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ECOLOGY, BIODIVERSITY AND CONSERVATION

# Plant Conservation Science and Practice

**The Role of Botanic Gardens**



**Edited by Stephen Blackmore  
and Sara Oldfield**

CAMBRIDGE

# *Plant Conservation Science and Practice*

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*The Role of Botanic Gardens*

Edited by

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## 8 · *Cultivating the Power of Plants to Sustain and Enrich Life*

### How Public Gardens Can Realise our Purpose by Focusing on the Basic Human Needs Universal to Diverse Audiences

SOPHIA SHAW AND JENNIFER SCHWARZ  
BALLARD

This chapter is dedicated to explaining how botanic gardens can increase the diversity of their visitors and programme participants and intensify visitors' level of involvement. There are many successful case studies from gardens around the world that demonstrate how gardens can engage people from all ages, backgrounds and abilities in all we do; we will highlight some of these.

The need to engage the broadest and most diverse audience in garden activities has never been more urgent. Plants, as a result of climate change, habitat fragmentation, invasive species, and other factors, are in peril. All life depends on plants – we rely on them for our food, clean air and water, medicine, shelter and clothing – and healthy ecosystems, all of which have plants at their core. By including everyone in our passion for plants and inspiring in all people an appreciation of nature, we can best fulfil our mission as botanic gardens. When we increase people's understanding of the importance of plants and plant diversity, we help build a citizenry of environmentally conscious civic leaders, scientists and stewards of our planet.

However, engaging a broad audience and inspiring all people to be environmentally conscious is an ambitious goal. We still have far to go to reach a day when botanic garden audiences reflect the diverse demographics of our regions. We have history to overcome: most American

and many European gardens were created from the private estates of white, upper-class individuals or through their personal philanthropy, and organised in ways that served the pleasures, social desires and intellectual curiosities of a white educated upper class. Historically, public gardens have been located in affluent neighbourhoods, and even if those neighbourhoods are diverse, visitorship has tended to consist of mostly white, generally affluent people. Often unintentionally, the programming, marketing, or cost of entry kept people whose backgrounds were different from the gardens' founders outside the garden gates. Changing this is both a matter of becoming more welcoming and intentionally altering traditional garden culture.

How we overcome this history and successfully achieve a more diverse visitorship is a question garden and museum leaders have debated and advanced passionately since at least the 1970s. Efforts to date have been guided primarily by the term 'community outreach' – reaching out from the institution's main building or garden site to people, most typically those who are poor and not white. The efforts have resulted in off-campus programmes in schools, parks and community centres; displays and exhibitions intending to appeal to varied interests; materials and tours translated into different languages; education and training programmes; and new on-site and online marketing tools that make an effort to anticipate the needs of diverse audiences. The invention of 'community outreach' was transformational in this effort of gardens and museums – allowing for important progress in changing the population of people served. However, despite garden and museum leaders' sincere commitment to these efforts, they were misguided in that they often stereotyped the needs and interests of new audiences, making assumptions about what would appeal to a specific demographic; for example, programming African drummers to attract black Chicagoans or offering Mexican food to attract local Latinos – neither of which results in a significant visitor demographic shift. Despite shortcomings, however, these efforts certainly helped by creating familiarity with a previously unknown institution.

However, this approach is insufficient to fulfil botanic gardens' mission today. Both the semantics and concept of 'community outreach' have served out their useful life. We should now do away with this inside-out framework and the words that describe it if we are to achieve our goal of truly serving and engaging diverse audiences.

We must do two things. First, we must enhance garden programmes that serve people's basic contemporary human needs, recognising we all

share dreams and challenges, regardless of where we live, how much money we make, our age, skin colour, gender or other superficial differences. We all need access to food, education and exercise. We all need support when we fall sick or grieve, and as we age. We all need safe places where we can relax, celebrate and spend our leisure time. The quality of all our lives depends upon a healthy future for our planet. Second, we must *authentically* engage the audiences we seek to reach, whether on site or in a neighbourhood. This requires that we interact on equal footing. We must be willing not only to talk but also to listen, and respond to diverse interests, desires and concerns through our actions and programmes. Botanic gardens, because of the deep human connection with nature, have a unique opportunity to do this.

### 8.1 Reframing ‘Community Outreach’ as Authentic Engagement

In order to identify a framework for engaging diverse audiences and specific tools to guide that approach, we will first deconstruct the concept of ‘community outreach’ and then suggest an alternative way of thinking about the services gardens provide.

According to the (online) *Oxford English Dictionary*, ‘outreach’ is defined as, ‘An organisation’s involvement with or activity in the community, especially in the context of social welfare.’ In the garden or museum context this reaching out has generally come in the form of a monologue rather than a dialogue, where an institution makes a priori judgements about its audience. Perhaps this explains why many museum and garden outreach efforts have not worked; they have been inadvertently grounded in unequal power dynamics and untested assumptions about the interests and needs of our target audiences.

And then there is ‘community’ – also a word that is problematic in the context of audience engagement. We are once again forced to reflect upon the ways language shapes both action and reaction. Community suggests more than commonality, it implies a shared interest, culture or context that defines individuals as a group. This can take place internally, by the members themselves, or more problematically, externally, in which case it can become little more than a stereotype. For example, journalists reporting on how different groups of individuals will vote in an election may characterise the ‘Latino community’ as supporting immigration reform or ‘women voters’ supporting Hillary Clinton for US president. However, we know that people do not act or vote in

homogeneous blocks and that we each can identify with multiple ‘communities’ at the same time. As cultural institution administrators, thinking along the lines of ‘appealing to a community’ can often lead to programme decisions (certain cultural exhibitions or festivals for example) that can inadvertently be understood as biased and contributing to stereotypes, thus distancing the very people whom we hoped to engage. At the same time, we cannot let the diversity of our audience overwhelm us – it is better to try, and to recognise publically and explicitly the multifaceted nature of any group, than not to engage with new audiences at all.

The words ‘community’ and ‘outreach’ were chosen with good intention, but the terminology has hindered deeper, reciprocal conversations with potential audiences. So, let us abandon the language of ‘reaching out’ to a ‘community’. Rather, let us use language that recognises the commonalities among all people and celebrates the differences: one that starts with openness and a willingness to listen and a desire to understand, one that draws in people from all ages, backgrounds and abilities to botanic gardens and museums. Let us reframe this process as authentic engagement, as conversation among equals. We will not broaden or diversify our audience by thinking that people who speak a language other than English, or who have less money, education or mobility cannot, metaphorically, step over the fallen tree or climb the hill on their own.

Garden leaders must aim to serve basic human needs in order to expand audiences and increase impact. Replacing the out-dated concept of the erudite institution attempting to reach out is a way of thinking that encourages us to ask, ‘how do we serve the individual, while meeting the universal needs of all people?’ In other words, how can we both ensure our garden is relevant to our users, visitors or customers, while at the same time be conveners of people of different backgrounds coming together at an exciting moment of opportunity to bring about positive social impacts against a backdrop of news that often seeks to divide us. Let us celebrate the fact that our living museums have the capacity, because of our commitment to nature, to address a diverse suite of needs; both those of our planet and of its diverse and complex human population. Garden grounds and programmes build people’s social, physical, emotional and intellectual strength in significant ways every day. What an exciting and important time, full of opportunity, it is to be working in places with so much potential to do good.

But it is not just about doing good.

Institutions that continue in the old model of community outreach may not thrive to their potential. Instead, we must with profound commitment, invite people in. We must put human beings, not the institution, in the centre. We must think about the ‘customer’ (and we use this term consciously, because in traditional business vernacular the customer is ‘always right’) and identify how our garden can serve them, not by making assumptions, but through dialogue and conversation. We must put the needs of our stakeholders, whether they are visitors, students, donors, volunteers, employees, vendors or programme partners, at the centre of our plans. If we focus on truly serving people of all backgrounds, abilities and ages – from birth through to death – we will thrive, and so will our message about plants.

## 8.2 How Can Botanic Gardens Broaden their Reach and Make a Difference?

Now that celebrating diversity and adopting authentic engagement are our framework, how then do we apply these in operations and programming to reach our current and desired audiences? Specifically, what do we do?

At the most basic level, garden presidents, together with their boards of directors and executive staff, must decide to make diversity a strategic priority and make decisions at every level of the organisation that support it. They must commit, not only verbally, but to the core of their belief system, that attracting people of all backgrounds to their garden is beneficial and the right thing to do. They must create a culture of acceptance within those groups who feel their needs are not being met are comfortable voicing their concerns with the confidence they will be taken seriously. Even today, there are those who would prefer not to hear other languages, or sit at a café table with people with whose skin pigments or clothes do not match their own. If these attitudes exist at the leadership level of an institution (board and staff), they must be addressed directly and openly, if necessary with the help of an outside mediator. The growth and positive change achieved at the Chicago Botanic Garden are in large part a direct result of a leadership-level staff and board commitment and partnership, one also embraced and forwarded by our government partners, the Forest Preserves of Cook County.

Then, we realise that we must review and assess every aspect of our institutions’ policies, programmes and communication vehicles,

looking critically for inherent bias or exclusionary language or symbols. We must ask ourselves honestly, ‘why are we not attracting a more diverse audience, workforce, board, etc.’ and speak openly about what changes we can make both for the short and long term. After a decade of effort at the Chicago Botanic Garden, we made many small changes to policies and programmes that might seem individually insignificant, but which together create a rich, consistent, reliable structure that allows for operational, programmatic and individual growth. From mission statement and personnel policies, to purchasing, programming and marketing, equality and openness must guide action.

At a basic practical level, it means considering how organisational structures affect staff. Of its nearly 300 permanent full-time employees, the Chicago Botanic Garden employs approximately 60 staff members for whom Spanish is their only or preferred language. In peak season, we add 50 Spanish-language-preferred temporary workers to this number. There are also employees who are unable to write or read in either English or Spanish. Yet until 2011, there was no one on the management team who could communicate with this essential workforce. In response, the Garden included fluency in Spanish in the hiring criteria for the new vice president of human resources. The culture of the institution started to shift immediately. Spanish-speaking employees were finally offered the right health-care benefit plans for their families; individuals struggling at work or with a personal crisis could find the help they needed. Lesson learned: you cannot build a positive institutional culture, help people to excel or, much less, diversify your team, if you cannot communicate with everyone.

Likewise, we reviewed our policies regarding same-sex couples and were surprised to find same-sex partner benefits did not mirror those offered to heterosexual staff members. Upon further research, we learned that in our successful event business, staff had been instructed not to book events celebrating the union of same-sex partners. Both of these policies were changed immediately. But it was against this background that our senior staff, with support of the board’s executive committee, decided to participate in the Pride Parade in Chicago – attended by almost a million people. Our horticultural staff created a colourful float from our trolley. Staff and volunteers danced and walked for hours along the parade route. After the first year of our participation, four Garden employees made a point of saying how much our participation meant to them. One



noted that she finally ‘felt like she belonged’ at the Garden. The Garden’s presence at the parade made a public statement of acceptance and respect to the diverse crowd of parade-goers and those who watched on television.

Operationally, inclusion extends beyond staff to those with whom we do business: our contractors and suppliers. The Supplier Diversity Programme, developed with our partners the Forest Preserves of Cook County and the Chicago Zoological Society’s Brookfield Zoo, aims to ensure that the Garden actively seeks out women- and minority-owned businesses to provide services and products. The bidding process requires that staff publicise opportunities to diverse audiences, and consider diversity when awarding contracts. Contractors, like staff, become part of the Garden ‘family’ for a time, to learn about the Garden’s mission and purpose. They also, upon completion of a project, feel invested in the campus and perhaps become more likely to visit or share the experience and purpose of the Garden with family and friends. If we expand our list of experienced suppliers, we naturally expand the understanding of our mission and reach of our institution. Botanic gardens can achieve operational sustainability and build understanding of plant conservation only if everyone – from diverse neighbourhoods and backgrounds – has the opportunity to become involved in our institutions. In Chicago, we have seen, and felt, results.

Finally, this means creating a culture in which all stakeholders are comfortable in voicing their unmet needs. For example, the neighbourhoods surrounding the Chicago Botanic Garden have a high Jewish population. In the Jewish tradition, the late-winter holiday Tu B’Shevat is a time for ushering in the ‘new year for trees’. The day is currently celebrated as an ecological awareness day and a welcoming of spring. In response to this specific, culturally relevant, demand, we developed programming for field trips and families that aligned with Tu B’Shevat that are now popular with all our audiences.

To recognise and reinforce our commitment to diversity, in late 2014, the staff, board and volunteers of the Chicago Botanic Garden adopted a new mission statement: ‘We cultivate the power of plants to sustain and enrich life.’ We wrote this not only to underscore the conservation message of the importance of plants, but also to include all of the people who help the Garden to fulfil its goals. The previous mission statement was descriptive, yet oblique: ‘to promote the enjoyment, understanding, and conservation of plants and the natural world’. Who was doing the promoting? Why? For whose benefit? Yet, by

emphasising three words: ‘we’, ‘cultivate’ and ‘enrich’, we provided clarity. The words ‘We cultivate’ include everyone – from gardeners and horticulturists to course instructors (who cultivate the minds of students) to ex-offenders who may be enrolled in our Windy City Harvest urban agriculture programmes. ‘Sustain’ refers to the fact that all life depends on plants. And ‘enrich’ gives merit to the mental benefits of our work, acknowledging the commitment of our horticultural therapists and yoga instructors, as well as emphasising the importance of the beauty, community, inspiration, joy and comfort that botanic gardens provide.

Only with everyone in the organisation working together, using the best of our diverse perspectives and backgrounds, can we make progress in achieving our bigger ambitions to save the planet by saving plants; identifying methods to mitigate the impact of climate change; and using the power of nature to beautify and restore neighbourhoods, and achieve social justice.

### **8.3 Conclusion: Change Won’t Come Easily, but the Stakes Are High and the Benefits Are Well Worth the Effort**

Botanic garden leaders must be agents of change if we are going to fulfil our mission. This is not always easy, and is occasionally risky, but people and plants depend on us. In Chicago, when we’re not sure what to do, we review the issue at hand through the lens of what is best for our stakeholder – ‘what would best meet his or her needs?’ We also remember the importance of our purpose and review the following values statements, on which our strategic plan is built:

- We believe: beautiful gardens and natural environments are fundamentally important to the mental and physical well-being of people.
- We believe: people live better, healthier lives when they can create care for, and enjoy gardens.
- We believe: the future of life on Earth depends on how well we understand, value and protect plants, other wildlife, and the natural habitats that sustain our world.

In conclusion, gardens will become more operationally sustainable and financially viable if we lead as agents of social justice. As garden leaders and enthusiasts, we must use the unique power of plants to sustain a

enrich the lives of our stakeholders – all people of every age, background and ability – in the ways they choose, grounded in satisfying the basic human needs we all share. When those we engage thrive, we thrive. The more diverse our audiences become, the more broadly our education and conservation missions will be shared around the globe – allowing more people to become engaged with our programmes and to live better, happier, healthier, more satisfying lives. Gardens can support people facing many challenges. Gardens are a refuge. Our campuses – whether big or small, urban or suburban – provide comfort and present solutions in science education, food security, workforce training, wellness and climate change. We offer solace to people facing crisis, and a place to celebrate or find joy. Gardens will remain sustainable – and we firmly believe they will – if we see the world’s greatest problems as the world’s greatest opportunities to serve. The more relevant our connections to our audiences, the more successful our institutions will be. Presented here are four case studies illustrating these concepts and principles.



Figure 8.1 Windy City Harvest Youth Farm students selling at a local farmers' market. For the colour version, please refer to the plate section. In some formats this figure will only appear in black and white.

### Case Study 8.1 *We Use Nature-Based Solutions for Social Justice: Windy City Harvest*

By Angela Mason, Chicago Botanic Garden

Through youth development, workforce training and job placement, entrepreneurship and farm business development, the Chicago Botanic Garden's Windy City Harvest's urban agriculture programmes empower at-risk youth and adults, including those involved with the justice system, to find a pathway to a successful future.

A four-tier training programme comprising Youth Farm, Apprenticeship, Harvest Corps and Entrepreneurship and Careers supports workforce development while building a local food system, healthier neighbourhoods and a greener economy. The produce grown and harvested at the 13 community-based sites reaches populations the traditional US food system has bypassed, especially low-income communities where grocery stores are scarce and rates of diet-related diseases are high. The work-related training increases the economic security of participants and communities.

#### **Youth Farm**

Each year, the Windy City Harvest Youth Farm educates and employs 80 to 90 teens from low-income communities at three farm sites in Chicago and one in Lake County, IL. As they advance through a programme grounded in sustainable urban agriculture and social emotional learning principles, Youth Farm students learn to grow food responsibly, work as a team, advocate for food justice, eat in a healthy way and become accountable – to themselves, their fellow farmers and to their employers. Through nutrition demonstrations and redemption of federal nutrition assistance coupons at markets and Women, Infants and Children (WIC) offices, Youth Farm students engage their communities and gain a better understanding of pressing social and economic issues.

Youth Farm teens work in all aspects of sustainable farming and food systems – from planting a farm to managing a beehive, from cooking with the food they grow to selling it at local farm stands and markets, and through sales to the Garden View Café, where the chef incorporates fresh organic produce into menu items available to Chicago Botanic Garden visitors. Teens are paid a stipend for four

hours per week in the spring and fall, and 20 hours per week in the summer, but the benefits far outweigh the wages they earn. By the end of the season, they have gained valuable job and teamwork skills, discovered a whole new way to look at the food they eat, and grown their support system to include supervisors, programme coordinators, legislators, and their fellow participants. The personal and professional impacts carry far beyond the programme end. On average, over 80 per cent of Youth Farm participants enrol in post-secondary education (compared to 29 per cent of all students entering Chicago Public High Schools). As North Lawndale student Anton Willis remarked, 'I know this job is going to help me to get another job.'

### Apprenticeship

Through the nine-month apprenticeship programme adults earn a sustainable urban agriculture certificate accredited by the Illinois Community College Board. Students begin with coursework. Then, from June through September, they complete internships at Windy City Harvest and partner farm sites. In September, students return to the classroom for sessions devoted to job searching, résumé building and mock interviews.

The experiences of recent graduates are evidence of the programme's success; as of 2015, 91 per cent of graduates have started their own businesses, are employed as beginning farmers or within the local food sector. Their positions include the rooftop gardening coordinator of Revolution Brewing, manager of the edible landscaping division at Christy Webber, GreenCorps mentor at Tilden High School, Windy City Harvest sales coordinator, and the manager of Mariposa Gardening and Design – who is now enrolled in a sustainable landscape architecture programme at the University of California, Berkeley, and interned at several French chateau gardens, including the Palace of Versailles, as part of the Garden's exchange programme with the French Heritage Society.

### Harvest Corps

Working with the Illinois Department of Juvenile Justice (IDJJ) Youth Centers as well as other organisations supporting at-risk young people, Windy City Harvest Corps offers educational and transitional jobs programmes for justice-involved youth aged 17–21, and others who

have significant barriers to employment. The Corps is a modified 13-week apprenticeship programme, with training in environmental literacy and work skills through the Roots of Success curriculum (which engages students by making learning relevant, building on prior knowledge and experience, and connecting education to employment and further learning in green career fields. This is supplemented with additional support service coordination (e.g. for housing or food stamps) and closely supervised work assignments to ensure that as these individuals transition back into their communities, they have the support systems necessary to be successful.



Figure 8.2 Corps participant harvests lettuce on the McCormick Place rooftop in Chicago, IL. For the colour version, please refer to the plate section. In some formats this figure will only appear in black and white.

### Entrepreneurship and Careers

Launched in 2013, the incubator farms of Windy City Harvest support entrepreneurs as they start or manage farms and farm-related businesses. Four industry-specific certificates are also offered: Business and Entrepreneurship for Local Foods, Season Extension, Aquaponics and Vertical Farming Systems, and Rooftop Farming and Edible Landscaping.

With support and mentoring from Windy City Harvest staff, students develop business plans and launch successful urban farm businesses and ventures. One example is Your Bountiful Harvest Family Farm, developed by Safia Rashid, who grows vegetables for WIC boxes, the Legends South Community and wholesale distributors, including Midwest Foods. Rashid worked her incubator farm plot with the help of her husband, volunteers and a team of interns. The 39-year-old mother of three grew vegetables to fill boxes for the WIC programme. 'It makes me very happy,' said Rashid, a onetime WIC recipient, 'I feel like I'm coming full circle to give something back to a programme that gave to me.'

### Impacts

Since its inception in 2003, the Windy City Harvest has impacted individuals and communities:

- 900 high school students from Chicago's low-income communities participated in the Youth Farm;
- 180 formerly incarcerated individuals participated in the Harvest Corps transitional jobs programme;
- 109 adults completed the apprenticeship programme;
- 22 adults completed the Business and Entrepreneurship for Local Foods and Season Extension certificate courses;
- 12 beginning farmers were mentored and supported in the creation of six urban farm businesses;
- 525,795 pounds of fresh fruits and vegetables were sustainably grown and harvested, generating over \$1 million in revenue and serving more than 875,000 low-income community members;
- 10,653 boxes of produce were distributed to Community Economic Development Association of Cook County (CEDA) Women, Infants, and Children (WIC) clients in exchange for food vouchers;
- Over 80,564 pounds of produce were donated to food pantries and community health centres, such as the Pacific Garden Mission and Pilsen Wellness Centre, or taken home by students and staff.

Stacy Kimmons, a 2014 Windy City Harvest Apprenticeship and Business and Entrepreneurship for Local Foods graduate, said:

In the future, I'm really hoping to have my own incubator and grow produce and sell it within the community. I want to use my Windy City Harvest education to show communities that there is a better way to eat healthy and live healthy.

These words from Stacy, who was introduced to sustainable agriculture while incarcerated, echo the programme's ripple effect. At the same time that the Chicago Botanic Garden is helping to launch the careers of youth and adults with recognised barriers to employment, its programmes provide access to fresh, locally sourced food in low-income Chicago communities. Like other programme participants and graduates, Kimmons is now gainfully employed and contributing to Chicago's growing urban agriculture movement.

### Case Study 8.2 *We Work towards a Sustainable Future: Jerusalem Botanical Gardens Social-Environmental Hub*

By Adi Bar-Yoseph, Jerusalem Botanical Gardens

The Jerusalem Botanical Gardens (JBG) established the Social-Environmental Hub to advance environmental awareness and encourage a sustainable lifestyle through support and promotion of social-environmental entrepreneurship. The Hub exemplifies the culmination of the gradual shift in the JBG's operating philosophy as it searched for its place in, and relevance to, the city in all its diverse complexity. The first step was to open the discourse and messaging so as to be more inviting. The second was to invite outside groups in for collaboration and co-creation of programmes and the third was the Hub – a platform for action and facilitator of an interdisciplinary professional network for change agents working towards sustainable community development.

As a university garden, the JBG knew well the challenges facing public gardens. The public perception was of a detached elitist institution into which one was invited only at the scientists' discretion, and this was reflected in the garden's landscape design, planting, programming and public relations. Strengthened by the significant social, political and security challenges characteristic of Israel and especially Jerusalem, this resulted in very low visitation and prompted the JBG to make a substantial shift in 2006 that resulted in a three step fundamental change – from openness to inclusion to interaction through dialogue.

The standard operating paradigm had essentially filtered out those who did not relate to the scientific, Hebrew language, message of the Gardens. To open it to a more diverse audience, the strong scientific messaging was slightly released and new programming and messaging were developed – traditional, ‘community outreach’. This shift positively impacted visitation, quadrupling footfall and began the process which would fundamentally change the way the Gardens engages the public.

Under the new slogan ‘plants grow people’ the JBG also opened its gates to groups who wanted to create their own collaborative programmes within its grounds. These were primarily groups offering vocational rehabilitation, horticultural therapy or doing community work. Most are still operating in the Gardens today. As the number of groups and programmes at the JBG grew, a wider need and larger opportunity became apparent. As part of its mission to maintain biodiversity, it was imperative the JBG include within its operational philosophy engagement the complete arc of human diversity. Innovation appears where there is a discrepancy between need and what is on offer. In inviting new groups into the Gardens, whether for JBG run or externally run programmes, a dialogue emerged and gaps became evident. These were our opportunities for authentic engagement as the community told us what it wanted and where it would allow us, and even expected us, to step in.

As botanic gardens the world over re-think how they remain relevant, ‘lower their fences’ and engage their public, the JBG turned to these earliest social programmes and expanded the search beyond them with environmental professionals and activists from a wide range of disciplines – from gardening and agriculture to art to high-tech. In our ‘market’ or rather, community research, we discovered there was already a great deal being done in the city to promote sustainability and environmental awareness and the search for engagement was mutual. This was clearly a message for which there was an audience. How could we meet the city’s inhabitants ‘where they were’ – engage them on their terms, grounded in their interests and without duplicating what already existed? What role can botanic gardens play in the efforts towards urban resilience and a sustainable future?

Botanic gardens are collections. In the past, that has meant privately holding something unique or exquisite. Today, collections are

maintained to perpetuate their content for all (in itself a kind of sustainability). Sustainability is the preservation of resources – air, water, food, biological and cultural diversity. Plants and a deep appreciation of the importance of diversity are at the heart of this. Ironically, it seems there is a perceived dichotomy between plants in context of science and horticulture and plants as the basis for sustainable communities. Merging these perspectives is where public gardens have a responsibility to contribute their expertise and a way for them to meet a wider audience where their interests lie. At the JBG it is the Hub that does this, supplementing the botanical discourse with one which speaks to the most basic human needs and links them with plants, biodiversity and conservation.

This new paradigm for engagement brought new groups into the Gardens and created a space for them to convey their own content as well as to co-create content with the JBG or with other groups involved with the Hub. When interaction occurs on equal footing, it changes both parties; conveying our message within the context of sustainability created opportunities to venture into new realms such as new social, economic and environmental challenges, urban gardening techniques, urban planning, art, design, technology, even innovative social enterprise, thus addressing either directly or indirectly the full spectrum of human diversity, expanding visitation, public profile and the reach of the Gardens’ traditional values and messages.

While the JBG could have continued to create programming and invite more groups in, it would have reached full capacity. Quickly. And so a new model was necessary. In its vision, goals and operational model the JBG Hub is based in familiarity with the community and is deeply rooted in the twenty-first-century tendency to open-sourcing and networking. To engage groups and individuals not only around issues of interest to them, but also through the mediums and modes they prefer, the Hub draws on the model of technological start-up hubs adapting it for the environmental realm to advance its goals and message by encouraging innovation and entrepreneurship. After dozens of meetings with activists, programme leaders, and public opinion shapers to map and understand the professional community on the city, the Hub focused its efforts on two overarching themes – professional development and networking. By creating a professional network for those working in the social–environmental field, the

JBG contributes to a crucial global cause closely linked with its core values and mission while creating a new platform on which these values can be conveyed and promoted. The Hub offers these groups professional assistance from the JBG experts supplemented by external support staff and consultants. More importantly, it enables and encourages collaboration and idea and resource sharing among members, matching organisations with complementary assets and needs to better affect change by advancing each group's specific goals as well as those of the community. Working in this model maximises existing capabilities as the community supplies its own needs with the Hub functioning mostly as facilitator, only directly supplying in its fields of expertise. To further facilitate this, a designated co-working space will be built for the Hub within the Gardens – a 'home' where these groups can work and interact informally among themselves and with the Gardens.

The interdisciplinary approach is fundamental. First, creating a sustainable future requires a deep behavioural shift which can only be achieved through solutions in all elements of life, second, this is the basis on which to attract new audiences and finally, the projects arising from interaction between professionals in different fields are more likely to be successful and infinitely more interesting. Three short examples show how wide-ranging this has become.

First and most closely aligned with the Gardens' traditional role is a local CSA farm working with teenagers who have dropped out of school. They built a hydroponic greenhouse on the JBG's undeveloped land and, alongside growing vegetables, they will run educational programming developed together with the JBG education department. Second, in the technological sphere, two groups bear mentioning; a green IT company developing smart gardening solutions will install its prototype in the Hub therapeutic greenhouse and a start-up working to revolutionise water management in Africa may take the hydroponic greenhouse off-grid. Technology developments hold much potential both in impact and in their potential to contribute to the sustainability of communities and the gardens themselves. Perhaps most innovative, is a group promoting a complementary local currency. Within its network the Hub uses this local currency as a sophisticated barter system to encourage interaction between its members. It also

supports the venture as part of the commitment to a wide approach to sustainability. The benefit of complementary currencies is that by increasing trade within the community it lowers costs (monetary and environmental) incurred due to transport. Furthermore, it strengthens resilience of communities by increasing diversity and keeping currency within the community, semi-detaching buying power from standard income capacity. To date the JBG Social-Environmental Hub has mapped approximately 100 organisations striving for social-environmental change through urban agriculture, community work, art and design, technology, business and social business, most operating locally but some with international aspirations.

The JBG's operational paradigm shift led, in each of its stages, to an expansion in its audience. In taking a more open stance towards the city, footfall increased 400 per cent and this figure continues to rise. Inviting outside organisations to see the JBG as a resource for their own programming needs resulted in 20 groups operating within the grounds. The shift to equal interaction through dialogue led to the development of a network of 70 organisations that are in contact with the JBG and with whom its impact is multiplied exponentially.

*Case Study 8.3 We Advocate for the Richness of Diversity in Ecosystems and in Social Systems: Science Career Continuum*

By Amaris Alanis-Ribeiro, Kayri Havens, Andrea Kramer and Nyree Zerega, Chicago Botanic Garden and Northwestern University

The US has over 17,000 species of native vascular plants. Nearly one-third of them are considered threatened (NatureServe, 2012 a,b) and may require conservation action to prevent extinction. Preserving America's natural heritage will require that the large array of conservation agencies and organisations work collaboratively to provide much-needed plant conservation capacity. Most of the environmental grand challenges facing our planet require botanical expertise to solve. Whether it is food security, climate change, biodiversity conservation, managing invasive species or habitat restoration, botanical knowledge plays a role in finding solutions. But botanical capacity, which includes human resources, research

funding and infrastructure and education programmes, is declining in the US and around the world (Kramer *et al.*, 2013). In the US, plant conservation is extremely under-resourced in comparison to animal conservation (Havens *et al.*, 2014). Additionally, there is a severe shortage of botanists in federal agencies with nearly half of them planning to retire by 2020. Because many of universities have dropped botany programmes, it is becoming more difficult to find botanically trained staff to refill these positions (Kramer *et al.*, 2010). The nation's science and land management agenda is suffering as a result.

The Chicago Botanic Garden's education and research departments are collaborating to help turn around this trend by providing a continuum of educational and research opportunities for students from middle school through graduate school that not only increases botanical capacity, but also aim to increase diversity in the fields of science, technology, engineering and mathematics (STEM), and especially science. Although nearly 30 per cent of the U.S. population is black or Latino, only 13 per cent of scientists come from those backgrounds (Landivar, 2013). Several research studies have indicated the importance of diversity (i.e. the importance for business bottom line, fostering a global perspective, different perspectives leading to innovation, etc.). Diversity is especially important for the field of science because the complexity of current environmental challenges requires the creativity and innovative thinking that can only come from the interaction of multiple perspectives and approaches, not just scientifically, but culturally as well.

### Programme Structure

The Science Career Continuum begins with Science First and College First, serving up to 65 middle-school and high-school students of colour from Chicago Public Schools. A free summer science immersion programme – combined with paid internships and mentoring for high-school students – improves these students' overall academic performance and puts them on a path to college. Once in college, College First graduates can apply for a Research Experiences for Undergraduates (REU) internship in Plant Conservation or a teaching assistantship with the Science First programme. Armed with an undergraduate degree, College First graduates can apply for five- and ten-month Conservation Land Management (CLM) internships.<sup>1</sup>

Conservation Land Management interns receive a stipend to assist professional staff at the Bureau of Land Management, National Park Service, or US Forest Service in one of 13 western states. Finally, students seeking a graduate degree are eligible for scholarships to the Master's or PhD programmes offered jointly by the Garden and Northwestern University.



Figure 8.3 Conservation and Land Management interns carry out a quadrat study in the prairie. For the colour version, please refer to the plate section. In some formats this figure will only appear in black and white.

### Middle and High School

Science First (SF) and College First (CF), with over two decades of programming, are the first steps in a successful model for a continuum of environmental science that provides students of colour with a clear and accessible pathway from middle school to college and science or STEM careers. They have a proven track record of success; among 51 alumni from 2005–2011 who responded to tracking surveys, 84 per cent completed post-secondary education with 61 per cent in STEM majors.



Figure 8.4 College First students collect macroinvertebrates in the lagoons at the Chicago Botanic Garden. For the colour version, please refer to the plate section. In some formats this figure will only appear in black and white.

#### *Addressing Accessibility and Relevancy*

Science First and College First provide programming for Chicago Public Schools (CPS) students who are black, Latino, or multiracial, first generation college students and/or students that qualify for free or reduced lunch. The programme targets students who are not necessarily at the top of their class or may have an undeveloped interest in science. To address barriers to participation, programmes are free, including all programme materials, lunch and bus transportation (students live 20–30 miles away from the Garden). Older students also receive a stipend – crucial for students who are often expected to supplement household income or fund their own education. This investment in addressing accessibility allows students to participate who may have been excluded from other enrichment programmes due to fees or GPA requirements.

Students engage with the Garden's 385-acre campus to foster social and cultural interest in science. Many have little experience interacting with nature due to life in heavily urbanised, often unsafe environments, so it is important to make cultural ties and illustrate the connections of a botanic garden with students' everyday lives. When building the curriculum, instructors reference students' applications, where students identify interest areas. As students learn about contemporary topics such as climate change, sustainable urban development and environmental justice, they reflect on how their communities are affected. In addition, participants choose their own research interest

and design their final project/experiment; older students select their desired internship positions.

#### *College and STEM Major Preparation and Persistence*

Once juniors and seniors in high school, College First students have the opportunity to earn college credit in environmental science. Engaging in college-level curriculum puts students at an academic competitive advantage, but research demonstrates that academic preparedness is not enough to ensure college completion among low-income first generation students. To address this issue the programmes emphasise comfort with science equipment, development of twenty-first-century skills, and provide additional supports to encourage college enrolment and persistence.

The Chicago Botanic Garden provides an entirely new context to science unavailable in a typical CPS classroom. Students use the Garden as a 'living laboratory' and in the Garden's Plant Science Centre, students are trained to use advanced scientific instruments in nine highly specialised laboratories. Students use geographic information systems (GIS), scientific databases, specialised microscopes, an automated soil analyser, DNA sequencers and more. The hands-on internships prepare students for lab work in college, build STEM transferable skills, and exposes them to possible careers related to the environment. Given the rapidly changing and increasingly globalised STEM economy, it is equally important for students to develop twenty-first-century skills, including effective reasoning, use of systems thinking and problem solving. Because disseminating information is critical to the success of science and any environmental initiative, the SCC teaches students to communicate using a variety of platforms. Final presentations exemplify how skill development is fostered along a trajectory; communication skills expectations for final presentations are scaffolded from presenting one-on-one to presenting in a large auditorium.

For participating students, community around science and academia is a high priority. Students often do not have a personal relationship with a science professional and thus lack access to the informal networks that are critical to persisting in the field. The mentoring components of Science First and College First build an ecosystem network to foster the sense of belonging for students of colour. High school students work side-by-side with college undergraduates, graduate students and PhD



scientists. This stair-step approach helps students understand and aspire to the next phase in the education continuum. The link between the Garden's informal education programmes and the plant science and conservation department creates a space for students to learn within a structured framework of professionals, including those in the Garden's joint graduate degree programme in Plant Biology and Conservation with Northwestern University. Mentorship builds community, crosses cultural divides, and engenders compassion. Students' mentorship of younger participants teaches them the value of collaborative work, while professionals improve their communication to lay audiences and gain a diverse perspective on subject matter.

### College and Beyond

The Garden continues its support by offering opportunities for students in college and post-graduation. The Garden, with colleagues from partner institutions, hosts a 10-week summer Research Experiences for Undergraduates (REU) programme. This programme offers undergraduate participants an opportunity to explore a diverse array of scientific fields related to plant biology and conservation. Travel, room and board, and research costs are covered by the programme, and participants receive a \$5,000 stipend.

Students work out of the Daniel F. and Ada L. Rice Plant Conservation Science Centre. They are trained in all stages of research, from hypothesis formulation through experimental design, data collection, analysis and ultimately presentation of results through a public symposium. There are often opportunities to participate in the professional community of practice by presenting at national scientific meetings or publishing findings in peer-reviewed journals. The REU interns interact closely with doctoral and Master's degree students and are encouraged to serve as research mentors for teens participating in the College First, as part of the step-wise mentoring system that allows younger students to envision themselves in the next phases of a science career.

Recent college graduates can continue their education and exploration of conservation science through the Conservation and Land Management Programme (CLM), a partnership between the Garden and federal land management agencies. Paid 5–10 month internships provide participants the opportunity to put their

education and skills to work in a real-life setting. The majority work with partners in the western US, including the Bureau of Land Management, National Park Service, US Fish and Wildlife Service and US Forest Service. With over 1,000 interns placed since its inception in 2002, CLM provides partners with a valuable resource: young, knowledgeable, enthusiastic college graduates who are passionate about and seeking to gain hands-on experience in conservation and land management. Likewise, interns learn what it is like to work for a federal agency, explore their career goals, and expand their résumés. They gain experience with new landscapes, habitats and species diversity, which is valuable for both professional and personal growth. As one former intern stated, 'For future CLMers, I would like to say this: do not let this opportunity get away from you! This is an amazing programme and you will learn a lot!'

The final steps in the pathway to a research career in conservation science are the Master's and doctoral programmes in Plant Biology and Conservation offered collaboratively through the Chicago Botanic Garden and Northwestern University. These programmes provide students with advanced training in plant and soil ecology, evolution of plants and fungi and applied conservation theory and methods. Students take courses at both the Garden and Northwestern and interact with researchers and faculty from both institutions. The PhD programme aims to foster an academic and research environment that allows students to gain the experience, skills and knowledge required to become scholars, leaders or practitioners in plant biology and conservation.

### Case Study 8.4 *We Help Build Local Capacity: Community-Based Floriculture Industry Development Project*

By Yves Nathan Mekembom, Limbe Botanic Garden

The Limbe Botanic Garden, Cameroon, was established by the German colonial government in 1890 as an agricultural research station with the purpose of researching plants of economic and medicinal interest, crops such as cacao, bananas, rubber and pineapple. Today, the Garden is a technical operational unit under the Ministry of Forestry and Wildlife and has continued that work in domestication of non-timber

forest products and tropical cut flower cultivation. One such project is the community-based floriculture industry development project, which had as its goal to evaluate and upgrade Cameroon's efficiency in the production and marketing of high-quality tropical cut flowers that meet international horticultural standards. The Community-Based Floriculture Industry Development Project (CFIDP) aimed to understand the cost and scale at which it might be possible for Cameroon to develop a strong floriculture industry.

The project's key objectives include:

- To understand what tropical cut flowers and nursery plant species, packaging and marketing avenues are best for Cameroon.
- To improve understanding of production, disease prevention and pest control of tropical cut flowers.
- To identify potential plant species for development of unique flagship products to be introduced into the world's floriculture market.

With support from the US Department of Agriculture, the project began in 2003 by working with the Cameroonian community to introduce local farmers to the UN FAO Good Agricultural Practices (GAP) through training workshops and radio broadcasts. Farmers also worked with the project's organisers to select pilot farms on which GAP could be used, test cultivars and propagate good quality seeds and seedlings. Surveys of the local and European markets were conducted to understand whether a floriculture industry could be developed in Cameroon.

At the national and international levels, collaborators worked to create a market for these new products, analysing global floriculture market trends and identifying potential plant species for development of unique flagship products to be introduced into the world marketplace. At the local level, eroded and degraded land was converted into cut flower farms. Educational campaigns increased awareness of the importance of the native species in cultivation and encouraged their use as landscape plantings to further decrease erosion.

The creation of a global market and the local capacity to fulfil resulting demand required the investment of stakeholders from local farmers and businesses, to government ministries and scientific research. It required a collaborative approach, with attention to the needs of all.

Collaborators included the Ministry of Agriculture and Rural Development, Cameroon, Ministry of Town Planning, Cameroon, University of Buea, Cameroon, the Cameroon National Herbarium and Royal Botanic Gardens, Kew.

There were two primary challenges in this work. The first was getting initial buy-in at the local level, convincing local farmers and businesses that changing their crop production and taking time for GAP training would result in a successful new commercial industry. Likewise, creating the demand and assuring the global market that there would be a steady and reliable supply of materials was also a challenge. However, by bringing all the stakeholders together with their multiple areas of interest and leveraging their expertise, they were successful in both. A critical component of these accomplishments was the inclusion of indigenous populations and the incorporation of traditional ecological knowledge into conventional conservation efforts.

Since the project's inception, flower production has become one of the main income-generating activities in the communities around Limbe. The number of participating farmers has tripled since the beginning of the project, and the cultivation of these flowers is extending to other nearby localities, including Yaounde, Bamenda, Douala and Bafoussam. There is now a consistent, dependable flower supply, and in fact local flowers now dominate the local market. This has resulted in an improved local economy and transformed the region's landscape. The cultivation of native flower species has also resulted in successful *ex situ* conservation of biodiversity and a substantial reduction in erosion on the now farmed land. These species are now also being used for local landscaping, further decreasing erosion. Limbe Botanic Garden has also seen an increased number of visitors as a result of the project.

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## Note

1. See CLM Internship Programme blog 2013 <http://clminternship.org/blog>.

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