



THE NEW YORK BOTANICAL GARDEN

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The New York Botanical Garden Launches Amazon Forest Program To Conserve and Manage Earth's Largest Intact Forest

Garden Scientists Collaborate with Brazilian Forest Service to Inventory Amazonian Tree Species, Train Forestry Workers, and Build a Better Baseline of Plant Knowledge

To help conserve one of Earth's ecological treasures, The New York Botanical Garden is launching a multifaceted program to dramatically improve the management and sustainable use of the Brazilian Amazon forest, part of the largest expanse of intact forest in the world.

In collaboration with scientific colleagues in Brazil and the Brazilian Forest Service, the Botanical Garden is committing its expertise in plant science to four related initiatives to promote environmentally responsible forestry practices and further the Garden's goal of conserving Amazonian biodiversity. These initiatives are: **to participate in the planning and execution of the Amazon phase of Brazil's National Forest Inventory; to train forestry workers in the critical skill of accurately identifying tree species; to develop protocols and resources for sustainable forest management projects; and to contribute baseline knowledge of the Amazon's flora, which is vital for effective ecosystem conservation.**

The new Amazon Forest Program, *A Better Baseline: Building Capacity and Resources for Forest Inventory in the Brazilian Amazon*, is supported by a major, new grant from the Gordon and Betty Moore Foundation. It builds on prior support from the Beneficia Foundation, the J.R.S. Biodiversity Foundation, The Overbrook Foundation, and The Tinker Foundation Incorporated and will help to leverage additional grants for the next stages of the program.

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“Since the Garden’s earliest years, our scientists have been at the forefront of documenting the almost unbelievable diversity of plant life in the vast Amazonian basin of Brazil,” said Gregory Long, Chief Executive Officer and the William C. Steere Sr. President of the Garden. “Thanks to the timely and significant support of the Gordon and Betty Moore Foundation and other generous funders, the Garden will play an even more active role in helping to preserve one of Earth’s natural wonders and most important ecological resources for future generations.”



Deforestation is damaging the Amazonian forest’s ability to stabilize climate and sequester carbon. (Photo by Douglas Daly, Ph.D.)

Amazonia—the watershed that feeds into the Amazon River and its tributaries—covers more than two million square miles in nine South American countries and is home to at least 40,000 species of trees, ferns, and flowering plants. Despite decades of deforestation, most of it is still forested, making it the world’s largest intact forest.

The qualities that make the Amazonian forest so valuable—its geographic size and diverse plant life—also create the greatest challenges to managing and conserving it. Stretching across an area larger than the continental United States, the region is home to more than

16,000 species of trees. By comparison, there are fewer than 1,000 tree species in the U.S. and Canada. Two-and-a-half acres can contain as many as 300 species of trees, some of which are rare, endangered, or not yet named. Vast areas remain unexplored botanically.

The Amazonian forest stabilizes the climate of South America and sequesters carbon, and the watershed of the Amazon River accounts for about 20 percent of Earth’s flowing fresh water. However, ongoing large-scale disruption of this ecosystem—due to agriculture, logging, and settlement—is causing tremendous damage to the forest’s most basic functions. That is why the sustainable use of the Amazonian forest and the preservation of its biological diversity are ecological imperatives. Achieving them depends heavily on continuing and even accelerating the work of documenting the Amazon’s plant life and improving mankind’s scientific understanding of key tree families.

Four Paths to a Better Baseline in the Brazilian Amazon

The Garden’s *A Better Baseline* program comes at a critical juncture for Amazonia. Brazil is opening up millions of acres of national forestland there to logging concessions for selective harvest. At the same time, the country is embarking on a massive effort to inventory the forests of the entire region to better monitor their health and productivity.

“It boils down to knowing the tree species, knowing how they differ from each other, and knowing where they are,” said *A Better Baseline* director Douglas C. Daly, Ph.D., the B. A. Krukoff Curator of Amazonian Botany and Director of the Garden’s Institute of Systematic Botany. “The accurate assessment of the region’s biodiversity, including the correct identification of tree species, has profound implications for the fate of the forests, from sustainable management to estimates of the carbon that is locked in the trees—or released as greenhouse gases by deforestation.”

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The Garden's Amazon Forest Program consists of four complementary initiatives, all with the goal of helping the Brazilian National Forest Service and other Brazilian partners implement sustainable forestry practices and improve the future conservation of plant biodiversity. As part of *A Better Baseline*, the Garden will:

- ***Participate in Brazil's National Forest Inventory***

Scientists at the Garden and in Brazil have documented that 50 to 70 percent of the tree species in forest inventories are currently misidentified and that the tree diversity in forest plots is severely underestimated. This can lead to local extinctions as rare species are mistakenly harvested.

As Brazil begins the national inventory of its Amazon forest in 2014, Garden scientists will assist in the planning and execution of the inventory's policies and practices, help train the field teams that will conduct the inventory, help coordinate the identification of the massive number of specimens that will be collected, and participate in quality-control teams to ensure the accuracy and validity of the data collected by the field teams.

- ***Train Key Forest Workers in Tree Identification***

The key player in forest management is the person who identifies the trees, called a *mateiro* in Brazil. The *mateiro* is expected to identify up to 800 trees a day in these mega-diverse forests, with no formal training and no resources other than his eyes and experience.

Garden and Brazilian scientists have designed a training course for *mateiros* that provides them with indispensable skills and links them to a network of human, institutional, and on-line resources. After successfully testing two pilot courses, the Garden and the Brazilian Forest Service have formed a partnership to offer the course to the field personnel of every concession that develops a management plan to operate in a national forest in Amazonia.



Training *mateiros* to identify trees correctly is an important component of *A Better Baseline*. (Photo by Douglas Daly, Ph.D.)

Part of the Moore Foundation grant will support these courses, which will be offered at a national system of vocational schools. The best *mateiros* will be tested, certified, and included in a database maintained by the Brazilian Forest Service that forest concessions and research institutes can use for hiring.

- ***Develop Protocols and Resources for Forest Management Projects***

The program will work closely with botanists at the major botanical research collections in Amazonia and at Brazil's national herbarium—a repository of dried plant specimens—at the Rio de Janeiro Botanical Garden to develop long-term resources and strategies for accurate tree identification, which will help ensure that knowledge of the Amazon's vast tree diversity is preserved.

Ultimately, the issue of accurate and consistent identification of tropical trees will be resolved with new technologies. In the foreseeable future, it will be possible to use a hand-held device to scan a leaf from a tree and identify its species. The Garden's Pfizer Plant Research Laboratory has been in the vanguard of developing techniques using DNA analysis, and Garden researchers will continue to test new technologies.

- ***Contribute Baseline Knowledge of the Amazon Flora***

The Garden is expanding its long-term research in southwestern Amazonia to include the state of Rondônia, where many of the Garden's Amazon Forest Program activities are currently focused. Rondônia's forests are severely threatened by soybean farming, cattle ranching, settlements, mining, and hydroelectric projects.

The Amazon phase of the National Forest Inventory will begin in Rondônia in 2014. The Garden is working with the Brazilian Forest Service, the regional environmental protection agency, and the Federal University of Rondônia to make Jamari National Forest in Rondônia a model of forest management for the Amazonian national forests where logging concessions will be granted. A pilot training course for *mateiros* has already been completed there. Also, the Garden has started a project in collaboration with institutions in Rondônia, neighboring Acre state, and Santa Cruz, Bolivia, to conduct a botanical inventory of Rondônia's border regions.

Program Leadership Builds on Decades of Research and Collaboration in the Amazon



Dr. Douglas Daly, Director of the Amazon Forest Program, has studied the flora of Amazonia for more than three decades.

Dr. Daly, the director of the Garden's Amazon Forest Program, has studied the flora of Amazonia for more than three decades, with a concentration on the Burseraceae (frankincense and myrrh family), one of the most difficult, diverse, and ecologically important Amazonian tree families. He has focused much of his work in the Brazilian state of Acre, where he has catalogued the flora and studied non-timber forest products to help diversify the regional forest economy.

By making his research program an indispensable source of information on the plant resources of southwestern Amazonia, Dr. Daly and his collaborators have advanced conservation and guided public policy.

They have participated directly in a state zoning project in Acre, providing justifications for the creation of new conservation units, and they are part of a tri-national consortium that is helping to monitor the impacts of a new highway linking Amazonia and the Pacific Ocean. Dr. Daly has worked closely with Brazilian collaborators to develop and co-teach training courses for Amazonian *mateiros* that are improving species identifications in tree inventories and promoting sustainable forestry practices.

For *A Better Baseline*, Dr. Daly is working closely with Daniel Piotto, Ph.D., who was appointed Executive Manager for Forest Information in 2012 to coordinate Brazil's National Forest Inventory. An applied forest ecologist, Dr. Piotto was a student in the Garden's Commodore Matthew Perry Graduate Studies Program, beginning in 2006. As a student in that program, he received his Ph.D. from the Yale School of Forestry & Environmental Studies in 2011.

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About the Gordon and Betty Moore Foundation

This project is funded in part by the Gordon and Betty Moore Foundation.

The Gordon and Betty Moore Foundation believes in bold ideas that create enduring impact in the areas of science, environmental conservation and patient care. Intel co-founder Gordon and his wife Betty established the foundation to create positive change around the world and at home in the San Francisco Bay Area. Environmental conservation efforts promote sustainability, protect critical ecological systems and align conservation needs with human development. Patient care focuses on eliminating preventable harms and unnecessary healthcare costs through meaningful engagement of patients and their families in a supportive, redesigned healthcare system. Science looks for opportunities to transform—or even create—entire fields by investing in early-stage research, emerging fields and top research scientists. Visit Moore.org or follow @MooreEnviro.

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The New York Botanical Garden is a museum of plants, an educational institution, and a scientific research organization. Founded in 1891, the Botanical Garden is one of the world's preeminent centers for studying plants at all levels, from the whole organism down to its DNA. Garden scientists conduct fundamental research on plants, algae, and fungi globally, as well as on the many relationships between plants and people. A National Historic Landmark, the Garden's 250-acre site is one of the greatest botanical gardens in the world and the largest in any city in the United States, distinguished by the beauty of its diverse landscape and extensive collections and gardens, as well as by the scope and excellence of its programs in horticulture, education, and science. Learn more: www.nybg.org

The New York Botanical Garden, 2900 Southern Boulevard, Bronx, New York 10458

The New York Botanical Garden is located on property owned in full by the City of New York, and its operation is made possible in part by public funds provided through the New York City Department of Cultural Affairs. A portion of the Garden's general operating funds is provided by The New York City Council and The New York State Office of Parks, Recreation and Historic Preservation. The Bronx Borough President and Bronx elected representatives in the City Council and State Legislature provide leadership funding.

First-page photo: The Falsino River and the Amazonian forest in Amapá state, Brazil (Photo by Douglas Daly, Ph.D.)

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