

PublicGarden

THE JOURNAL OF THE AMERICAN PUBLIC GARDENS ASSOCIATION

VOL 29, NO 1 • 2014

**GROWING OUR SOCIAL ROLE,
EAST MEETS WEST,
A TALE OF TWO GARDENS,
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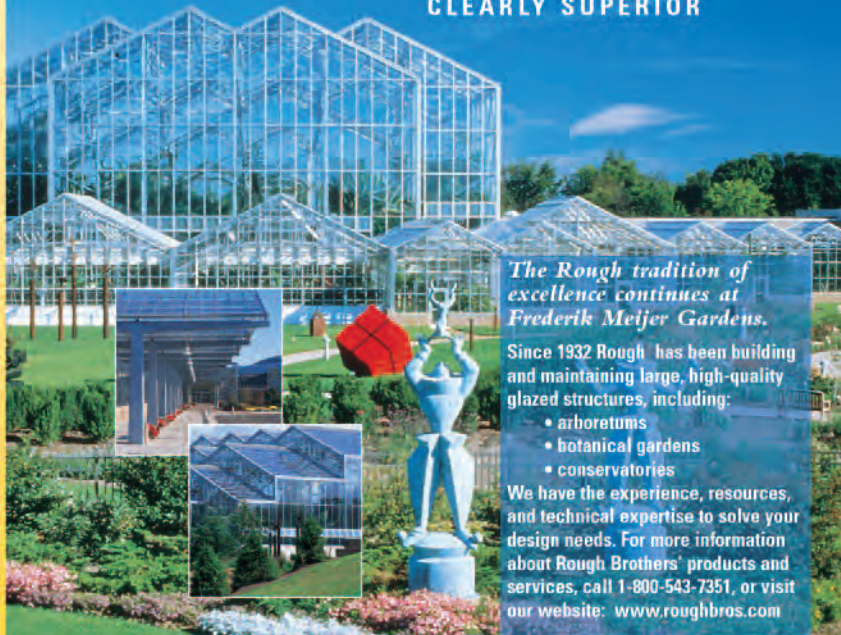
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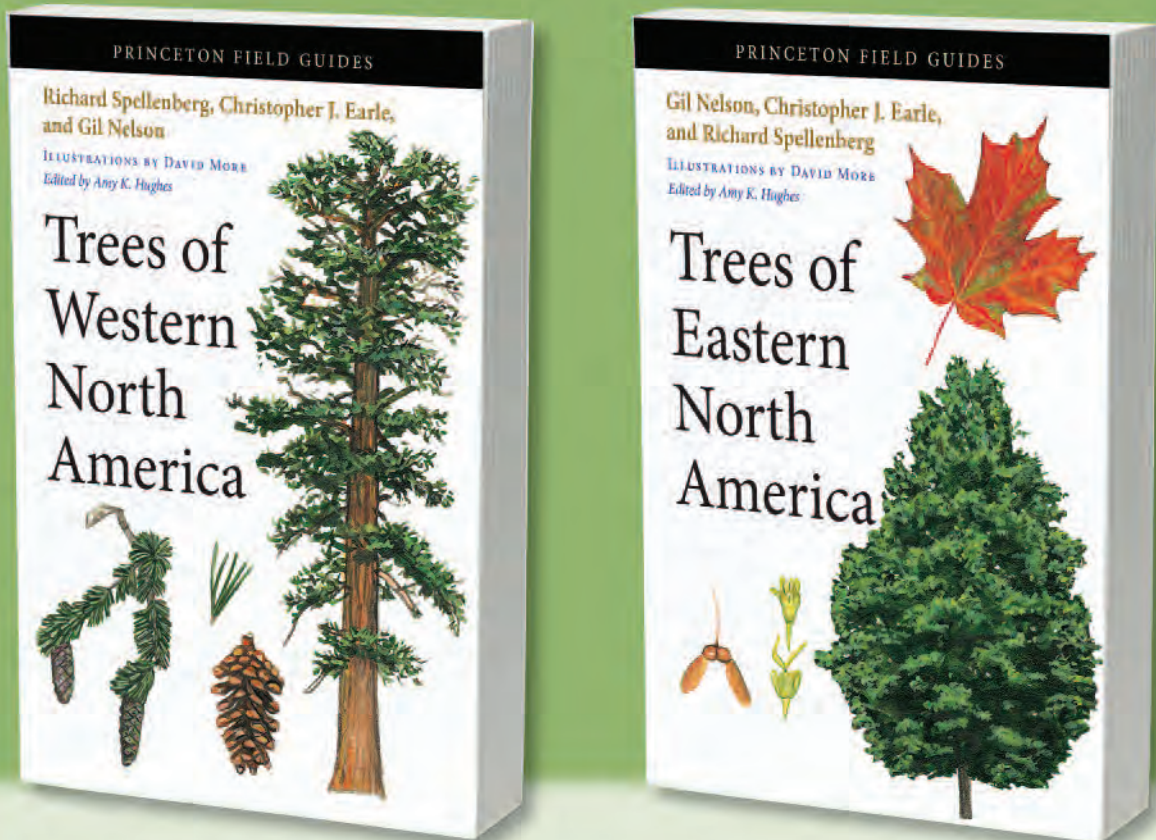
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Nature's beauty is on display year-round at Tyler Arboretum

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SUBSCRIPTIONS All members of the American Public Gardens Association receive a free subscription to the magazine. Subscriptions are available to firms and individuals interested in working with members of the garden industry as follows: in the US at \$48 per year; all others at \$90 per year (includes a postage and handling charge).

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Director's Note



Dear Readers,

In our last issue of *Public Garden*, I talked about several exciting changes that would be revealed in future editions of the magazine. These changes are a direct response to the feedback we've received from you when asked what we could do to make *Public Garden* magazine an indispensable resource.

In this issue you will start to see indications of our fresh, new style such as a cleaner layout and higher quality photography. We are moving away from the use of themes to guide the content of each issue. Over the next year you will see new sections and features that will enable us to deliver content that is diverse, collaborative, and crosses over multiple aspects of our industry and associated specialties. In each issue, there will be something for everyone to enjoy.

Public Garden magazine is not the only facet of APGA that's growing. Thanks to the diligent work of our board of directors and staff, 2015 will see the implementation of our new strategic plan. The plan's purpose is simple. It focuses our momentum by providing the tools, resources, and capabilities APGA needs to serve public gardens and advance them as the leaders, advocates, and innovators they are.

As we celebrate our seventy-fifth anniversary in 2015, we will be sharing our strategic plan with all of you, our loyal readers, and hope that you recognize the passion and dedication for our members that is at the forefront of everything we do, both now and well into the future.

Yours,

D. Casey Sclar
Executive Director
American Public Gardens Association

An early autumn morning at the top of a hill at the Brandywine Battlefield in Chadds Ford, Pennsylvania, with a native *Cornus florida* transforming energy from the morning sun.

PHOTO CREDIT: RHODA MAUER



Young people from the More Choices More Chances school group gaining horticultural experience at Royal Botanic Garden, Edinburgh.

PHOTO CREDIT: ROYAL BOTANIC GARDEN, EDINBURGH



GROWING OUR SOCIAL ROLE

KATE WHITTINGTON, ASIMINA VERGOU, AND JULIA WILLISON

Safeguarding the future of plants is one of the main roles one can associate with modern botanic gardens. Even though poverty, obesity, youth unemployment, anxiety disorders, and an aging population are very real and prominent social problems, globally, they probably don't sound like matters that concern a botanic garden.

Social and environmental issues are intrinsically linked—environmental degradation can lead to a multitude of socio-economic problems, and vice-versa (Pelow 2000; Taylor 2000). It is, therefore, impossible to address one set of problems without tackling the other. Could botanic gardens have a role to play in tackling such monumental issues?

The role of botanic gardens is ever-evolving—from the Italian physic gardens of the sixteenth century, to present-day centers of plant conservation and education. Now, botanic gardens face both a new challenge, and a new opportunity to widen their outreach—by developing a social role.

With more than half the world's population living in urban areas, we have

never been so detached from the natural world, but botanic gardens are ideally placed to combat this. Being located at the intersection of society and nature, and engaging with more than two hundred fifty million visitors annually, botanic gardens play a pivotal role in reconnecting people with nature (Dodd and Jones 2010).

In the face of economic downturn and threatening funding cuts, now more than ever botanic gardens must prove their relevance to society. It is widely accepted that contact with “nature” contributes to a range of societal goals including health, education, social cohesion, and urban regeneration. By reaching out to marginalized or disadvantaged sectors of the community, botanic gardens can extend these benefits to everyone. By running programs with unemployed youth or adults with physical or learning difficulties, for example, gardens can help to provide them with new skills, an increased appreciation for nature, and a greater sense of self-worth.

For most botanic gardens, plant conservation is approached from a

scientific perspective rather than a social one. But given that environmental and social issues are so closely intertwined, growing a social role is vital in order for botanic gardens, as well as other scientific and educational institutions, to prove their modern-day relevance by engaging with their local communities on issues of mutual concern.

Naming and Framing: Growing a Garden's Social Role for Plant Conservation

So, what exactly does growing a social role mean?

Botanic gardens developing their commitment to working with their local and global communities on common issues of social and environmental importance, for the enduring benefit of those communities, the gardens themselves, and towards a sustainable future for our planet.

Public outreach is an important aspect of any botanic garden's work, but some community groups are much more difficult to engage with than others. Botanic gardens attract a mainly white, middle-class, older demographic/

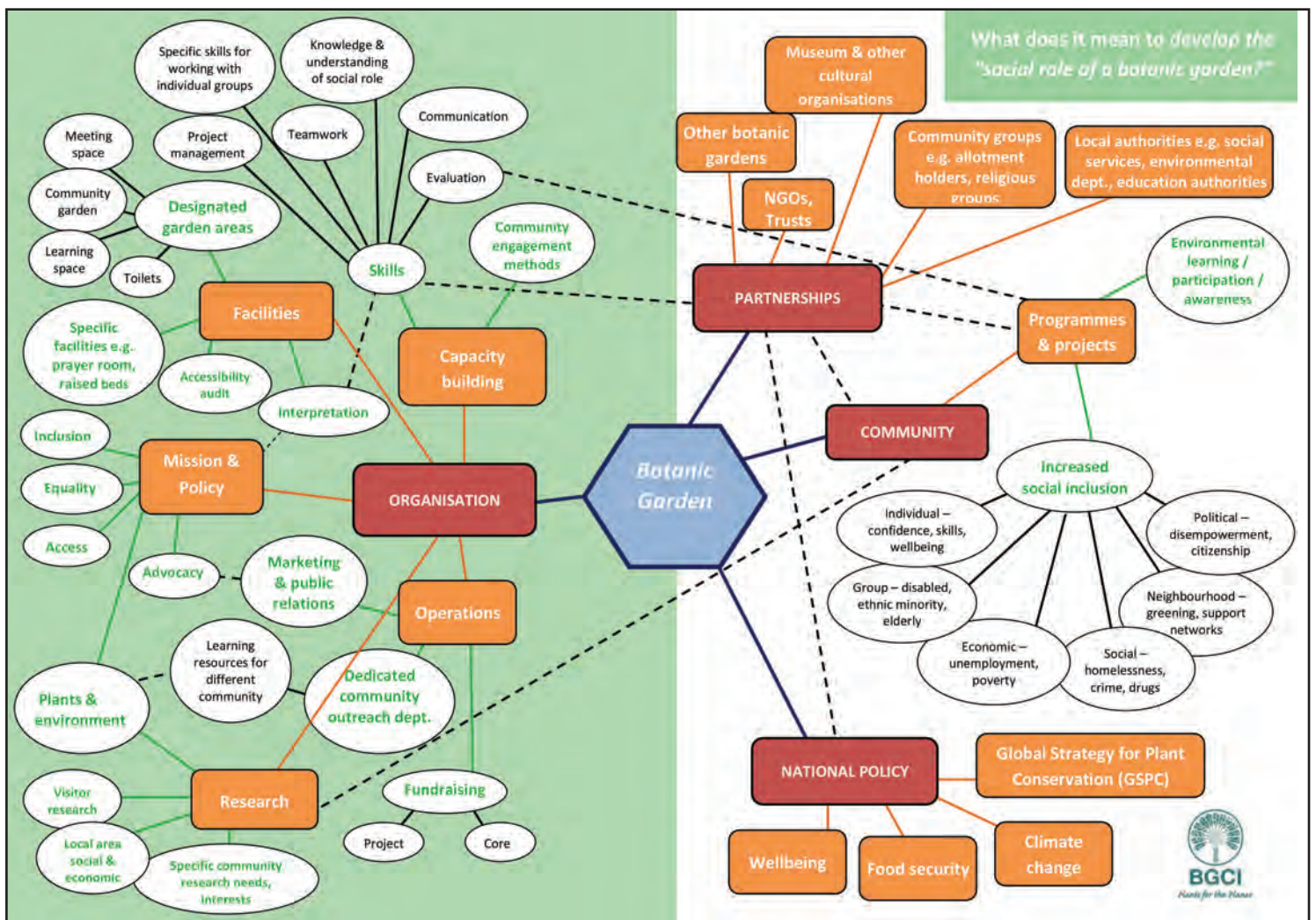


Figure 1: What it means to develop the social role of a botanic garden

audience, with some groups viewing them as exclusive and “not for them.” So, while many gardens already run education/community projects, significant gaps exist in the range of visitors they engage with.

Growing a social role is a pro-active process, requiring gardens to take the initiative to identify and reach out to under-represented or disenfranchised sectors of their local community, by engaging them in their sites, or by running activities in the community.

To do this, gardens can start by benchmarking. Audience research can provide data about the current visitor profile and who is not visiting the gardens along with their needs and interests. With these data available, the gardens can run small-scale projects with local and underrepresented community groups, which can be an effective

springboard to more ambitious programs. An essential part of this process is forming partnerships with community groups and the organizations that work with them, a process that requires patience, tact, and determination.

There exist different models for engaging communities including top-down and bottom-up approaches and different levels of engagement, ranging from providing information to working together. It is essential to identify what social exclusion issues¹ the community faces that could be addressed with a project and how these can be linked with addressing environmental issues, during the planning process, when engaging with the community. Engaging communities in plant conservation needs to be done in a way that is relevant to the participants’ lives, interests, expectations, and needs.

Evaluating the social and environmental impact of a community project is crucial for the sustainability of this sort of work in the garden.

Running a small-scale community project can only be the springboard for achieving long-term organizational change in a garden that aspires to grow its social role. Figure 1 illustrates all the internal and external factors and elements that influence and comprise a botanic garden’s social role. The Communities in Nature initiative provides examples of gardens that have already embarked on organizational change and the impact of their work, so far...

(Editor’s note: Expanded content available on the APGA website at <http://www.publicgardens.org/content/public-garden-growing-social-role-extra>. Descriptions of projects at Bristol Zoo Gardens (BZG), University of Leicester Botanic Garden (ULBG), The National Arboretum (Westonbirt), and the Royal Botanic Garden Edinburgh (RBGE).)

¹ The role of a botanic garden in “tackling exclusion and promoting inclusion is understood in terms of its social impact in relation to disadvantage, discrimination and social inequality” (Sandell 2003, 45-46)



(Left) Pilton project group visit

(Bottom Left) Clients of the Bristol Drugs Project learn about woodland conservation management at Westonbirt, the National Arboretum in the United Kingdom.

PHOTO CREDIT: WESTONBIRT

A Call to Arms

Growing a garden's social role is not limited to working with particular groups and narrowing the audiences that the garden appeals to; it is a long-term process during which the organization learns how to diversify its audiences and reach and be relevant to a wider part of the society. As David Rae, director of horticulture at Royal Botanic Garden, Edinburgh, put it:

There's no point in preaching about environmental sustainability to only 5 percent of the population, it has to be to 100 percent, and that means everybody... So, we've got to find new ways of reaching people who don't naturally come here. (August 10, 2012)

In addition to addressing issues of social exclusion, growing a garden's social role requires rethinking plant conservation as an activity that is supported by scientific research and encouraging public participation. Simon Toomer, Director of Westonbirt, England, UK, highlighted:

We have to be careful to make sure that what we're doing in these kinds of projects is using the real significance of, and the distinctive nature of, the botanic garden. When we're planning these activities, they do need to be part of the place, rather than simply using it as a venue. (September 25, 2012)



In its five-year life, Communities in Nature has been steadily supporting botanic gardens in becoming socially relevant. Research commissioned by BGCI in 2010 (Dodd and Jones 2010) documented the state of the social role of gardens worldwide. The coordination and evaluation of community projects in six botanic gardens showcased the impact of this work (Dodd and Jones 2011; Vergou and Willison 2013b) and the publication of a manual (Vergou and Willison 2013a) provided a step-by-step approach for growing an organization's social role. The initiative currently is expanding its remit and calls gardens to arms, at a global level, to share their best practice in this field of work and build partnerships to address social and environmental issues with their communities.

If you would like to know more about this initiative, visit: http://www.bgci.org/education/communities_in_nature. If you would like to be part of this initiative and also share a case study from your garden in our Community Projects World Map, please contact BGCI Education (asimina.vergou@bgci.org).

Botanic Gardens Conservation International (BGCI), the world's largest network of botanic gardens, is currently leading the Communities in Nature program. This initiative aims to further develop the capacity of botanic gardens to realize their potential in contributing towards social change and public engagement with environmental issues.

BGCI is grateful to Calouste Gulbenkian Foundation for generously supporting the Communities in Nature Programme. BGCI would also like to thank our many colleagues from botanic gardens, community organizations, and project participants who were involved in the program. Last, we are indebted to the academics and other professionals and friends who contributed to the evaluation of the program.

Kate Whittington, an environmental sciences graduate, is currently pursuing an MSc in science communication at Imperial College, London.

Asimina Vergou is the head of education at Botanic Gardens Conservation International and is working on building the capacity of botanic gardens in public engagement.

Julia Willison is the head of participation for the Royal Botanic Gardens, Kew, where she is responsible for learning. Julia also leads the Grow Wild program which aims to reach thirty million people in the UK by inspiring them to grow native plants.

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Garden Professional SPOTLIGHT

PHOTO CREDIT:
S. HUMPHREY

Randee Humphrey, director of education at Lewis Ginter Botanical Garden, Richmond, Virginia

(Editor's note – In this new feature, we asked the following: Tell us about your journey in the garden industry; Tell us about a recent project you worked on; What do you find most rewarding about working in this industry?)

Had I known when my career began how completely gratifying it would be to work in a public garden, I may have started down that path thirty years ago. Instead, I spent significant time in museum education—first at an art museum, and then a children's museum where I honed administrative and fund-raising skills, learned how to assemble, lead, and coach a team, and developed a particular interest in organizational dynamics and change management. Through a combination of providence and serendipity, I joined Lewis Ginter Botanical Garden in 2004, and every day since I've felt deep affection for this special place, where I can encourage

creativity, continue to learn, enjoy the company of immensely talented colleagues, influence and inspire future directions, and invent novel ways of bringing people and plants together to improve our community.

I also love designing and tending my home garden, keeping chickens and bees, and visiting public and private gardens and cultural landscapes wherever I travel. The public garden world is the most generous I've ever known. So many colleagues/friends have answered my out-of-the blue queries and provided guidance at every turn. And getting involved with APGA—everyone should—has added depth and breadth to my professional repertoire and

opened doors I didn't know I was ready to walk through.

One of those doors has been a portal to deeper community engagement. I'm working with our leadership team and key partners to expand the Garden beyond its walls, by increasing local capacity to accomplish urban greening and beautiful place-making projects which are often beyond the reach and resources of local government.

With Lewis Ginter Botanical Garden in the lead, we're building a collaborative Richmond movement called Beautiful RVA. From the first meeting in January 2013 with forty attendees, the Beautiful RVA network now numbers over 275 civic leaders representing over sixty-five local organizations, all of which want a more economically viable, attractive, and sustainable community. The Garden is the community anchor and horticultural expert at the center of this coalition—we're turning our assets and talents outward to stimulate community-building, communication, and collaboration around urban greening initiatives.

There's a creative tension in most institutions to balance internal priorities with external opportunities. I feel like we've matured as a garden to the point where we're less about "either/or" decisions, and more focused on offering the table around which like-minded partners find creative, collaborative solutions that build a more resilient, beautiful community.

What's exciting for me professionally and personally is how Beautiful RVA is a natural extension of the Garden's heartfelt mission, as well as a way to give expression to that inner voice reminding me to live fully, be present, and serve others. At a time when my peers talk of retirement, I'm all about reirement—how can I help build our Garden's capacity to lead and influence social change? How do we translate desire into transformative local action? What are our best assets and how can we deploy them to improve our community's quality of life? These are big questions that may not be answered in my lifetime, but posing them is certainly a good start.



SURPRISINGLY!

Use Humor to Tell Your Story

JENNIFER GOODSMITH AND KATE SACKMAN

Communications is hard. Really hard. How do you break through all the clutter and get your message across? Improvise. That's the answer.

The Latin expression *de novo* means “from the beginning,” “afresh,” or “beginning again.” So, if you are going to embrace this phrase, you need to embrace how you can think differently, and by thinking differently, you can get your point across in a different way. This is where improv comes in.

The key to improvisation is to attract people to your key message. First, you have to entice them to pay attention to the message. Then, you need to share information to enlighten them. Before you move on, you have to empower them, and—above all—you need to be surprising. Let us show you how this works.

EcoMyths Alliance is a non-profit organization that empowers people to make eco-friendly choices by presenting simple science in entertaining ways. The EcoMyths vision is that environmental living will become accepted as mainstream and routine—instead of something perceived as extreme or hard. The Alliance does this through humor, using effective social media and cartoons to bust myths.

Working with a host of environment-friendly partners, such as The Morton Arboretum, EcoMyths works to overcome the overwhelmingly negative messages surrounding environmental issues, which we believe discourage people from taking simple, positive steps that really can help green our world.

As we planned to bust a myth about biodiversity, it was clear to us that people needed to be enticed. This is a serious topic with significant implications, but how could we get people to think—and care—about this? Nicole Cavender PhD, vice president of science and conservation at The Morton Arboretum, suggested that the biodiversity topic be shared through a discussion about coffee. The idea that the coffee tree could become extinct sends chills through every caffeine-addicted person in the world. So EcoMyths made a cartoon that highlighted this plight. Yes, java justice is needed to save coffee...



CARTOON CREDIT: ECOMYTHS ALLIANCE



(left) The *Hug a Tree* exhibit was popular with people of all ages.

PHOTO CREDIT: THE MORTON ARBORETUM

Illumination: Tree Lights at The Morton Arboretum encouraged people to experience trees in a different way.

PHOTO CREDIT: THE MORTON ARBORETUM

see their faces projected on the trees or sing to the trees and watch them light up, or they could just hug a tree; around every turn, they were surprised. This not only raised awareness about trees, but it was downright fun...cold...but fun.

How do you come up with ideas that help communicate in a new way? It is all about letting go and thinking outside the box. Do some simple improv exercises (the Internet offers countless options, or check out YouTube for videos from What's My Line) to help get the creative juices flowing. Wear your watch on your other hand for a day to force yourself to act differently. Do some brainstorming by taking an idea and thinking about ways to make it different or more engaging—all while remembering that no ideas are bad ideas in this process. Throw one hundred ideas against a wall, and see if any stick. All you need is one good one. Once you have a germ of an idea, let it grow.

In order to get people to pay attention to your messages, make sure your communications are fun, spontaneous, and memorable. Is it funny? Is it digestible? Is it surprising? And above all, you have to be willing to let down your guard and laugh at yourself. That's it. It is simple to change how you communicate... Or maybe it is just another excuse to wear silly hats.

Jennifer GoodSmith is vice president of marketing and communications at The Morton Arboretum.

Kate Sackman is president and founder of EcoMyths Alliance, a non-profit that busts environmental myths to inspire people to live more sustainably.



and by design, coffee trees. The article that accompanies the cartoons on the EcoMyths website focuses on the disappearing act facing trees (<http://www.ecomythsalliance.org/2013/03/disappearing-act-is-coffee-next-on-the-chopping-block/>). To empower people, EcoMyths focuses on “One Green Thing You Can Do”—in this case...

Kate Sackman, founder and president of EcoMyths says, “Using cartoons is one way to get people to see the issues at hand in a different way. The simple science articles that always accompany the cartoons enlighten people, and The One Green Thing empowers them to do something.” The key then is to use all communication channels to share the information. EcoMyths uses the Web as its primary tool, along with social media and traditional radio interviews on WBEZ, Chicago’s Public Radio station.

The Morton Arboretum implemented a different *de novo* with the launch of an interactive light show designed to show trees in a different way. Over the course of thirty-eight evenings, visitors were invited to walk along a mile-long path through trees to see and interact with trees in a different manner. People could

DO ONE GREEN THING:

Help preserve biodiversity in your community! Landscape with native plants and grasses, and maximize green spaces in your backyard or neighborhood to foster local biodiversity.

EastMeetsWest

International Collaboration Links Japanese and Pennsylvania-Based Arborists

JEFF DICE, SHARI EDELSON, AND DEREK KALP

Penn State's University Park campus, located in State College, Pennsylvania, is home to many historic tree specimens, some of which pre-date the institution's original founding in 1855. In a campus environment where change is constant, the preservation of such historic trees acquires heightened significance: in a setting defined by the construction of new facilities, the alteration of planted landscapes, and an ever-changing population of over forty thousand undergraduate students, such venerable trees provide a link with the past, anchoring today's campus to a larger historic context.

The enduring value of such heritage trees often comes into sharper focus in the face of potential threats to tree health or survival. Such was the case with an iconic Japanese maple (*Acer palmatum*) specimen estimated at over one hundred years old, located adjacent to an academic building on Penn State's central campus. The tree's broad-spreading habit had rendered it susceptible to damage from snow-loading and strong winds. In addition, the early 2013 loss of the tree's main vertical limb had revealed considerable decay, causing concern among campus arborists. While pruning had been considered as a means to reduce weight on lateral limbs, we worried that such intervention would compromise the tree's aesthetic value. With cabling impossible due to the lack of a vertical leader, installation of ground-anchored braces seemed the best option for supporting the maple's heavy limbs.

The challenge of preserving this Japanese maple sparked a dialogue between personnel in Penn State's Office of Physical Plant, which employs the campus arborist crew and a staff of in-house landscape architects, and the university's Department of Landscape Architecture. The arborists felt that bracing would be the best means of intervention, and while the landscape architects agreed, they sought a solution that preserved the tree's aesthetic integrity as well as its physical health. The group decided to research traditional Japanese methods of tree-crutching to see if lessons could be learned from this centuries-old practice.

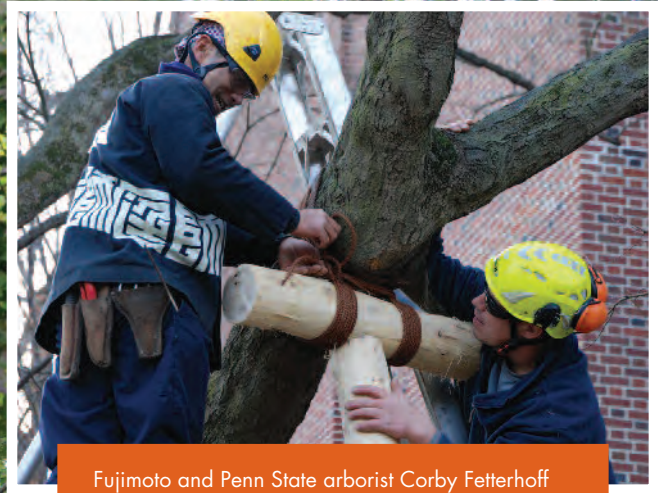
At this point, Ron Henderson, head of the landscape architecture department and professor of Asian studies, made a transformative suggestion: Why not bring master Japanese arborists to Penn State to teach their American counterparts?

Henderson contacted his colleague Kibo Hagino, a Japanese architect currently headquartered in Kanazawa and known for his project-based collaborations with traditional craftsmen. Hagino secured the participation of master gardener Kurato Fujimoto, an expert in traditional arboricultural techniques, of Japan's famed Kenroku-en

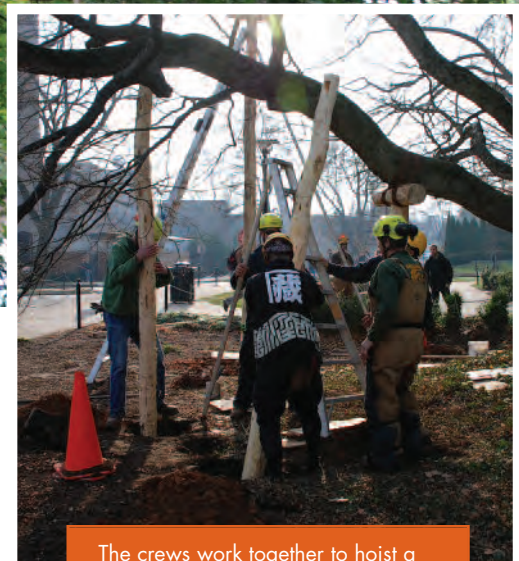
The Japanese maple in autumn 2014, ten months after project completion.



Japanese master gardener Kurato Fujimoto coaches Penn State arborist Drew Beben on a knot-tying technique.



Fujimoto and Penn State arborist Corby Fetterhoff tie a brace to the tree with traditional jute rope, which the Japanese arborists brought with them from home. A woven mat has been placed around the maple limb to prevent possible friction damage.



The crews work together to hoist a brace into position. Holes dug in the ground to anchor the braces will later be backfilled with soil.

ALL PHOTO CREDITS: PENN STATE UNIVERSITY

Garden. The two made the journey to Penn State in December 2013. Over the course of several days, Fujimoto and Hagino worked with the Penn State arborists to construct and install a system of crutches and braces for the maple. While the Japanese experts shared methods for executing traditional ties and knots, the Penn State team was able to bring American cultural and technological heritage to the project as well. In a marriage of Asian and American techniques, each tree brace was secured with both Japanese braided rope cords and Amish-style mortise and tenon joinery. Wood for the braces themselves was harvested from locally available and rot-resistant black locust (*Robinia pseudoacacia*), a departure from the typical Japanese use of *Chamaecyparis*. With luck, the impacts of this cross-cultural exchange will continue to be felt

for years to come. Anecdotal evidence from Japanese landscapes suggests that in addition to preventing snow and wind damage, tree-crutching may actually promote growth. And because the rope ties on the maple must be replaced every five years or so, Penn State's arborist crew will have to keep their skills honed in the traditional Japanese arts of rope-wrapping and knotting. The Japanese maple project has the potential to influence the perception of heritage trees on the Penn State campus as well. In addition to drawing renewed attention to the maple itself, the visually striking braces and crutches also reflect an emerging philosophy of tree preservation that values older specimens as unique and irreplaceable anchors in a sea of change.

(Editor's note: to see a video, please go to <http://publicgardens.org/content/current-public-garden.>)

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Derek Kalp serves as landscape architect at Penn State University's Office of Campus Planning and Design. He may be reached at dlk153@psu.edu.

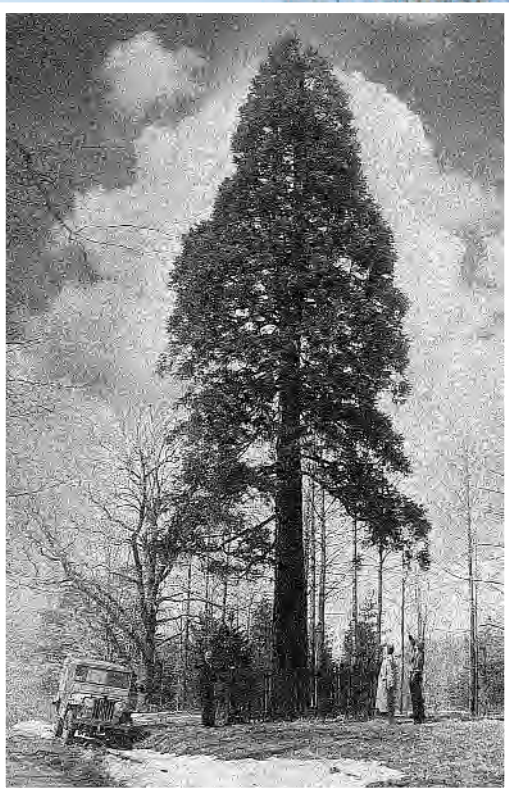


TYLER ARBORETUM

Celebrating 70 Years

LAURA MCPHAIL

This is a big year for Tyler Arboretum in Media, Pennsylvania, as it celebrates its seventieth anniversary as a public arboretum. Laura Tyler, the last descendant of the Minshall/Painter/Tyler family, bequeathed the land in 1944 to the public for use as an arboretum. For seventy years, Tyler has been a place of sanctuary, learning, and connections to the natural world for thousands of dedicated members and visitors.



Tyler's Giant Sequoia is the largest of its specimen on the East Coast.

PHOTO CREDIT: TYLER ARBORETUM ARCHIVES



Spring bursts with color in the Magnolia collection.



Tyler has a robust corps of individual and corporate volunteers who help in all aspects of the Arboretum.

PHOTO CREDIT: JULIA LO EHRHARDT



The arboretum hosts over 7,000 children annually for a variety of nature-themed educational programs.

PHOTO CREDIT: LAURA MCPHAIL



The Tulip Tree House is the latest in Tyler's growing collection of unique and interactive tree houses.

PHOTO CREDIT: LAURA MCPHAIL

Memory Lane

Walking through Tyler is a trip through time. Thomas Minshall purchased the land from William Penn in 1681 and settled his family there in 1682. Eight generations of his family owned and farmed the land throughout the centuries.

In 1825, brothers Jacob and Minshall Painter (the sixth generation) became interested in the popular naturalist movement of the time. They dedicated great time and resources to planting over one thousand trees and plants in systematic rows, arranged like the spokes of a giant wheel, that emanated from their house at the center—just to see what would grow! Today, over twenty of these trees planted by the Painter brothers still thrive in the area behind the historic Barn—the “Old Arb.”

A Period of Immense Growth and Change

For most people, the history lesson stops there. But what happened in the following seventy years?

In 1946, preeminent horticulturist Dr. John C. Wister was appointed as Tyler Arboretum's first director. The property was overgrown and in much need of attention. Dr. Wister, and his wife Gertrude, worked diligently to cultivate collections and maintain the natural areas at Tyler. They are especially remembered for creating Tyler's renowned Wister Collections of magnolias, lilacs, cherries, rhododendrons, and crabapples that you see today. Dr. Wister served as director of Tyler until 1968; he died in 1982.

In the 1950s, a Garden for the Blind was created and filled with fragrant herbs and flowers. The Friends of the Arboretum was created in 1958. In its first three months, Tyler had ninety members; today it has over three thousand dues-paying members.

In July 1966, the first step in developing the education potential at the Arboretum was taken when area teachers from first grade through senior high school joined together to create curriculum-based learning opportunities, and by January 1967, over 1,650 students had come to the “classroom out-of-doors” at Tyler. The Arboretum now hosts over seven thousand students and hundreds more adults annually in educational programs.

So much has happened in just the last fifty years. Tyler became recognized as an Important Bird Area (IBA) and a Holly Arboretum. Pink Hill was identified as a rare serpentine barren ecosystem. The American Chestnut Nursery was established. Hiking trails were cleared and blazed. The Stopford Meadow Maze was created. Nature's Magical Path and the Native Woodland Walk were developed.

The *Big Bugs* exhibit invaded, people took a seat during *Sit-A-Spell*, and who can forget the tree houses among the various special exhibits at Tyler? In fact, to the delight of members and visitors, Tyler marked its anniversary this summer with the opening of the Tulip Tree House, the tenth in Tyler's growing collection of unique tree houses.

Family-oriented special events like Pumpkin Days and the Pancake Breakfast bring the community together. Summer festivals like the Fairy and Wizard Festival, the Tree House Festival, and the Butterfly Festival have entertained thousands in just the last few years. Weddings, retirements, birthdays and other celebrations have all been held at Tyler.

Paved enhancements like the Scenic Loop have brought those who were formerly unable to manage the terrain to areas of the Arboretum they had never before experienced. The launch of Tyler's mobile app in August provided digital connections to navigation, gardens and features at Tyler, history, interactive games, FAQs, and more.

Tyler Arboretum turns seventy this year, and it's time to celebrate! It's a time to remember all of the staff, members, donors, educators, and visitors who have faithfully stewarded the land and the opportunities found there over the last seven decades. It's a time to think of how far Tyler has come, and take advantage of opportunities for future growth. It's a time for you to become connected to Tyler Arboretum.

Information is available at www.TylerArboretum.org.

Laura McPhail is the communications coordinator at Tyler Arboretum in Media, Pennsylvania, and an adjunct communications instructor at Penn State Brandywine. She can be reached at lmcp@mail@tylerarboretum.org.







A quiet evening at one of the ponds at Mt. Cuba Center in Hockessin, Delaware. Here the ponds act as mirrors, weaving a mosaic of fall colors and patterns with the blue sky.

MAPMAKING Made Easy

APGA and Esri Partner to Provide GIS Software and Training to Gardens



MELANIE SIFTON

APGA and Esri, a leading global supplier of geographic information system (GIS) software, began a partnership in 2009 to launch a grant program to provide Esri software and training to APGA member gardens. Through a simple application process, any APGA member institution may receive free access to Esri software, training, books and user conferences. Currently, an ArcGIS software grant provides access to desktop, online, and mobile GIS. In addition ArcGIS for Parks & Garden, a separate program and website, supports GIS in public gardens.

Based on interviews with leaders in this field, here are their top tips for the greatest success in your mapmaking endeavors.

Tips for Successful GIS Use

What should a garden do when starting to use GIS for collections and facilities tracking? The experts recommend a few key elements to ensure success, and the Alliance for Public Gardens GIS is working to remove as many barriers as possible, including by providing free training.

- Attend an information or training session at an APGA event, or attend the San Diego Esri user conference to which the ArcGIS for Public Gardens grant provides free access.
- Be prepared to dedicate staff time to learn the software, and to work on the GIS. GIS-trained college students can help kick start a GIS program through internships or student projects, but for

long-term sustainability, some staff time should be expected.

- Acquire a recent, high-quality orthorectified aerial photo to begin to create a working base map for your garden. An orthophoto is an aerial image that has been corrected for topography and true distance. These types of aerial photos may often be obtained through a request to a local government authority, but a garden in need of a recent orthophoto may also hire a contractor to fly over a site and create one. Orthophoto access from some organizations may come with usage agreements or fees, and orthophotos will need to be refreshed every few years in order to remain current to any on-the-ground site changes. Aerial photos may also be provided by Esri or



Collection mapping with GPS

PHOTO CREDIT: MIA INGOLIA



Huntington staff member Kai-Ting Chiu using collection management tool on her cell phone.

PHOTO CREDIT: DAVID SIVERTSEN



GIS for Public Gardens: Getting Started Workshop

PHOTO CREDIT: MIA INGOLIA

TIPS FOR SUCCESSFUL GIS USE

Expanded content available on the APGA website at <http://publicgardens.org/content/current-public-garden>

Mapmaking Made Easy

1. An ortho-rectified aerial photograph is used as a base map at the Huntington Botanical Garden.

PHOTO CREDIT: DAVID SIVERTSEN

2. Map display shows North Vista at the Huntington, highlighting Camellias. Screenshot of the iPad collection management tool

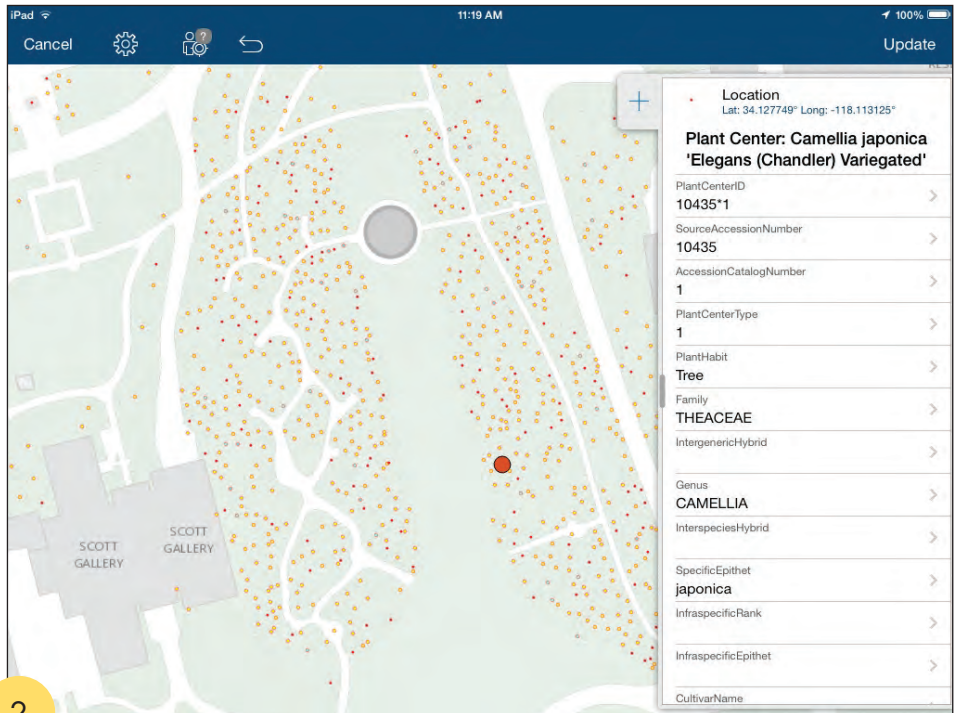
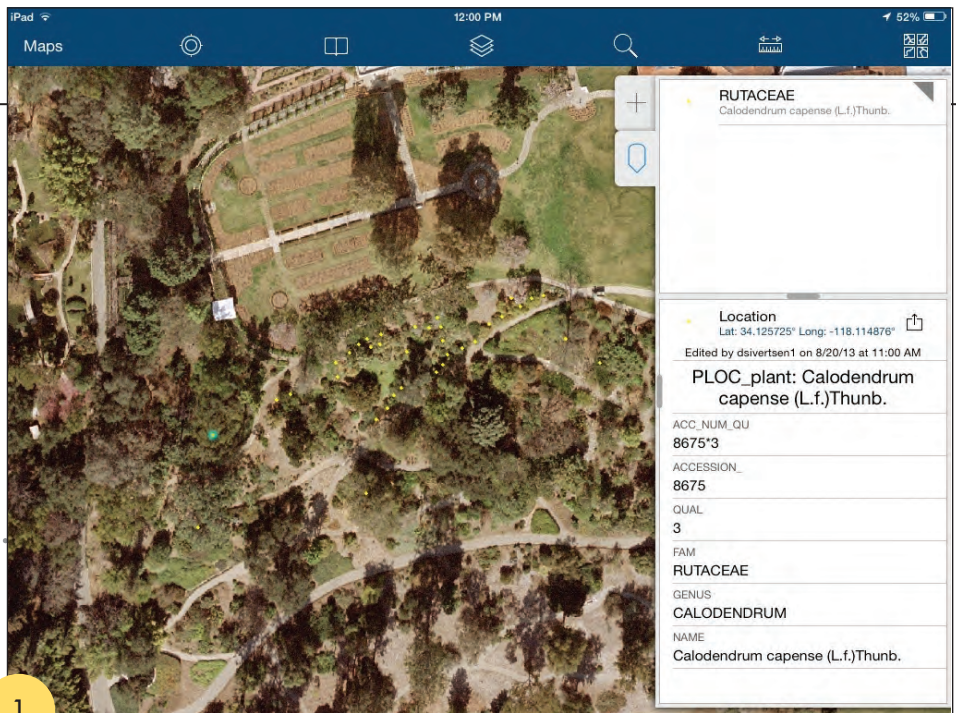
PHOTO CREDIT: DAVID SIVERTSEN

public domain data such as Google maps satellite imagery, but expect the resolution of the image to be lower and, therefore, less useful for accurate map visualization.

- Obtain a **GPS (Global Positioning System) field data collection unit** for on-the-ground inventories. GPS uses signals from satellites to log the longitude and latitude of locations, and the precision can be down to sub-millimeter accuracy, depending on the quality of the GPS receiver. Many gardens are using iPads and Android mobile devices with GPS capabilities as basic field data collection units, but more accurate and specialized devices are also available.
- Try out some of the **user-friendly GIS mobile applications for field data collection**, but save any lengthy or complicated plant records data for entry onto a desktop computer. Mobile devices are handy for use with GIS inventories, but go back to the office to verify and reconcile data entered in the field—particularly if using staff, students, or volunteers who are not accustomed to such work.

(Editor's note: Expanded content available on the APGA website at <http://www.publicgardens.org/content/public-garden-mapmaking-made-easy-extra>)

Melanie Sifton is the vice-president of horticulture and facilities at Brooklyn Botanic Garden. She may be reached at MelanieSifton@bbg.org.



RECOMMENDED GIS RESOURCES

A wealth of free information, advice, discussions, and GIS tools are available to any garden interested in getting involved. These are a few of the top online garden-specific GIS resources now available:

- Alliance for Public Gardens GIS, with links to grant info: <http://publicgardensgis.ucdavis.edu/>
- LinkedIn discussion group for the Alliance for Public Gardens GIS: www.linkedin.com/company/alliance-for-public-gardens-gis
- ArcGIS for Public Gardens Esri website: <http://solutions.arcgis.com/parks-gardens/>

The Esri Conservation Program website, for Esri support grants and resources beyond public gardens: www.conservationgis.org

Smoky SKY

TRACY MAGELLAN

A stately Bailey palm (*Copernicia baileyana*) during a smoky morning sunrise at Montgomery Botanical Center in Coral Gables, Florida. This photograph was taken on Monday, June 9th, 2014, two days after lightning struck setting a brush fire in the Everglades. The Everglades northwest of Montgomery burned for days, leaving a smell and haze in the garden on that morning. Montgomery is approximately 37 miles south of the area of the Everglades that caught on fire, yet the smell of smoke was distinct. The fire did not make its way to Montgomery, but the ashes blew in.

Plant based ash has been used as fertilizer for generations. It is alkaline and contains about 0-1-3 (N-P-K) and adds nutrients to the soil. The alkalinity did not affect the Bailey palm since it is already being grown in alkaline marl soil, but perhaps the nutrients blown in fertilized the tree. Though fires can be detrimental to an environment, they can also enhance an environment when well managed. Fire can reduce pathogens in an environment. If prescribed burns are set, fuel - in the form of twigs and high grasses - can be reduced preventing wild fires like the one creating this thick smoke.

Tracy Magellan is the outreach manager at Montgomery Botanical Center.



BUTTERFLIES

Capture a Community

KENNETH SETZER

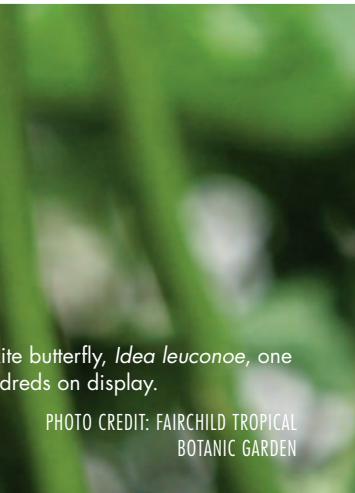
Children especially fall in love with butterflies drinking nectar from a flower, and not surprisingly, these future scientists always want to know more.

In fall 2012, Fairchild Tropical Botanic Garden opened the Paul and Swanee DiMare Science Village, a complex housing classrooms, space for researchers, a DNA lab, micro-imaging lab, orchid propagation lab, and Glasshouse Café, which looks out into the crowning glory: the ten-thousand-square-foot Wings of the Tropics butterfly conservatory—a living ecosystem. This soaring structure serves as home to hundreds of tropical butterflies and moths, representing at any given time dozens of species from the Caribbean, South and Central America, and Asia. Entering the exhibit is like stepping through a portal to the rainforest; the stone walls are dripping



A tropical stream awaits visitors. The adjoining Glasshouse Café is visible at left.

PHOTO CREDIT:
FAIRCHILD TROPICAL
BOTANIC GARDEN



A paper kite butterfly, *Idea leuconoe*, one of the hundreds on display.

PHOTO CREDIT: FAIRCHILD TROPICAL
BOTANIC GARDEN

Inside the Wings of the
Tropics Conservatory

PHOTO CREDIT:
FAIRCHILD TROPICAL
BOTANIC GARDEN



with ferns and orchids; tropical fish frolic in a meandering stream; *Coccothrinax* palms tower overhead; nectar plants show off colors like an open box of crayons. The winged stars of the show, like the favorite blue morphos, are absolutely everywhere.

But it's more than just a pretty place to watch butterflies. Like most botanic gardens, Fairchild promotes conservation and an appreciation of the plants we love and the creatures that depend on them. Wings of the Tropics is no exception. Volunteers and staff use the exhibit as a means of engaging the community at large. After the dazzling show of butterflies and flowers, people naturally want to delve deeper into

topics like biodiversity, conservation, and plant-animal symbioses. Children especially fall in love with butterflies drinking nectar from a flower, and not surprisingly, these future scientists always want to know more. Never wasting such an opportunity, the Wings staff teaches and interprets the life cycles and biodiversity fluttering right at their fingertips.

The pupae for the exhibit are imported and maintained under strict USDA guidelines to ensure no non-native species can escape the enclosure. Therefore, no host plants are allowed inside the conservatory, only nectar and pollen food source plants. Nevertheless, the chrysalises are visible

through large windows leading into the Vollmer Metamorphosis Lab. Visitors can watch a butterfly emerge from its cocoon, warm up its wings, and later be released into the Conservatory.

Miami's edge-of-the-tropics climate means the lessons learned in the Conservatory don't end at the door. Our hope is that visitors will take with them a greater love of tropical plants and animals and use this inspiration and information to maintain their own butterfly gardens, supporting pollinators, plants, and the beauty of tropical nature in the process.

Learn more at www.fairchildgarden.org.

Kenneth Setzer is a writer at Fairchild Tropical Botanic Garden in Coral Gables, Florida. He can be reached at ksetzer@fairchildgarden.org.



Several of the images shown were contributed by alumni or their children; other images are from the BBG archives.

PHOTO CREDIT: J. BICKNELL



Former Children's Gardener Warren Lewis contributed this newspaper clipping from 1947, which was scanned and reproduced for the show.

PHOTO CREDIT: J. BICKNELL

A CROWD-SOURCED Centennial Exhibit

JESSICA BICKNELL

The Brooklyn Botanic Garden (BBG) is a fifty-two-acre oasis in New York City with a rich history, a key part of which is the Children's Garden. Open only to those enrolled in our education programs, this kids-only garden was one of the first of its kind when it opened in 1914 and the beginning of education programming at BBG. Still devoted to hands-on education and learning by doing one hundred years later, this space remains dedicated to giving kids the authority and space to plant their own vegetables, make mistakes, learn from the process, and reap the benefits of hard work. This garden has positively impacted thousands of young people over the years, and BBG set out to celebrate the centennial in a big way. One part of this celebration was a historic exhibition in the gallery space.

In order to incorporate voices of our audience into the exhibit and also to fill in some gaps in our archives, BBG solicited photos, stories, and memorabilia from Children's Garden program alumni. We collected "memories" in a variety of ways: through two, in-person drop-off events; through an email address, stories@bbg.org; and through an electronic survey mailed to our members. Signs by the Children's Garden, as well as postcards displayed at BBG and given out at events, helped us put out the call for submissions.



Children's Gardeners worked hard on their plots in 1927.

PHOTO CREDIT: LOUIS BUHLE



The Botany Bee interactive was based on a Children's Garden contest from the 1920s. Some of the themed planting display can be seen in the background.

PHOTO CREDIT: J. BICKNELL

LESSONS WE LEARNED

If you are considering reaching out to visitors to contribute to your garden's historic celebration, here are some takeaways:

Start Early

We started putting the word out about the collection in September—late additions were still pouring in by March for a May exhibit opening. It took time for word to spread, alumni to sort through old photos, and to get them to BBG. Plus, scanning everything took lots of time and many wonderful volunteers!

Use a Variety of Ways to Reach Out

Something we learned from a prior attempt is that Flickr is not the best way to collect contributions from this audience. The email address and the online survey were the two most popular ways alumni contributed. The survey, in particular, required very little effort to complete.

Be Clear about What You Will (and Will Not) Use, and Where

We were unable to use everything we collected for the exhibit. We stated up front that the contributions might not be used, which helped set expectations. When we did decide something was going in, we emailed the contributor to let them know and to invite them especially to the gallery exhibit opening. Although we asked for permission to use the images collected for both the gallery show and promotional materials, we found it necessary to notify contributors when their images were being used in other contexts—such as banners in the garden—so that they were not surprised by a large-scale representation when they visited.

Attribute Properly

In the exhibit, images and artifacts from contributors were marked with a "Garden Memory" tag on the label, and stories with a "Garden Story" tag. These were always attributed to the submitter and helped make it clear with a visual cue when the voice was BBG's or that of someone else.

Plan for the End

Several contributors requested to keep the banners and gallery prints made from their photographs for their personal use after the exhibit ended. We are doing our best to arrange for this, but did not set a policy initially beyond the return of original items. The learning continues.

The Children's Garden centennial was a big success for BBG because staff past and present, in many departments and at all levels, plus volunteers, parents, kids, and alumni, pulled together to support the exhibit and events. We couldn't have asked for a more meaningful way to celebrate this remarkable garden and the beginning of an education legacy here at BBG.

We received more than fifty responses—from children's gardeners past and present, their family members, and former instructors. Memories collected included medals, photographs, recipes, newspaper clippings, buttons, badges, and video footage. These objects and stories added a richness to the exhibit that we couldn't have achieved on our own, and the collection itself served as a lead-up to the celebration of the centennial.

The gallery show ran four months and contained over thirty-five images from both our archives and contributors, plus artifacts, video, and two interactive components. We also created a space where visitors could add their own story to a trellis and design their own Children's Garden plot, as well as a themed plant display in the middle of the conservatory. A garden-wide signage program and a series of special events, celebrating the rich history of children's education at BBG, accompanied the gallery show, as did an alumni "reunion" that brought around 250 former instructors, students, and their families to the Garden.

The Children's Garden centennial was successful thanks to a joint effort on the part of staff, volunteers, and alumni, who all pulled together to support the exhibit and events. The crowd-sourced exhibition was a meaningful way to celebrate a remarkable garden and the beginning of an education legacy here at BBG.

(Editor's note: Expanded content available on the APGA website at <http://www.publicgardens.org/content/public-garden-crowd-sourced-exhibit-extra>.)

Jessica Bicknell is director of interpretation and exhibitions at the Brooklyn Botanic Garden and may be reached at JessicaBicknell@bbg.org.



A TALE OF

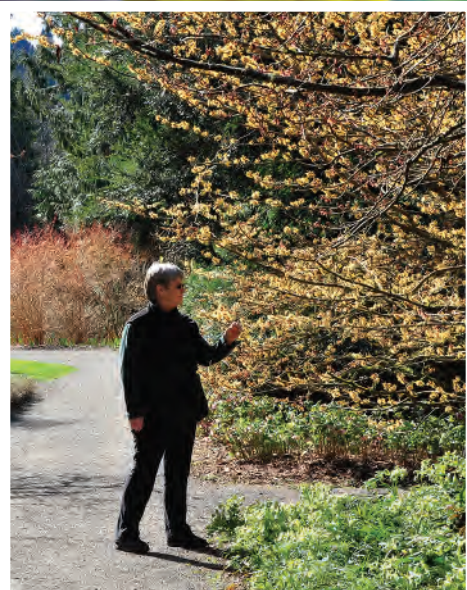


Berberis x media 'Arthur Menzies', shown blooming in January, was selected at the Washington Park Arboretum for its cold hardiness.

ALL PHOTO CREDITS: LARRY HOWARD

RAYMOND J. LARSON

The Joseph A. Witt Winter Garden



Looking south from the north entrance to the Witt Winter Garden, through an allée of witch hazels



Stewartia monadelphica, *Garrya x issaquahensis*, and *Cyclamen coum* blooming in February

The Winter Garden has been a component of the University of Washington Botanic Gardens' Washington Park Arboretum since 1949. In 1987, a major renovation of the existing garden was planned to highlight it as a "clearing in the forest" among the established native and exotic trees of the Washington Park Arboretum. Being a special interest of the University of Washington's late curator, Joseph A. Witt, it was rededicated in his honor when renovations were completed in 1988. Since that time, it has remained one of the most popular and best-loved features of the arboretum.

The garden is designed so that visitors move through a changing sequence of slightly raised beds and paths around a central lawn. It can be experienced from many angles, all set against a mature backdrop of western red cedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*). As such, it highlights species that are at home in a light woodland setting. Major components include members of the witch hazel family (Hamamelidaceae), *Sarcococca* species, boxleaf azara (*Azara microphylla*) and smaller-scale trees with

interesting bark such as northern Chinese red-birch (*Betula albo-sinensis*), paperbark maple (*Acer griseum*), and *Stewartia* species. To contend with the Pacific Northwest's often grey winter skies, plants were also selected for contrasting colors in a sequence of hues. Plants especially adapted to our mild maritime climate are also featured, with the locally selected silk-tassel bush (*Garrya x issaquahensis*) and hybrid grape-holly (*Berberis x media* 'Arthur Menzies') putting on a distinct show.

The Witt Winter Garden is an evolving display devoted to color, texture, and fragrance. In 2010, a large American elm (*Ulmus americana*) was removed to reclaim lost space for existing plantings and to enable the addition of new species. This year, we removed a few of the surrounding western red cedars where their canopy had begun to encroach on the space and swallow up too much light. The garden continues to inspire visitors and to showcase the wonderful plants that can brighten the garden in even our coldest and darkest months.

Raymond J. Larson was hired as the curator of living collections for the University of Washington Botanic Gardens in 2013.



GARDENS

Dwarf tigertail spruce (*Picea abies* 'Howell's tiger tail') provides form and color.

PHOTO CREDIT: CAROL GROVE

SONJA M. SKELLY

The Mullestein Winter Garden

At Cornell University in Ithaca, New York, we have a saying—"Ithaca is Cold"—because winters here are cold...and long. It was for this reason that Cornell Plantations, the botanical garden, arboretum, and natural areas of Cornell University, decided to put in a winter garden. The goal was to celebrate winter and show visitors how a garden, with properly selected plants, can be as interesting, colorful, and beautiful during a time when most gardens are sleeping. Completed in 2000, the Mullestein Winter Garden was designed to highlight the colors, textures, and shapes of plants that provide beauty and interest in the winter landscape. The plants were carefully selected for their winter-time ornamental characteristics: beautiful bark, colorful twigs, lasting and colorful fruit, sculptural branching, and varied form. These characteristics are showcased by the shrubby dogwoods, curly willows, river birches, hawthorns, a wide variety of conifers, cotoneasters, witch hazels, winterberries, hollies, and crabapples. The Garden is centered on an old millstone, and locally quarried stone provides the foundation for the garden's paths and raised beds. The result is a garden that is vibrant and attractive even during the coldest, dullest days of winter.

For more information and a full plant list, visit: cornellplantations.org/our-gardens/botanical/mullestein

Sonja Skelly is director of education at Cornell Plantations.



Locally quarried stone provides the foundation for the garden's paths and raised beds. After a snowfall a delicate tracery emerges.

PHOTO CREDIT: SONJA SKELLY



Dwarf tigertail spruce (*Picea abies* 'Howell's tiger tail') provides form and color.

PHOTO CREDIT: CAROL GROVE



The bark of several *Betula nigra* 'Cully' HERITAGE® trees provides interesting texture.

PHOTO CREDIT: UNIVERSITY PHOTO

Sadleria cyatheoides (Blechnaceae) is endemic to Hawaii, where it is found on all the major islands. It can reach five-feet tall, and resembles a small tree fern.

PHOTO CREDIT: JAMES GAITHER



NORTH AMERICAN PLANT COLLECTIONS CONSORTIUM (NAPCC)

FERN S

CHRIS CARMICHAEL AND HOLLY FORBES

Most people are familiar with ferns at some level, whether it's their iconic, finely divided foliage or the varied palette of green that ferns lend to a woodland understory. As non-flowering plants, ferns are often considered filler or background, much like those other non-flowering garden staples, conifers. But also like conifers, ferns are a diverse and often beautiful group found in many different habitats around the world. Their fronds vary from the lacy elegance of maidenhair ferns to the bold and undivided blades of hart's tongue fern. With a complex life cycle, ferns are biologically interesting, and well worth closer consideration as garden plants.

The University of California (UC) Botanical Garden at Berkeley (Garden) has over five hundred accessions of 360 taxa of ferns. About 65 percent grow in the outdoor collections, and about 84 percent are of known wild origin, making them particularly valuable research specimens. This collection received NAPCC status in 2007.

The Garden's fern collection has two particular strengths that we will build upon in a focal manner. The first is the collection of xerophytic ferns in the New

World Desert Area and the Xerophytic Fern Display along the side of the Arid House, as well as in several biogeographic collections. These ferns are from arid regions of California, deserts of the Americas, and from southern Africa. Represented genera include *Cheilanthes*, *Pellaea*, *Aspidotis*, *Astrolepis*, and *Notholaena*. These xerophytes have special adaptations that allow them to prosper in otherwise inhospitable habitats, such as special hairs or scales on the leaves to help stem water loss, and the ability to go dormant in dry times and to respond rapidly to limited seasonal rainfall.

Xerophytic species native to California demonstrate that ferns can prosper in the summer dry climate of the state, and should be considered as part of our native plantings. While not strictly considered xerophytes, the familiar polypody ferns of California cope with our summer-dry climate by going fully dormant when the rain stops, then springing into growth with the first rains of autumn.

These plants have received significant attention from the Hardy Fern Foundation and the British Pteridological Society, both of which have made study tours to the Garden.

Images and a discussion of the Garden's xerophytic fern holdings feature prominently in *Encyclopedia of Garden Ferns* (Timber Press, 2007) by Sue Olsen. A recent grant funded by the Saratoga Horticultural Research Endowment was used to begin propagating these unusual and highly garden-worthy ferns with the goal of introducing them to the horticultural trade in California.

The second prominent strength of the collection lies in our holdings of California native ferns. While twenty-eight species of ferns are listed as rare in the recently revised *Jepson Manual – Vascular Plants of California* (University of California Press, 2012), no ferns are on threatened or endangered lists for the state. We are working with state and local conservation agencies, as well as with other public gardens in the state, to articulate the conservation needs of California native ferns.

The Garden has benefited greatly from the curatorial support of Dr. Alan Smith, curator of pteridophytes at the UC Berkeley's University and Jepson Herbaria and former member of the Garden's Faculty Advisory Committee. Dr. Smith is an internationally recognized expert in fern systematics and taxonomy and is a co-author of *The Pteridophytes of Mexico*

Fairy swords (*Cheilanthes lindheimeri*) is a drought-tolerant fern native from Oklahoma to Arizona. It was established in the garden in 1955 where it tolerates regular summer water.

PHOTO CREDIT: HOLLY FORBES



The variegated foliage of *C. florida* 'First Lady' brightens the garden in summer with shades of green, gold, and chartreuse.

PHOTO CREDIT: BOB SCHATZ





Rosy maidenhair fern (*Adiantum hispidulum*) and other Pteridaceae are popular garden subjects.

PHOTO CREDIT: HOLLY FORBES

(2004). Dr. Smith received the Asa Gray Award in 2014 from the American Society of Plant Taxonomists. This award recognizes outstanding lifetime achievement in the field of plant systematics. Over twenty published research papers have been based, at least in part, on the Garden's fern collection; nine of these are authored or co-authored by Dr. Smith.

Ferns are woven into the tapestry of our habitat-based planting scheme, and we have for many years added them in line with our goal of representing as broad a range of taxonomic diversity as possible in our collection. Tropical ferns are displayed in the Orchid, Fern and Carnivorous Plant House and in the Tropical House, and aquatic ferns are presented in the Aquatic Plant Display. In nature, ferns make up an important component of many habitats, from the tropics through temperate regions, from deserts to rainforests, and from fully aquatic to epiphytic life zones. They range in size from the giant tree ferns of our Australasian Area to tiny floating plants that you would be hard-pressed to identify as a fern, such as the mosquito fern (*Azolla filiculoides*) found on the surface of most of the Garden's ponds.

Several other Garden areas host outstanding collections of ferns. Tree ferns (*Cyathea*, *Sphaeropteris*, *Dicksonia*) native to New Zealand and Australia

This *Llavea cordifolia* (Pteridaceae) was collected in Nuevo Leon, Mexico, where it grows in deep shade by a waterfall. It doesn't need quite that wet a situation in the Garden, shown here in the Mexican/Central American Area.

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create a striking display at the approach to the Australasian Area just beyond the Japanese Pool. Their trunks play host to epiphytic staghorn ferns (*Platycerium* spp.) and they are underplanted with terrestrial ferns, including *Sadleria cyatheoides* from Maui, Hawaii! With its cool, moist climate, New Zealand is the origin of many species of ferns grown in the San Francisco Bay Area. With a bit of supplemental watering, ferns from New Zealand do well in our California landscape.

Another particularly choice assemblage of ferns is found throughout the Mexican and Central American Area. Mexican tree ferns of the genus *Cyathea* are just barely hardy in our cloud forest planting, as is the case with the few members of the otherwise tropical genus *Elaphoglossum* that we grow outdoors. With undivided, blade-like fronds, the genus *Elaphoglossum* is one of several with the common name tongue fern—indeed, the generic name translates as elk tongue.

Members of the family Polypodiaceae are particularly common in this area. Allied with the familiar polypodies of California, most of the Mexican and Central American taxa are now classified in the genus *Pleopeltis*. These ferns can form dense but not invasive stands in shaded areas with limited moisture. Two particularly

choice representatives from this area are the elegant *Llavea cordifolia* and the rare Mexican form of the hart's tongue (*Asplenium scolopendrium*).

Ferns often add an exotic element to plantings or indoor collections. The bold, five-foot-tall fronds of the Japanese turnip fern (*Angiopteris lygodiiifolia*) create a startling presentation in the Asian Area along Strawberry Creek. Visitors explore the amazing range of tropical fern frond forms and patterns of sporangia in the Orchid, Fern and Carnivorous Plant House. Our collection shows that ferns grow in many habitats, often where you least expect them. They add texture and beauty to our gardens and homes, and most of us are just beginning to appreciate their potential.

Chris Carmichael is associate director for collections and horticulture. He has led the curatorial and horticulture staff since 2000. He may be reached at carmichl@berkeley.edu.

Holly Forbes joined the curatorial staff in 1988 and has been the curator since 1997. She also leads the Garden's plant conservation programs. She may be reached at hforbes@berkeley.edu.



This is an unusual Mexican form of Hart's tongue (*Asplenium scolopendrium*, Aspleniaceae). Various forms are available in the horticultural trade, including fronds with frilled margins.

PHOTO CREDIT: HOLLY FORBES



Japanese turnip fern (*Angiopteris lygodiiifolia*, Marattiaceae) is an Asian species that is doing well under tree canopy, but might not survive a freeze in the open.

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Found in the Australasian Area, *Asplenium oblongifolium* (Aspleniaceae) shows its sori, which release spores. The fern life cycle is complicated, including alternating generations of gametophytes and sporophytes (the foliar form we are used to seeing). See the American Fern Society website for life cycle details: www.amerfernsoc.org



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