

The Bulletin

OF THE NATIONAL TROPICAL BOTANICAL GARDEN

Volume XXV, No. 3

Spring 2008



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ON THE COVER: Construction of NTBG's Botanical Research Center (BRC) was completed in January. The BRC will house the Garden's library, herbarium, and research facilities. Designed and built to reduce waste, be energy efficient and earth friendly, the BRC will have the distinction of being Kaua'i's first LEED-certified building. (See article on page 5).
Photo by Peter S. Goltra.

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.

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ISSN 1057-3968

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Green is Gold

by Jon Letman, Associate Editor

It's hard to imagine somewhere greener than the grounds of the NTBG Headquarters in Kalāheo, Kaua'i. High above the verdant Lāwai Valley, this windswept ridge, home to NTBG's research and educational facilities, is now the embodiment of green.

When plans began for the construction of a new Botanical Research Center (BRC) to house its library, herbarium collections, and new research facilities, NTBG Director and Chief Executive Officer Chipper Wichman saw potential for the Garden go from green to greener.

Working with architect Dean Sakamoto, the Garden began to examine the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification program.

New and renovated buildings around the world can 'go green' by following LEED standards and earning credits with the goal of gaining certification on one of four levels — certified, silver, gold, and platinum. Credits are based on fulfilling certain criteria and meeting stringent building requirements that have less impact on the earth's resources, use energy more efficiently and create overall healthier environments inside and out.

Wichman liked the idea of following recognized international standards and saw LEED not only as a good practice, but also highly consistent with the NTBG's mission. Being the first LEED-certified building on the island, the Botanical Research Center also held the potential to help transform the way people approach construction on Kaua'i.

“LEED is a whole new way of looking at construction, how we use



▲ Certified tropical hardwood is used for exterior siding and interior stairs. This “Jungle Mix” is a warm blend of beautiful Southeast Asian woods, reclaimed from mine timbers, railway ties, and building demolitions, that otherwise would have been discarded into landfills. The deck is made from a renewable wood source.



▲ Parked beside its own electric charging portal fed by the rooftop PV system, this GEM (Global Electric Motor) vehicle has zero emissions.



▲ An array of photovoltaic panels (PV), adjacent to clerestory windows, significantly contribute to meeting the building's energy needs. The roof also has a rainwater catchment system, allows indirect sunlight into work areas, and reflects solar heat.

resources and reduce associated waste. The implications go far beyond the building itself and have the potential to influence people in all spheres.”

But as a famous Muppet once sang, “*it’s not easy being green.*” So it is with earning LEED certification. Key to the process is the ability to learn and embrace a vast and complex culture of environmental practices and procedures that include thoughtful selection of not only a building’s site, structure, and orientation, but all materials to be used in the preparation, construction, and projected life of the building.

LEED standards dictate everything from the amount of demolition-generated waste and construction debris allowed to the source, content, and treatment of materials like rebar, glass, concrete, asphalt, and wood to the composition and placement of finishing materials such as adhesives, sealants, paints, and carpet.

The BRC was also designed to minimize soil erosion, reduce the release of sediment and dust, and lessen the overall ‘footprint’ it has on the environment during and after construction.

Pursuing LEED certification changes the way buildings are built as well as what happens inside and around them. Encouraging carpooling and use of low- or zero-emission vehicles earns additional credits. To this end, NTBG purchased a GEM (Global Electric Motorcars) vehicle which has its own charging portal beside the building.

The BRC is both green and clean with its comprehensive recycling program that maximizes the use of rainwater, sunlight, and wind for producing its own energy and reducing the need for non-renewable energies.

Fulfilling LEED requirements, at first glance a daunting task, was approached as a historic opportunity for all involved. NTBG,

Sakamoto, and general contractor Unlimited Construction Services, Inc. and its sub-contractors were committed to incorporating LEED into the entire project from beginning to end.

NTBG initially anticipated it would be able to meet enough criteria to achieve LEED silver certification. However, as the project progressed, the team’s creativity yielded even more innovative ways to “think sustainable” and opened up _____ the possibility for gold certification.

*“it’s not easy
being green”*

Before ground could be broken in _____ January 2007, a number of trees occupying the future BRC site had to be removed. Trees were either donated, relocated or chipped and used internally as mulch. Several tree cuttings were taken to be grown in NTBG’s greenhouse and soil was moved and stockpiled for use in other projects.

Over the course of the next twelve months of construction, it became clear that this was to be no ordinary building in form or function. From the ground up, the BRC took shape demonstrating how a building could be highly functional, energy efficient, comfortable to use, incredibly strong and strikingly beautiful.

NTBG and Unlimited educated themselves and all sub-contractors on LEED practices, starting with waste reduction. Throughout construction, over 65% of all waste materials were diverted from Kaua‘i’s only landfill.

Inspired by the concept of LEED, one of the sub-contractors suggested substituting crushed recycled glass instead of local sand for use as backfill, one example of how the entire construction team was quick to accept and adapt to this new paradigm in building.

The BRC was designed not only in consideration of the health of the planet, but also that of the building’s occupants. Inside the



BRC overhead clerestory windows provide abundant indirect natural lighting which is easy on the eyes and provides truer color resolution. Low-emitting building materials reduce harmful volatile organic compounds and an air filtration monitoring system limits and measures air impurities.

Certified sustainable tropical “Jungle Mix” hardwood exterior paneling (reclaimed from items that would otherwise have been discarded) creates a rich blend of red, blond, gold, and chocolate hues, which softens the look of the reinforced concrete two-story building and provides an additional layer of insulation. More LEED credits were garnered by using local aggregate in the concrete, reducing the amount of fuel consumed and therefore greenhouse gases generated through importation of materials.

Permeable outdoor surfaces were created by embedding hollow plastic rings in a gravel-pave system, allowing the land around the BRC to absorb more water and diffuse it to the surrounding landscaping of drought-tolerant native Hawaiian species, Polynesian introductions,

◀ Overhead clerestory windows and cruciform skylights allow natural light in, providing truer color resolution, minimizing the need for electric lighting and contributing to an all-around healthier environment.

and hearty pre-existing plants well-suited for the environment. This also helps eliminate the need for a permanent outside irrigation system.

Elements like climate control, motion sensor lights, photovoltaic (PV) cells, and a rain catchment system that captures and stores water underground for use in irrigating the plantings below help in creating a more earth-friendly building. And because the rooftop PV system is projected to generate up to 30kW toward the building's total energy needs, it will be more economical to operate.

Construction was completed on January 30, 2008, well ahead of schedule, and celebrated with a traditional Hawaiian blessing. NTBG, Sakamoto, Unlimited, and all the partners and supporters of the project had made both conservation and construction history on the island of Kaua'i.

Reflecting on the BRC project, Wichman is clear, "there's no going back. LEED is now business as usual. It's just the right way to do things." Looking out at the gardens from his office at Headquarters he says, "moving forward, everything we do will be even more environmentally sensitive whether it's LEED or not."

Supporting documentation is being assembled for submission to the U.S. Green Building Council's LEED Certification review board. With the completion of the Botanical Research Center, NTBG has both elevated its status and commitment to promoting a sustainable future, taking an already green organization from even greener to gold.

SNAPSHOT - New Botanical Research Center NTBG National Headquarters, Kalāheo, Kauaʻi, Hawaiʻi

ABOVE

- Rooftop photovoltaic system projected to produce up to 30kW
- Roofing material designed to reflect heat (Solar Reflective Index of at least 78)
- Rooftop rain catchment system pipes water to a cistern

BELOW

- 25,000-gallon underground water storage for irrigating garden below
- Plumbing system projected to use 30% less potable water than standard fixtures
- Gravel-pave sub-surface system creates permeable, stable surface that reduces erosion and sedimentation

INSIDE

- 20,000-square foot indoor space
- Reinforced concrete structure with insulating steel and glass designed as “a box within a box within a box” to maximize protection against hurricane-force conditions
- State-of-the-art climate control system to maximize the health and life of its contents and occupants
- No chlorofluorocarbon (CFC)-based refrigerants used in heating, ventilation, air-conditioning or refrigeration systems
- Advanced air filtration and monitoring capabilities
- Designed to maximize indirect light for best interpretation of true color, preservation of resources, and occupant’s health
- Motion sensor lighting system reduces energy usage
- Environmentally friendly materials reduce harmful volatile organic compounds found in paints, sealants, carpeting, etc.

AROUND

- Drought-tolerant native Hawaiian landscaping
- Trees and dirt removed for construction donated, replanted, or reused
- Certified reclaimed tropical “Jungle Mix” hardwood; protective and aesthetically pleasing
- Comprehensive recycling collection and storage facilities
- Grill and grate system traps dirt and pollutants at high-volume entries
- Preferred parking for car pool and low- or zero-emission vehicles
- GEM electric car with built-in charging portal
- Over 65% of construction and demolition-generated waste diverted from landfill

Making the Move

In most cases, a completed building means it's just a quick and simple process to move in and set up shop. Not so when the building will house collections of irreplaceable dried plant specimens, books, journals, and botanical prints invaluable to the study of tropical plants. These materials require much more than heavy lifting.

Herbarium and book pests are some of worst enemies of collections such as these. Chemical means of pest control are not only environmentally unfriendly, but can render a dried specimen useless for DNA extraction. So NTBG made sure the BRC was outfitted with a non-chemical method for eradicating such insects before the collections are placed in their final location, or as additions are made.

Each book, each dried plant specimen enters the new building through a preparation room known as the “dirty room” and into a 551-cubic-foot walk-in freezer. There the materials remain for seven days before they are removed through a second freezer door that leads directly into the large “clean” areas of the structure.

As of press time, 20,000+ books, journals, and botanical prints have made the complete move through the freezer, and will be unpacked when new shelving arrives. An estimated 40% of the dried specimens in the 57,000+ herbarium collection have been moved through as well.

— Janet L. Leopold, Editor

As the result of a generous gift in honor of a long-time Garden supporter, the BRC will be formally dedicated as the Juliet Rice Wichman Botanical Research Center in February 2009. A number of interior spaces or features have been named by other contributors. Naming opportunities are still available; for information, contact NTBG's Development Office at (808) 332-7324, ext. 210.

This piece was just one of the articles featured in the print magazine
The Bulletin of the National Tropical Botanical Garden.

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