `alala recovery program, using their skills in clinical pathology to analyze blood and fecal samples to investigate evidence of disease. In the rare occurrence that an `alala dies, its body is rapidly shipped to San Diego for our pathologists to explore the cause of death.
Immediately afterward, tissues are collected by the Institute’s geneticists, who culture cells for eventual storage in the Frozen Zoo®, allowing them to live on in anticipation of future technological breakthroughs.

The `alala has proven to be a challenging species to propagate in captivity, with efforts hindered by a disappointing rate of hatching healthy chicks, due to high levels of embryonic mortality and congenital abnormalities. Consequently, the `alala is intensively managed to maximize reproductive success by using behavioral analysis, artificial incubation, and hand-rearing.

We are happy to announce that the 2010 breeding season has been our most productive `alala season to date. The team hatched a total of 13 chicks, with 11 youngsters being successfully raised to independence.

One of the flagships of the Hawaiian forest, and a key species for the dispersal of native fruits and seeds, is the `alala, or Hawaiian crow.

Every healthy `alala chick that hatches is a victory for our conservation program. Researchers are working hard to ensure chicks survive by relying on artificial incubation of eggs and hand-rearing of young birds.

The team hatched a total of 13 chicks, with 11 youngsters being successfully raised to independence.

The `alala population has risen by 30 percent in two years, bringing the flock to a total of 77 birds and representing a significant step away from the brink of extinction.

Of course, the ultimate goal of `alala recovery is to reestablish a viable population in the wild, as part of a multifaceted approach to ecosystem restoration. A flourishing captive population is only the first major step. We look forward to working with our partners on the next steps in the conservation of the `alala. Protecting and managing the forest habitat will be a demanding task and lengthy process. For now, our challenge is to continue the reproductive success, while we develop strategies and resources for the exciting prospect of reintroducing `alala back to the wild.
You might be wondering, “What does a garden have to do with conservation?” First, a garden connects people to nature. Second, this is not just any garden!

That gardens connect people to nature is not a stretch for the imagination—many studies have proven this. But connecting gardens to conservation—that needs a little more explanation. The La Jolla Community Garden, which we are creating in collaboration with the La Jolla Band of Luiseño Indians in Pauma Valley, is an example of community-based conservation that incorporates a local community’s needs and ideas into solutions for sustainable conservation.

Community-based conservation addresses political, economic, social, cultural, and ecological aspects of conservation, with the goal of decreasing threats through multidisciplinary approaches and solutions. It can include education but more often includes research, policy development, and capacity building. Community-based approaches are being incorporated into the Institute’s conservation projects in Vietnam, Mexico, Peru, and Cameroon. Together with local communities, we work to develop alternative livelihood and economic solutions that reduce threats to wildlife, science, and social science curriculum standards will be incorporated into garden activities for students. Educational workshops led by Native American plant specialists and educators will highlight the ecological importance of native plants and associated cultural traditions. An ethnobotanical guide is being created that incorporates the community’s culturally important native plants and their uses as well as Luiseño names and locations where wild populations of these plants can be found on the reservation.

The collaborative La Jolla Community Garden provides a model approach that revitalizes cultural and ecological practices and traditions to connect people to their land as well as enhance local native habitat conservation. Community-based conservation projects such as this link diverse conservation approaches to engage and empower communities as active participants and advocates for conservation.
HONORS AND AWARDS

Director of Genetics Dr. Oliver Ryder was awarded the highest honor bestowed by the American Genetic Association as the Wilhelmine Key Distinguished Lecturer at the 2010 annual conference in Hilo, Hawaii.

Applied Animal Ecology field team member Javier Vallejos Guerrero received a 2010 Disney Conservation Hero Award for his innovative research and habitat protection efforts for Andean bears in Peru.

Dr. Lance Miller (Behavioral Biology), Jeff Andrews (Collection Husbandry Science), and Dr. Matt Anderson (Behavioral Biology) received one of six American Association of Zoos & Aquariums Poster Awards for their research on elephant activity levels and walking rates.

THE SCIENCE OF SAVING SPECIES


This paper examines the physiological consequences of potential climate change scenarios for the koala, focusing on the water and energy budget of the species.


The results of this study, which have important implications for translocation of endangered iguanas, show a survival advantage for hatchlings that disperse into open habitats where fewer predators occur.


Using laser traps, this research answers evolutionary questions about how sperm compete for eggs by showing that sperm from primates that mate with multiple partners swim faster and with greater force than sperm from primates that have a single mate.

The Institute for Conservation Research is grateful to the following for their support of imperiled species:

A grant from an Anonymous Foundation will assist the Applied Animal Ecology Division in conserving the Andean bear and its native habitat in Peru. A donation from the American Psychiatric Association was directed to koala research through the Behavioral Biology Division and to the Conservation Education Lab. A grant from Allen and Kay Autry was given to Behavioral Biology for the okapi bioacoustics project. A gift from Patricia Beckman will provide classroom visits from area schools to the Conservation Education Lab. A grant from the James & Kathryn Colachis Fund at the San Diego Foundation will provide funding for the California condor release program in Baja California, Mexico. A centrifuge was purchased for the Reproductive Physiology Division, thanks to a donation from the William H. and Mattie Watts Harris Foundation. A grant from the Max and Yetta Karasik Family Foundation is helping to conserve endangered Hawaiian birds in their native habitat. A grant from the Maurice J. Masserini Trust contributed toward the purchase of wildlife disease detection equipment, and the McBeth Foundation gave a grant to provide the Wildlife Disease Laboratories Division with an optical plate reader for disease diagnosis. A donation from the Sahan Daywi Foundation will assist Andean bear conservation in Peru. A grant from the Ellen Browning Scripps Foundation was made to the Wildlife Disease Laboratories Division for research on insect-transmissible diseases. Dr. James and Mrs. Carolyn Sheldon made a gift in support of the California Condor Recovery Program. A contribution from the Joan Irvine Smith and Athalie R. Clarke Foundation will assist the Applied Plant Ecology Division in seed banking of native California plants. A gift from Shirley Sykes was given in support of Molecular Diagnostics. A grant from U.S. Bank will enable area educators to attend Summer Life Science Teacher Workshops in 2011. Funding from the Don and Marie Van Ness Fund at the San Diego Foundation will contribute toward the Summer Student Fellowship program in 2011, and the Walter W. and Betty C. Zable Foundation gave a grant to sponsor a Zable Summer Fellow for 2011. A grant from the Steven and Carole Weinberg Foundation made possible the purchase of a centrifuge with rotors and adaptors for the Desert Tortoise Conservation Center.

We are also thankful for gifts we received from the following estates:

Living gorilla cells were sent to the University of Cambridge, England, as part of a collaborative project to purify individual chromosomes that can help us understand patterns of male migration and environmental changes over time.

With our collaborators, we released 36 captive-bred mountain yellow-legged frog tadpoles into a high-elevation stream in the San Jacinto Mountains as part of an effort to establish new populations of this critically endangered species in the wild.

Our reproductive physiologists rescued viable oocytes and potential stem cell-containing tissues from an endangered female Calamian deer and successfully banked them in the Frozen Zoo® for future conservation efforts.

I Institute researchers obtained the first-ever field radiographs of koalas in their natural habitat using state-of-the-art equipment from the San Diego Zoo.

Wildlife Disease Laboratories staff visited the Balsa de los Sapos amphibian conservation center in Ecuador to train local biologists in techniques for disease diagnosis, prevention, and control.

Debuting new curricula on biomimicry, spatial ecology, and climate change, the Conservation Education team completed their fifth annual Life Science Teacher Workshop series, hosting 98 teachers from 22 states and the United Kingdom.

Applied Plant Ecology staff transplanted 7,500 native plant seedlings germinated from seed collected on-site to help restore wildfire-impacted natural areas surrounding the San Diego Zoo Safari Park.

For more information about the San Diego Zoo’s global conservation efforts and how you can join us in our fight against extinction, please visit our Web site, www.sandiegozoo.org/conservation and join the Global Action Team.