

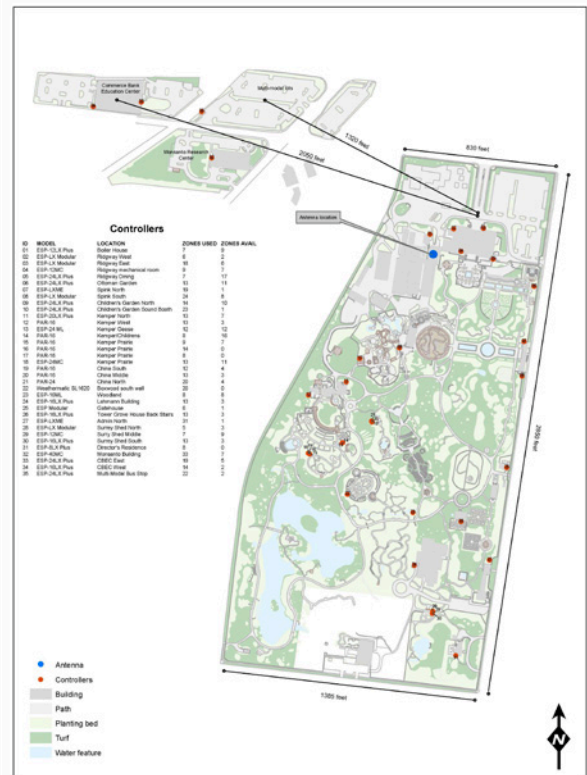
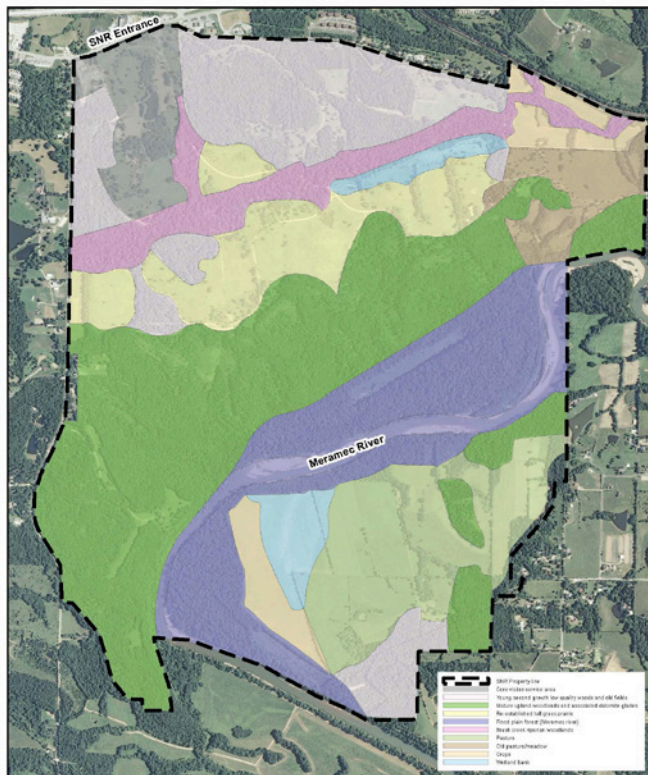


# **GIS for Public Gardens, Parks and Zoos**

**Advancing your organization's unique needs with geographic information systems**



**Alliance for  
Public Gardens GIS**



The Missouri Botanical Garden uses GIS information for a wide variety of uses including updating collection information (top), vegetation mapping (bottom left) and mapping irrigation controllers (bottom right).

## What is GIS?

*You've heard the term GIS, know that it stands for Geographic Information System, and understand that it is a robust tool that combines technology and maps. You are interested in finding out more about the possibilities and whether or not investing in the resources to take advantage of this type of tool would be valuable for your organization. If any of this describes your situation, this information is you!*

The idea of GIS can be difficult to understand. Is it software that you buy? Is it a type of hardware? Is it a profession? Is it a set of information that describes the position of a person, place or thing on the planet? Is it a brand? How do I get it?

GIS is not any one thing, but, as the abbreviation suggests, a system that integrates hardware, software, skilled users and data. GIS gives users the ability to view, store, edit, inventory, manipulate and analyze large amounts of geographical data for a variety of extremely useful purposes.

Because the idea of GIS can be daunting for those unfamiliar with its capabilities, the UC Davis Arboretum, with funding from the Institute of Museum and Library Services (IMLS), has created print materials, presentations, a website, a guide to GIS and variety of training materials to provide those interested in advancing their public garden organizations with the information needed to find out more about GIS and get started! This brochure is just the beginning.

## Why Start Now?

*At work and at home, we now rely on a host of location-based technologies via our desktop computers, laptops, mobile tablets, and smart phones. GIS is one of the key technologies powering this new ecosystem of information about our world. Along with other mobile technologies, GIS is being adopted by many botanical gardens, zoos, and other public gardens. Several market forces are driving this change:*

- GIS is becoming simpler to use and more user-friendly.
- GIS is rapidly moving to fast, affordable cloud-based platforms enabling users the flexibility to edit data in the field.
- Mobile technology is now widely available, faster, and affordable.
- Easy-to-use mobile devices (smartphones, iPads, etc.) link seamlessly to GIS.
- An international collaborative consortium, the Alliance for Public Gardens GIS, provides peer-to-peer support, advice, and encouragement for public garden staff working with GIS and exploring its use.
- A free GIS template for mapping public gardens is now available from the Alliance for Public Gardens GIS.
- Esri, the creator of ArcGIS software, now provides free GIS software, training, books, and conference registration to members of the American Public Gardens Association (APGA).

## What Can GIS Do? Connect workers.

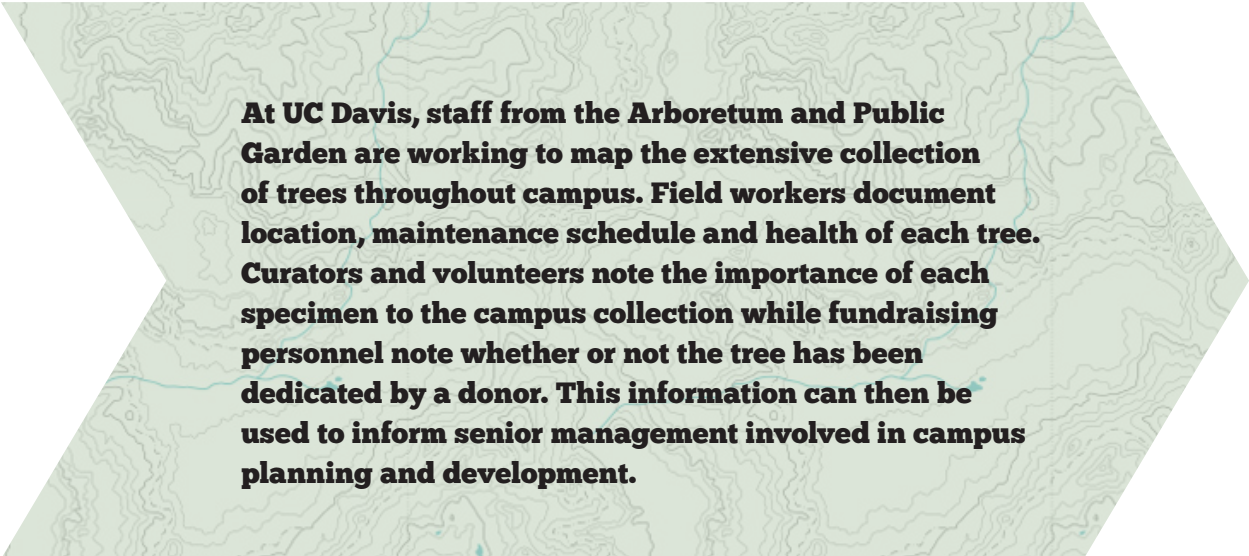
**Executives.** When leaders have a clear view of what is going on at every level they can easily weigh alternatives and make informed choices about where and when to invest the time and money needed to meet important strategic goals.

GIS executive dashboards offer a high-level, visually compelling, map-based views of key performance indicators (KPIs) and can be powerful visual tools that summarize the most critical information that senior management need to run their organization effectively.

**Employees across departments.** When a GIS is used across many departments in a botanical garden or zoo, from operations to communications, shared data can be collected once and then used many times; one department will benefit from the work of another.

New information never before mapped or perhaps known only by staff who originally installed a landscape, managed the construction or the renovation of a site, can now be captured, included in the GIS, and shared with everyone from gardeners to marketers.

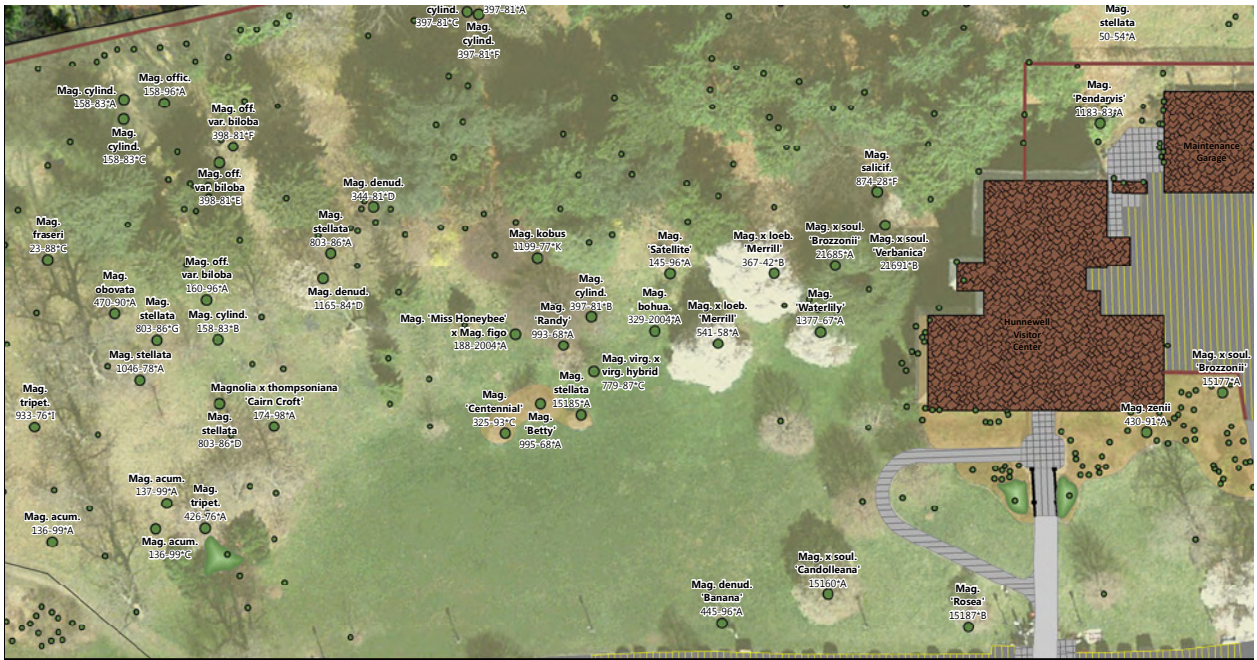
**Field staff and volunteers.** The latest GIS tools, when connected with cell phones, tablets, and other mobile technologies, can consolidate information about a multitude of diverse garden and museum work tasks currently documented in hard-to-find files and scattered across many departments, into a single, streamlined workflow. This is revolutionizing how, where, and to whom information is available—staff or volunteers in the field can now have real time, critical project information at their fingertips without leaving the work site.



**At UC Davis, staff from the Arboretum and Public Garden are working to map the extensive collection of trees throughout campus. Field workers document location, maintenance schedule and health of each tree. Curators and volunteers note the importance of each specimen to the campus collection while fundraising personnel note whether or not the tree has been dedicated by a donor. This information can then be used to inform senior management involved in campus planning and development.**



Using GIS, arborists at UC Davis record the size, health and maintenance needs of heritage trees (*above left*); groundskeepers and tree trimmers schedule upkeep based on information from the arborists (*above right*); senior management and planners use the data when planning areas for new construction (*bottom*).



**The ARNOLD ARBORETUM** of HARVARD UNIVERSITY **Hunnewell Building Magnolia Collection**  
Hunnewell Lawn Group

0 20 40 80 120 160  
Feet  
1 inch = 40 feet

Locating plant specimens like the fried egg poppy or lady tulip (*top left*) during their blooming periods is easy, but with GIS curators know exact specimen locations regardless of the season; curatorial volunteers assist staff with documenting plant accessions (*top right*); finding a specific tree is not a treasure hunt with the help of GIS: Hunnewell Building Magnolia Collection from the Arnold Arboretum of Harvard University (*bottom*).

## What Can GIS Do? Save time and money.

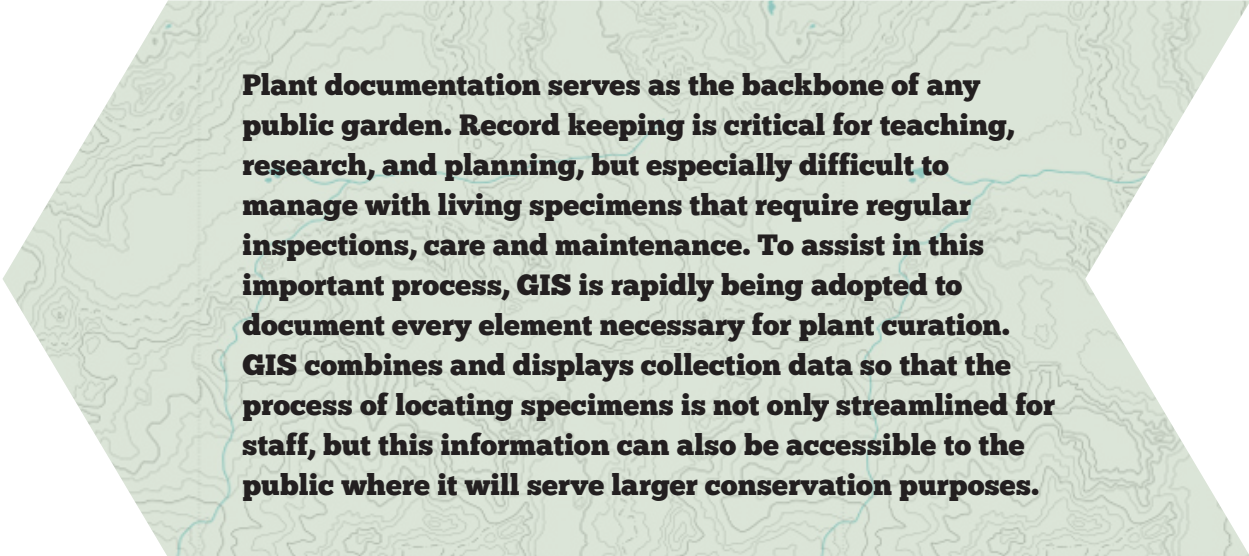
**Locate information quickly.** GIS can reduce costs caused by duplication and loss of information. This is not a problem that public gardens alone face. In large commercial institutions, research shows the following:

- Staff spend almost 9 hours each week searching for lost information.
- Staff often re-create content that already exists.
- Almost 30% of the work week is spent managing incoming information with inefficient tools that were not designed for elegant, rapid information delivery.\*

**Eliminate work-arounds.** The return on investment (ROI) for incorporating GIS into your workflow ranges from 38% for upgrading an existing information system, to over 600% for putting in a new integrated knowledge management system\*. The savings come from eliminating costly work-arounds created by staff to independently track information.

**Speed Planning.** Thanks to GIS, what was once an overwhelming task of creating multiple maps to explore competing alternatives and outcomes has become a thing of the past. Live maps generated by the GIS can provide clear metrics on project alternatives, and compare the costs and benefits of competing ideas.

**Reduce Maintenance Costs.** Facilities managers using GIS-created maps spanning multiple trades can detect trends related to service requests. When data suggests an update or renovation, they have the tool they need to make intelligent, cost-effective decisions knowing where new construction is planned, when system maintenance is required and where future demolition is planned.



**Plant documentation serves as the backbone of any public garden. Record keeping is critical for teaching, research, and planning, but especially difficult to manage with living specimens that require regular inspections, care and maintenance. To assist in this important process, GIS is rapidly being adopted to document every element necessary for plant curation. GIS combines and displays collection data so that the process of locating specimens is not only streamlined for staff, but this information can also be accessible to the public where it will serve larger conservation purposes.**

\* Feldman, S. and C. Sherman, 2001. "The High Cost of Not Finding Information", IDC White Paper. IDC: The Premier Global Market Intelligence Firm, 5 Speen Street, Framingham, MA. Available online at: <http://www.ejitime.com/materials/IDC%20on%20The%20High%20Cost%20of%20Not%20Finding%20Information.pdf>. Accessed 1 March 2012.

## What Can GIS Do? Engage your community.

**Inspire Visitors.** Just as facilities and curatorial staff with mobile devices can now update GIS data in the field, garden educators can use the GIS as a foundation to create cloud based, content rich mobile tours linked to audio, video, and photographic resources for your visitors and engage garden visitors with location-aware activities with mobile devices that many people already have in their pockets.

**Share Your Story.** The progress your garden is making on restoration projects, new construction or the mapping of a recently planted collection isn't only of interest to management. GIS builds maps that tell stories, document innovation and record progress which can and should be shared with the public, members and donors with an interest in your success.

**Work with local schools.** Students learn best when working on real world problems, especially those that can make a difference in their own lives, like community mapping. GIS is widely used for STEM (Science, Technology, Engineering, and Math) education projects in school and museum collaborative projects because it is a powerful tool for discovery, invention and creation, and communication:

*GIS allows students to collect and visualize authoritative data about the question of interest, adding their own data to the map before performing a wide range of analyses on the data in question. GIS problems are steeped in both critical thinking and spatial thinking elements, motivating learners as they learn work-force ready skills. In short, GIS allows STEM students to do exactly what STEM professionals do in thousands of career fields daily.*

*Tom Baker, in "Advancing STEM Education with GIS"*

For example

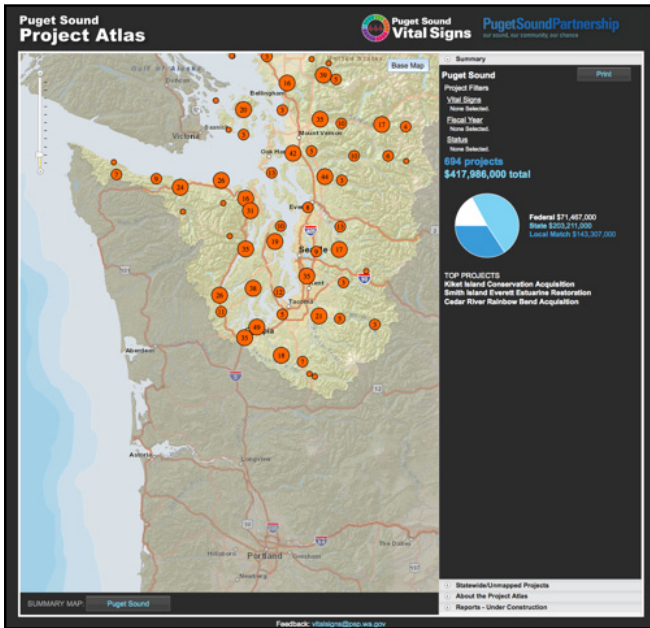
**Researchers from the Missouri Botanical Garden and Massachusetts Institute of Technology (MIT) are working with upper elementary and middle school teachers to design games in which students move around in the real world but interact with simulated characters on the screen of a handheld and use the handheld to make observations and measurements that are generated by a simulation. Some of the scenarios that they have explored in their games include watershed studies, food web investigations, and a cemetery-based scavenger hunt where students "meet" people who had lived in their community through minibiographies crafted from historic census records.**





Community members, students and retirees interested in gaining new skills or sharing their GIS knowledge are eager to help public garden organizations with mapping tasks.

Arkansas 4-H team leader demonstrates a practical GIS application in the field (top left); Puget Sound Partnership displays a project atlas on their website to give their donors and wider audience the opportunity to see the number of projects they support (middle left); high school students learn about careers in GIS from a specialist with National Resource Conservation Service (middle right); students from the Chicago Botanic Garden gather data to assist scientists' understanding of climate change (bottom).



Bobbie Davis, NRCS



## Next Steps

It's an exciting time to incorporate GIS into your public garden organization's workflow. Leaders in the industry are working together to create and test products customized to meet the needs of public gardens worldwide.



### 1. Find out more

Visit the website for the Alliance for Public Gardens GIS at <http://publicgardensgis.ucdavis.edu>.

Here you can sign-up for email updates, access online training resources including our "Guide to GIS," download PowerPoint presentations that will help you start the GIS conversation with your organizations, find how-to information with helpful resources to kick-start your own GIS community volunteer program, watch training videos and more!

### 2. Stay connected

Sign-up for the Alliance for Public Gardens GIS newsletter on the homepage of our website. Via email you'll be informed of the latest public garden GIS happenings, the most recent training materials, software downloads, GIS news and GIS training events.

### 3. Join the community

We realize that many public garden organizations may feel isolated and uncertain about taking on a new, technically challenging project so we've launched multiple social networking sites to share stories, ask questions, mentor others and build a body of shared knowledge.

Of all our social networking sites, our LinkedIn group has become the most active and is a convenient place for staff working with GIS to exchange ideas and explore alternatives.

*Join and become an alliance member along with the organizations listed on the following page.*

# Participating Organizations

Members of the Alliance for Public Gardens GIS (March 2013)

Adele Ford Garden Design  
Advanced Resource Technology  
AECOM  
Aesthetic Pruners Association  
Al Bustan Zoological Centre  
Alice Springs Desert Park  
Alliance for Public Gardens GIS  
Alta Vista Botanical Gardens  
Amarillo Botanical Gardens  
Ambler Arboretum, Temple University  
AMEC Environment & Infrastructure  
American Design & Landscape  
American Public Gardens Association  
Andrews University  
Applewood Estate  
Architect of the Capitol  
Arnold Arboretum of Harvard University  
Asociación Vicus Futura  
Atlanta Audubon Society  
Atlanta Botanical Garden  
Australian National Botanic Gardens  
B. Yaeger LLC  
Baker Arboretum  
Ball State University  
Barnes Inc Landscaping  
Baron Brothers Nursery  
Barranquilla Zoo  
Basalt Public Gardens  
Beeline and Blue  
Bergmann Associates  
Biltmore  
Bittersweet Landscaping  
Boone County Resource Management  
Botanic Garden of Smith College  
Botanic Gardens Conservation International  
Botanica The Wichita Gardens  
Botanical Garden of Tartu University  
Botanical Software Ltd.  
BotanicalValues  
Botany 2000, Inc.  
Bracknell Forest Council  
Breathing Trees  
Brooklyn Botanic Garden  
Buffer Zone College  
Building Owners & Management Association  
Busch Gardens & Adventure Island  
Butterfly Conservation Initiative  
Caldwell  
California State University of Fresno  
Callaway Gardens  
Cambridge Water Department  
Catania Botanic Garden  
Center for Public Horticulture  
CEPS/INSTEAD  
Chicago Botanic Garden  
Chicago Park District  
Children's Fairyland  
City of Boston Department of Transportation  
City of Commerce City  
City of Dublin  
City of Fort Worth  
City of Glendale  
City of Lenexa  
City of McAllen  
City of Memphis  
City of Olathe  
City of Toronto  
City of Yonkers Parks  
Cleveland Botanical Garden  
CMM  
College Student  
Collins Compier  
Colonial Pennsylvania Plantation  
Community College of Baltimore County  
Compositae and Digital Forvaltning  
COMSATS Institute of Information Technology  
Conestoga House & Gardens  
Connecticut College  
Cornell University  
CSU Long Beach  
Cunningham Manor  
Cynthia Vonderahe  
Delaware County Community College  
Denver Botanic Gardens  
Denver Zoo  
Department of Energy  
Department of Sustainability, Environment,  
Water, Population and Communities  
Descanso Gardens  
Desert Botanical Garden  
Designer Gardens Landscaping  
Doron Ambar  
Dumbarton Oaks  
DYNA Software  
Earthy Designs  
East Lothian Council  
ECC  
eCoAmerica  
EcoBotanic Designs, Inc.  
Edison & Ford Winter Estates  
Edsel & Eleanor Ford House  
Education, Agriculture and Technology  
EFL Landscape Design  
Emmas Tradgardsservice  
English Heritage  
Erie Zoo & Botanical Gardens  
Escuela de Ingenieria de Antioquia  
Esri

Esri Malaysia  
Esri Sweden  
Esselworld & Water Kingdom  
Facultad de Arquitectura, Universidad de Buenos  
Aires  
Faculty of Forestry, Belgrade  
Federik Meijer Gardens & Sculpture Park  
Fenland Ironworks Ltd  
First Harvest of Rotary District 5110  
Florasearch, Inc.  
Forest Lawn  
Fort Worth Botanic Garden  
Foundation Gardens  
Foxborough Nursery, Inc  
Franklin Park Coalition  
Frederik Meijer Gardens & Sculpture Park  
Freeport McMoran Copper & Gold, Inc.  
Friends of High School Park  
G4S  
Gainesville State College/IESA  
Garden Geek LLC  
Garden State Growers  
Gardens of the Fox Cities  
GardEntice LLC  
GEM  
Gemini Landscapes Ltd  
Georgia Mountain Fairgrounds  
Geosearch Technology  
Geoville  
Girl Scouts of Northern Indiana-Michiana  
Grand Hyatt Mumbai  
Great Bend - Brit Spaugh Zoo  
Green Valleys Association at Welkinweir  
Greenwise Organic Lawn Care  
Harvard University  
High Glen Estate  
High Point University  
Higher Educational  
Hillwood Estate Museum & Gardens  
Historic London Town and Gardens  
Holden Arboretum  
Hortus Botanicus Leiden  
Hot Springs Village Property Owners Association  
Howard County Conservancy  
Humber Arboretum and Centre for Urban Ecology  
Huntsville Botanical Garden  
Idaho Botanical Garden  
Idaho Chief Information Officer  
IG  
IGR University of Graz  
IIITB  
In Harmony Community Club  
INECO-TIFSA  
INOVA-EEM  
Instituto Inhotim - Jardim Botânico Inhotim  
Instituto Superior de Agronomia (UTL)  
ISC srl  
Japanese Maples and Evergreens  
JB Barre  
JBmed  
JP Varos  
K & M Lawn and Garden  
Kadoorie Farm and Botanic Garden, LEED Green  
Associate  
Kasraie Consulting  
Kerawa  
Killester College of Further Education  
Ladew Topiary Gardens  
Lake Metroparks  
Landscape Arboretum at Temple University,  
Ambler  
Lark Label  
Lawn & Garden SVC of Wilton Manors  
Leitch Landscapes  
Leo Meridian Infrastructure Projects and Hotels  
Ltd. (LMIPHL)  
Lewis Ginter Botanical Garden  
Life Spectrum Concept Ltd.  
Lincoln Park Zoo  
Living Well Consulting  
London Borough of Hounslow  
London Edible. Gardens Limited  
Longwood Gardens  
Lovett Pinetum  
Lundgren Co  
Lyon Arboretum  
Lyons Consulting Group  
Mac Garden Solutions  
MacCallum More Museum & Gardens  
Mangolia Botanic International  
Mariana Qubein Arboretum & Botanical Gardens  
@High Point University  
Marshall University  
Mary M. B. Wakefield Charitable Trust  
Mass Audubon  
Massachusetts Horticultural Society  
Matthaei Botanical Gardens & Nichols Arboretum  
Mead Botanical Garden, Inc.  
Meadowbrook Farm  
Minnesota Park and Recreation Board  
Minnesota Department of Natural Resources  
Mira Costa College  
MiraCosta College  
Missouri Botanical Garden  
Misty Hills Private Botanical Gardens &  
Arboretum  
Morris Arboretum of the University of  
Pennsylvania

Mount Alexander Shire Council  
Mount Auburn Cemetery  
Mount Nebo Miami Memorial Gardens  
Mounts Botanical Garden  
Muscatine Area Geographic Information  
Consortium  
MWV CDLM  
Naples Botanical Garden  
National Arboretum Canberra  
National Botanic Garden of Belgium  
National Museum of Natural History and Science  
Botanic Garden  
National Park Service Olmsted Center for  
Landscape Preservation  
Nehrling Gardens  
New Plymouth District Council  
New York Botanical Garden  
Nitsch Engineering  
North Carolina State University  
North Central Bronx Hospital  
Nova Scotia Agricultural College  
OBG  
Ocean Color and Coastal Oceanography  
Laboratory  
Ohio State University Chadwick Arboretum &  
Learning Gardens  
Olbrich Botanical Gardens  
Olds College  
Ordina  
Organic EARTH Solutions LLC  
OSU Chadwick Arboretum  
Otis Hyde Herbarium  
OzGreen  
Paola's Pesto  
Particular  
PenBay Solution  
Penn State University  
Petrozavodsk State University  
Phipps Conservatory and Botanical Garden  
Plantasia Design Center & Botanical Gardens  
Planterra Corporation  
Powell Gardens, Inc.  
Private Estate  
Quarryhill Botanical Garden  
Quintana J.  
QwikMow, LLC  
R J Landscapes  
Royal Botanic Gardens, Canada  
Raines Tree Care  
Ramat Hanadiv Gardens  
Ramat Hanadiv Memorial Gardens and Nature  
Park  
RCE  
Recent College Graduate  
Red Apple Farm  
Red Butte Gardens  
Reeves-Reed Arboretum  
Reiman Gardens - Iowa State University  
RIT, INC  
Roane State Community College  
Royal Botanic Gardens, Canada  
Rochester Community and Technical College  
Rodriguez Consulting, LLC  
Roger Williams Park Botanical Center  
Rose Garden Nursery of Petaluma  
Rosewood Involvement Centre  
Rotary Botanical Gardens  
Royal Botanic Gardens Melbourne  
Royal Botanic Gardens Sydney  
Royal Botanical Gardens  
Royal Horticultural Society  
RUA  
Ruth Bancroft Garden  
Ruth Mott Foundation  
Sales Process Improvement Consultant  
Salish Coast Sciences  
San Diego Botanic Garden  
San Diego Zoo and Zoo Safari Park  
San Francisco Botanical Garden  
San Francisco State University  
Sara Furr Schatz Landscape Architects  
School Garden Network  
SEAWEAD  
Seed Savers Exchange  
Seller Instrument & Mfg. Co. Inc.  
Self Employed  
SF Botanical Garden  
SFSU Facilities  
Shasta College  
Smith College  
Smith College, Lyman Conservatory  
Smithsonian Institute  
Smithsonian Institution  
Sochi National Park  
Social Media  
Southern Cross Ranch & Stables  
Southern Virginia Botanical Gardens  
SOW Trust  
Spring Grove Cemetery & Arboretum  
Springs Preserve  
State Botanical Garden of Georgia  
Statsbygg  
Stockbridge School of Agriculture  
Stonecrop Gardens  
Stonagate Gardens  
Streissguth Gardens  
Summerland Ornamental Gardens  
Summit Garden  
Sunnyside Organic Seedlings

Swale Borough Council  
Technical Product Marketing & Sales  
Ted's Greenhouse  
Tehran Municipality  
Temple University, Ambler  
Teranet Inc.  
Terra Bella Landscaping  
Territory and Municipal Services  
The Alchemy Garden  
The Arboretum, State Botanical Garden of  
Kentucky  
The Arboretum, University of Guelph  
The Atlanta History Center  
The Brenton Arboretum  
The Care of Trees  
The Dallas Arboretum & Botanic Garden  
The Dawes Arboretum  
The Key School  
The Knot Event Planner  
The Living Desert  
The Los Angeles County Arboretum & Botanic  
Garden  
The Morton Arboretum  
The National Statistical Coordination Board  
The National Trust  
The Nature Conservancy - Ohio Chapter  
The New York Botanical Garden  
The Oregon Garden  
The Pink House  
The Real IPM Company (K) Ltd  
The Ruth Bancroft Garden  
The Slovakian University of Agriculture  
The University of North Carolina at Greensboro  
The University of North Carolina at Wilmington  
TMG  
Todd's Landscape Care, Inc.  
Tofino Botanical Gardens  
Toledo Botanical Gardens  
Torbay Council  
Town of Orleans  
Treeline  
Trees Atlanta  
Trosa Textilmakeri  
TruGreen LandCare  
TSB Real Estate  
TÜ Botaanikaead  
U.S. National Arboretum  
UAF Georgeson Botanical Garden  
UBC Botanical Garden  
UC Davis Arboretum  
UC Santa Cruz  
UCSC Arboretum  
UNC Charlotte Botanical Gardens  
University of Missouri  
Universidad de Granada  
University & Jepson Herbaria, University of  
California, Berkeley  
University of Bergen  
University of California, Los Angeles  
University of California, Santa Cruz  
University of Delaware  
University of Delaware Center for Historic  
Architecture and Design  
University of Granada  
University of Guelph Arboretum  
University of Iowa  
University of Karachi  
University of Maryland  
University of Maryland, College Park  
University of Massachusetts Amherst  
University of Missouri  
University of Nebraska, Lincoln  
University of North Carolina at Charlotte  
University of Porto  
University of South Carolina  
University of South Carolina  
University of Texas  
University of Virginia  
University of Washington Botanic Gardens  
Urban Ecology Center  
Urban Economics Inc  
Urban Wildlife Research Lab  
Utah State University  
Valley Land Fund  
VanDusen Botanical Garden  
Ventura Botanical Gardens  
Virginia Department of Health  
Virginia Tech Horticulture  
Wageningen University  
Wallace Desert Gardens  
Washtenay County  
Wave Hill  
Wavelength Nominees  
Wellesley College  
Wellesley College Botanic Gardens  
Western North Carolina GIS  
Whattidyoubringme  
Wild About Your Gardens  
Wonderful Holland  
Worcester City Council  
Ympäristönsunnittelu Henttonen  
Zoological Society of San Diego

## About Us

### Alliance for Public Gardens GIS

Since 2007, the UC Davis Arboretum has led a nationwide team of botanical gardens and zoos staff—with funding provided in part by the Institute of Museum and Library Services (IMLS)—to develop GIS as a tool to help garden staff manage public gardens more effectively.

### Key Partners

Key partners include the San Diego Zoo and the San Diego Zoo Safari Park, the Missouri Botanical Garden, the Arnold Arboretum of Harvard University, the Montgomery Botanical Center, the San Francisco Zoo, the San Francisco State University, the Center for Integrated Spatial Research at University of California, Santa Cruz, and the Chicago Botanic Garden, among many other gardens. The Alliance for Public Gardens GIS grew out of these efforts.

### Special Acknowledgements



Jack Dangermond and Peter Raven. (Photo by Jon Kamen.)

For more than 20 years, Jack Dangermond, president and founder of Esri, Inc., the world's largest GIS software company, and Dr. Peter Raven, world leader in botany and ecology, advocate for global biodiversity conservation and president emeritus of the Missouri Botanical Garden, have enthusiastically advanced the use of GIS for global plant conservation and supported efforts to develop this technology as a powerful management tool for these living scientific collections. Together, they have worked to directly support or advocate for the national teams developing data models, customized applications, and training materials for GIS in public gardens. Their vision and leadership has been a powerful force behind the success of these national collaborative efforts.

