Botanic Gardens Conservation International Education Review

roots

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↑ *©Brooklyn Botanic Garden*

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Forthcoming Issue
Volume 14 Number 1: Engaging Youth

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Liliana Derewnicka

FIRST WORD
HAIL TO THE VOLUNTEER!

The contribution that volunteers make to botanic gardens and the wider museum sector cannot be over-estimated. In 2001, the Canadian Museums Association found that volunteers made up 65% of the workforce in museums (Holmes, 2003). This becomes an unfathomable number of people when you consider the number of museums, botanic gardens and heritage organisations worldwide. It is important to note that this varies dependent on culture, for example, University Botanic Gardens Ljubljana was a pioneer in developing a volunteer programme in Slovenia, a programme which was proudly presented to other organisations in Slovenia and surrounding countries as a model for how volunteers can encourage intergenerational learning whilst saving an organisation threatened with closure (Derewnicka *et al*, 2015). On the other hand here in the UK, since 1998, 92% of museums offered opportunities to volunteers (Holmes, 2003).

Considering this it seems a terrible shame to me that these heroes of the cultural sector go unsung in literature as Millar (1991, p.1) points out *"Volunteers are a significant part of the museum community... The growth of museums at the rate of one a fortnight in recent years is due mainly to the huge growth in voluntary trusts and 'all volunteer' museums. Yet, in the current debate on the function of museums in society the place of volunteers in museums merits scarcely a mention. It is important to redress the balance."*

More to the point, Measham (2009, p.537) notes that *"Whilst there is considerable research on volunteering in other sectors (e.g. health), there has been relatively little attention paid to understanding environmental volunteering"*

↑ *Volunteers at Kew's Hive deliver interpretation to visitors ©Julia Shelley*

← *Kings Park Science volunteers help to investigate how plants respond to fire regimes ©BGPA*

"Volunteering can be defined as pro-social behaviour, done of one's own free will and without monetary reward, to benefit another person, group or cause"
(Measham and Barnett, 2009 p.537)

↑ *Due to her prior voluntary experience Evropi Dalampira is now Director of Anel Honey Park and Anel Beekeeping Branch of Thessaloniki ©Evropi-Sofia Dalampira*

In fact, typing 'botanic garden volunteers' into Google Scholar returns precious little reward. With funding cuts affecting many botanic gardens globally these and similar organisations are only kept afloat thanks to their committed volunteers. This is why, in this issue of Roots we want to celebrate the vital work of these dedicated individuals. To do this I have chosen a selection of articles that really highlight the range of activities that volunteers in botanic gardens get involved with. From students as volunteer guides in Argentina to scientists volunteering in student engagement in the UK, this issue showcases how gardens around the world are working with volunteers in research, interpretation, citizen science, environmental education, maintenance, restoration and much more.

The impact on the organisation seems clear, but what of the volunteers themselves? It is important for botanic gardens to ensure that volunteering is mutually beneficial. The impact that volunteering can have on a person's life is all too clear in Evropi Dalampira's article about how volunteering allowed her to build a successful career. Yet ensuring this is not easy. Hager and Brudney (2004) identify nine practices which are associated with effective volunteer management and retention, yet the majority of these have not been widely adopted by charities. As they put it *"Charities interested in increasing retention of volunteers should invest in recognizing volunteers, providing training and professional development for them, and screening volunteers and matching them to organizational tasks"* (ibid., p.3) - this goes for all botanic gardens.

The first step to effectively matching volunteers to organisational tasks is understanding the reasons why individuals agree to give up their time for free. Motivations behind volunteering vary from person to person and organisation to organisation. Orr (2006) identifies motivations for volunteering in museums related to enhancing leisure experiences, forwarding a career and development of self-identity, i.e. by displaying dedication and commitment. Also pertinent to botanic gardens, Measham and Barnett (2009) identify six motivations for environmental volunteering: contributing to community, social interaction, personal development, learning about the environment, a general ethic of care for the environment and an attachment to a particular place.

And so, as the motivations for volunteering vary widely so do the roles that volunteers can play; therefore, with effective procedures and systems in place, the sky is the limit when it comes to how volunteers can be part of a botanic garden's work. As Amanda Le Poer Trench puts in in her article (page 6) *"If a botanic garden has a vision, which it can translate into a plan with sufficient infrastructure in place to support it, then the potential of that volunteer relationship is inestimable."*

Liliana Derewnicka
Botanic Gardens Conservation International

← *Volunteer experiences at Jardín Botánico Gaspar Xuarez sj are designed to enhance students' learning ©Ma. Laura Perasso*

Good Volunteer Management Practices:

- ***Regular supervision and communication***
- ***Liability coverage or insurance***
- ***Data collection of volunteer numbers***
- ***Screening to identify suitable volunteers***
- ***Written policies and role descriptions***
- ***Recognition and awards***
- ***Annual measurement of impact***
- ***Training and professional development for volunteers***
- ***Training for paid staff in working with volunteers (Hager and Brudney, 2004)***

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Author: Amanda le Poer Trench

WHAT IS THE VALUE OF VOLUNTEERS? THE MILLION DOLLAR QUESTION!

Those that can 'do' and those that can do more 'volunteer'! However, are volunteers the panacea for all botanic gardens resourcing ills? Do they represent a good enough return on capital employed? In this article I examine the 'significant seven' components which have been crucial to Kew in the development of a cost-effective volunteer programme.

RBG Kew has a record of working with volunteers since 1992 and there are currently over 680 volunteers supporting our work in a variety of ways. Traditional volunteer roles include horticultural support, guiding and support to our schools, families and science programmes. However, here at Kew, volunteers permeate all areas of the organisation – all our litter pickers are volunteers, our meteorological office data weather monitoring is done by a volunteer and even our bee keeper works as an analyst during the week and morphs into our bee guru at weekends. We even have one sterling volunteer, Jill, who has been coming to Kew two days a week for the last thirteen years to wash and stack all the flower pots in our Tropical Nursery – without Jill there would be no clean pots!

↑ *Volunteer explainer Richard with some happy customers ©Julia Shelley*

Those that can 'do' and those that can do more 'volunteer'!

← *Horticultural volunteer and master florist Henck immersed in preparations for Kew's Orchid Festival ©Katy O'Brien*

If a botanic garden has a vision, which it can translate into a plan with sufficient infrastructure in place to support it, then the potential of that volunteer relationship is inestimable. It is a gift relationship, binding only in honour, trust and mutual understanding but with incredible potential. Kew volunteers give us the two most valuable gifts they can, their time and their talent, and for that we celebrate and thank them. We do not pay them, but that is because they are priceless!

Kew's mission is 'to be the global resource for plant and fungal knowledge, building an understanding of the world's plants and fungi on which all our lives depend'. We class ourselves as authentic and passionate experts, but increasingly that people and expert equation is not just made up of over 700 committed staff but our growing army of dedicated volunteers. We have an ambitious programme of botanical research and development of the visitor amenity attraction with an increasing focus on public engagement and our learning agenda. However, for many years this programme has been set against a background of significant financial constraints with a static 'Grant in Aid' from the government that has been decreasing in real financial terms, with the associated challenge for the organisation to seek ever more creative ways of utilising our resources. Cue our Kew volunteers! As a Human Resources (H.R.) professional I believe that our people are our organisation's most valuable resource and in support of that philosophy, it is vital that we have the right person, in the right place, doing the right activity at the right time. I fear that some of my colleagues who are passionate about monocots and dicots might disagree with this premise, but how would our plants thrive without our people and how would we meet our organisational goals and targets without our people? Hence we need to attract, recruit, manage, develop and retain the best people in a transparent, lawful and cost effective way – both staff and volunteers.

In recent years, volunteers have donated around 100,000 hours to Kew each year. This equates to well over a million pounds that our organisation would have to spend on an equivalent value of staff time. One of our key quantitative indicators of our volunteers' value to our organisation is the 'Volunteer Investment and Value Audit' (VIVA Ratio), which demonstrates that for every £1 the organisation invests in our volunteering programme, we receive over £10 in return each year. With a volunteer retention rate of over 85% each year our volunteers have built up a considerable bank of Kew knowledge, experience and expertise. Arguably, more important than all this quantitative data, is the qualitative data and feedback we receive concerning the value that our sterling volunteer task force brings to Kew – their commitment, knowledge, enthusiasm, and energy. Over 1,600 volunteer-led guided walking tours of Kew each year are testimony to this. However, volunteer labour is not 'free labour'. There must be sufficient infrastructure in place to support our volunteers and our volunteer programmes in a cost-effective and professional way. This infrastructure

↑ *Volunteer Jill, who has made the washing and stacking of pots into an art form! ©Amanda le Poer Trench*

includes having a robust volunteer strategy, policy and procedures in place, dedicated volunteer budgets and, very importantly, staff time. So whilst our volunteers have a unique contribution to make, it is a two-way relationship not just an altruistic one. It requires both parties to contribute to receive the mutual benefits.

So why do we want to involve volunteers at Kew? Firstly, there is a demand from both sides – there is no shortage of people wanting to donate their time and talent to us, whether it is for altruistic reasons or because 'Kew' is a valuable addition to their C.V. Not only do they help us fulfil our corporate objectives but they are also part of the symbiotic relationship we have with our local community, increasing public access to Kew and fulfilling our social responsibility agenda; for example 10% of our horticultural volunteer task force have additional needs or disabilities. The creation of learning and development opportunities for volunteers to learn new skills or keep skills current also gives Kew staff valuable experience of supervising, training and mentoring people. Our volunteers are also messianic about Kew – going out into the local community and preaching 'Kew'. This raises the profile of our work and gives us valuable publicity. Volunteering also supports government policies and volunteer initiatives, notably our government's vision of the 'Big Society' which has become part of our popular culture.

So what is the key to maximising the cost-efficient deployment of this incredible pool of volunteer labour? Cue Kew's 'significant seven' components: strategy, stakeholder engagement, support and supervision, statistics, systems, money and budgets, and 'self-actualisation' (Maslow, 1943).

1. Strategy – a clearly defined strategy to align volunteering programmes to support the objectives of the organisation; that is to ensure a common understanding of what the organisation wishes to achieve through its volunteer task force and how it proposes to do that with associated key performance indicators. Recent important volunteer developments at Kew have included recruitment of 'virtual volunteers', a new tranche of garden explainers whilst our next big development areas will be a youth volunteering programme for 14 to 17 year olds and a community ambassador programme to encourage currently underrepresented groups to come and volunteer at Kew.

2. Stakeholder engagement - Kew's first volunteer strategy in 2010 included the formation of our Volunteer Steering Group, chaired by the Volunteer Coordinator, which meets three time a year. It consists of pertinent stakeholders in the volunteering equation, including the Kew trades unions, H.R, sectional volunteer coordinators and very importantly, representatives from the main groups of volunteers at Kew.

3. Support and supervision – the key tools to balance the needs of the organisation with those of our volunteers - support to motivate and develop them and show them they are valued, and day to day supervision to ensure our volunteers are doing what we need them to do to the correct standard and to resolve any problems.

4. Statistics – ongoing monitoring and evaluation of our programmes through the collection of both quantitative and qualitative data. Our last volunteer survey revealed that 62% of volunteers rated their experience as excellent and 94% as good or better, but also highlighted areas for improvement. Crucially it told us 54% of volunteers were willing to give Kew more time. Hence one of the key thrusts of our strategy has been encouraging and enabling existing volunteers to have exposure to as many volunteering roles as possible and to volunteers donating as many skills/hours as they wish to.

So what is the key to maximising the cost-efficient deployment of this incredible pool of volunteer labour? Cue Kew's 'significant seven' components: strategy, stakeholder engagement, support and supervision, statistics, systems, money and budgets, and 'self-actualisation'.

Abraham Maslow in his 1943 paper "A Theory of Human Motivation" in Psychological Review

↑ *Volunteering in the rain ©Julia Shelley*

← *Volunteers from the University of the Arts, London preparing to film visitor-engagement volunteer Shruti in action ©Amanda le Poer Trench*

5. Systems and processes in place to support a professional approach to volunteer personnel management. Our volunteers are here to do what we need them to do and not just what they want to do. To this end we do not design roles around individuals but we have tasks that we need going which are specified as role descriptions, advertised positions, detailed online application forms, recruitment discussions with potential volunteers, references, induction and training specific to their role. All of this needs to be supported by excellent communications and a human resources information system to minimize duplication and maximize efficiency.

6. Money and budgets to support our programmes (in Maslow's terms, volunteers' 'lower order needs' i.e. physiological and safety needs must be met whether it be for corporate wear, lockers, or a tea room). At Kew we were privileged to receive a bequest from a former volunteer, Mary Du Val, which has enabled us to furnish a resource room for our volunteers, with computers, library, lockers and a rest room space with catering facilities.

7. Self-actualisation (Maslow) – the final step allowing a volunteer to reach their full potential. Most people want to continue to learn and develop throughout their lives, so opportunities to learn from our resident experts are key, as well as opportunities for socialisation by a volunteer-led social committee. Our volunteers can access our intranet, and our weekly electronic volunteer newsletter details talks and training opportunities that they can get involved in. We have externally-sponsored annual volunteer awards, and indeed, our Volunteer Guides have received the Queen's Award for volunteering, whilst last year one of our science volunteers, Sheila Thompson, was awarded an MBE for her services to botanical science at Kew.

In so many organisations volunteering develops in a piecemeal rather than a controlled and considered way, with no long-term vision. If a botanic garden has a vision, which it can translate into a plan with sufficient infrastructure in place to support it, then the potential of that volunteer relationship is inestimable. It is a gift relationship, binding only in honour, trust and mutual understanding but with incredible potential. Kew volunteers give us the two most valuable gifts they can, their time and their talent, and for that we celebrate and thank them. We do not pay them, but

↑ *Anne, Richard and Maraz preparing for action in the gardens ©Julia Shelley*

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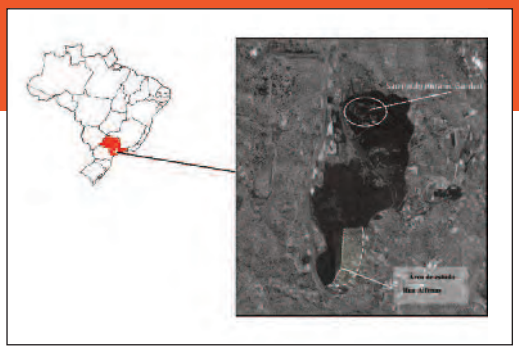
BEYOND THE WALLS OF THE GARDEN

The São Paulo Botanical Garden conserves the third largest remaining area of Atlantic Forest. This represents a great conservation challenge due to the highly urbanized surroundings and consequent impacts on biodiversity. Educating local people about these impacts was the aim of the project. First, the major problems were identified as waste dumping and the wall around the forest; then environmental education activities were set up, employing a participatory approach. Real empowerment of citizens has brought significant improvements – eliminating encroachment into the forest, enriching plant diversity, proper disposal of waste, and a new awareness of the importance of preserving the area.

The city of São Paulo is one of the most urban settlements in the world, with a population of about 12 million inhabitants. The São Paulo Botanical Garden (JBSP) is based in an important urban conservation area, the Parque Estadual das Fontes do Ipiranga, which looks after the third largest fragment of native forest in the region, with 1300 arboreal species, 40 of which are threatened with extinction, and 24 natural springs (Figure 1).

In such a highly urbanized setting, with a considerable level of social exclusion, the park's biodiversity suffers from diverse impacts including debris and waste disposal, invasion/occupation, and water pollution, bringing conflict between the surrounding residents and the public authority.



↑ *Figure 1: Location of Botanical Garden of São Paulo and the area where the project was carried out ©A.Q.Souza*

To minimize the current socio-environmental problems in the area and engage the population in the search for solutions and better preservation of biodiversity, a project for 'Engagement and participation in the areas surrounding JBSP' was set up, with the purpose of:

a. Establishing a dialogue between the community, the Botanic Garden and the city council experts;
b. Identifying the current conflicts in the area;
c. Formulating solutions jointly; and
d. Promoting social awareness to achieve socio-environmental improvements.

IDENTIFYING IMPACTS

The staff of JBSP found evidence of specific encroachment and impacts on vegetation in the conservation area of Atlantic Forest, especially around its outer limits. Therefore, a decision was made to set up a community educational project within the area known as Alfenas Street. Once the project was agreed, the following steps were to be taken:

1. A study of environmental perceptions relative to the JBSP forest was initiated, by carrying out interviews with the residents. The focus group identified two problem areas: first, the delimitation of the park's physical area was marked by a wall in a precarious condition, a target for vandalism and allowing illegal access to the woods. Second, there was a build-up of rubbish and debris all along the wall and on the footpath, creating an unfavourable habitat, harmful and toxic for animals, and an eyesore and nuisance to residents. (Figure 2)

2. Identifying local leaders, who were invited to participate in the project and to discuss, develop and implement an action plan for the area. For this step, twenty meetings were held in total, characterized as a forum for discussion, where actions were defined and redefined specific to the area. The main outcome was the decision to replace the old wall with a fence and new footpath construction along the 1.5 km of the path, with landscaped retreat and leisure areas.

3. Implementation of the action plan. Throughout the meetings, the community consistently asked for the removal of the wall that surrounded the park. The staff of JBSP suggested its replacement with a wire fence, plus construction of a new footpath and further tree-planting with native species. The community also asked that the landscape retreat with benches, proposed on the original plan, should be made more extensive, since the region has few such leisure spaces which can be used by children, young people and seniors. The modification was discussed and incorporated into the project.

4. Educational activities were conducted in partnership with the city council, aiming at raising awareness in the community of the importance of the area, and the revitalization and preservation of its biodiversity. The residents participated in creating an ecological walk, exhibition of an educational video (Figure 3), talks, and seed planting.

5. The planting of 120 seedlings of jerivás Syagrus romanzoffiana (Cham.) Glassman, a native palm tree of Atlantic Forest, donated by JBSP and planted by residents along the footpath – they are also responsible for its maintenance. The experts taught the community about planting techniques and caring for the palm trees, raising interest and appreciation for their indigenous vegetation. (Figure 4)

6. Play activities and interactive workshops were offered in two local schools with the purpose of showing the importance of the JBSP and the need for preserving the nearby Atlantic Forest. (Figure 1)

The São Paulo Botanical Garden looks after the third largest fragment of Atlantic forest in the region, with 1300 arboreal species, 40 of which are threatened with extinction, and 24 natural springs

↑ *Figure 2: The wall bordering the conservation area ©A.Q.Souza*

Engagement in the conservation of biodiversity can have positive results if the real existence of people involved is considered

↑ *Figure 3: Educational action in a local school ©A.Q.Souza*

7. To resolve the problems of rubbish dumping, signs were put up to inform the locals to dispose of waste in the correct garbage cans located at strategic points.

COMMUNITY BENEFITS

Results show that the project succeeded in promoting the inclusion of previously excluded social groups, in encouraging citizens to become engaged and participatory, bringing real improvements in environmental standards, diminishing the former pressures such as illegal access and inappropriate waste disposal, restoring the value of the region´s environmental assets and providing better support for the community in conserving the Atlantic Forest and biodiversity.

In social terms the project contributed to several favourable outcomes: improving levels of critical capacity and group social learning, appreciating the effectiveness of collective action, and the better development of levels of commitment and citizenship of all involved.

CHALLENGES TO BE MET

- Having enough qualified staff to integrate physical, environmental and social knowledge aspects of the area, allowing an interdisciplinary approach;
- Budget availability – i.e. sufficient funding to carry out the actions proposed throughout the process;
- To keep planning and making steady progress. To retain the support of the community it is necessary that expectations are managed and promises met;
- Bringing different factors into play as needed – success demands continuous reassessment, inviting new people in and keeping them informed and willing to engage with the process.

The project's greatest period of activity was during the period of revitalization of the area, which lasted about two years, with intensive participation of the staff in local action. Currently, regular visits are carried out by JBSP staff with local leaders, to monitor the situation and ensure continuity.

THE RIGHT RESULTS

- An improvement in quality of life for local people, who started valuing their successfully conserved natural environment (Figure 5).
- The educational project visibly reduced the environmental impacts, eliminating debris and waste discarded on the footpath, vandalism of the wall and encroachment in to the park.
- Implemented structures are still in place in the region, a great indicator of the success of the project.

This project shows that engagement in the conservation of biodiversity can have positive results if the day to day lives of people involved is considered. The participants are socially excluded groups, many of whom had never visited the JBSP. The action taken focused on social and environmental problems, raising the perception of the residents about how these affect their lives and impact directly the environmental quality and the biodiversity that JBSP seeks to conserve.

In this sense, Botanic Gardens can and should have a strong part to play in urban public politics, since they are an integral part of cities, providing a great service to them and to their residents, but directly impacted by human behaviour in those cities.

↑ *Figure 4: Planting of Syagrus romanzoffiana ©A.Q.Souza*

The educational project reduced visibly the environment impacts in the forest

↑ *Figure 5: Project outcome©A.Q.Souza*

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SUPPORTING SCIENTISTS AS VOLUNTEERS IN PUBLIC ENGAGEMENT

Many botanic gardens are based in universities and research institutes, which offer a rich source of scientific researchers and lecturers to draw on in our public engagement work. The Gatsby Plant Science Education Programme is based across the Sainsbury Laboratory, Cambridge, and the Cambridge University Botanic Garden. We have both a UK-wide remit, and a focus on supporting teenagers in the local area. Here, we discuss how we have encouraged scientists, university lecturers and graduate students to become volunteers in our student engagement project, with some challenges but overall very positive results.

Putting volunteers at the centre of our project has resulted in both risks and rewards. We see excellent workshops run by volunteer scientists which succeed in challenging audiences, but we have also seen researchers struggle to engage their listeners. Here we set out why we have felt it well worth continuing with this approach.

The Gatsby Plant Science Education Programme is based across the Sainsbury Laboratory, Cambridge, and the Cambridge University Botanic Garden. We work to engage and inspire young people with plant sciences, to show the importance and fascination of the subject, and to encourage them to consider studying it further.

Volunteers offer the young people who are our target audience an opportunity to meet 'the real people working in real careers'

Three years ago, we began a new strand of our latest programme, running a series of events for teenagers in the Lab and Garden. From the first, we agreed that practising scientists and horticulturalists would play a key role in delivering the events. The programme was run by a dedicated education officer, the Lab's events manager and the project manager.

Our volunteers support us in three key projects: a careers event, a series of Masterclasses for 17-year-olds, and our website, IntoBiology.org. In addition, we have supported the University of Cambridge's access and outreach work, encouraging young people to see this prestigious University as 'somewhere for them'.

IMPORTANT OUTREACH

The majority of our events take place during the working day, so without the committed support of the Director of the Botanic Garden and the Director of the Sainsbury Laboratory, many of our volunteers would not have been able to take time from their usual duties. Indeed, the Director of the Lab strongly encouraged scientists to engage in running workshops for our teenage audience, emphasizing the importance of science outreach which had been the objective from the Lab's inception. We thus had a ready-made team of volunteers, with enthusiasm but little experience.

Volunteers offer the young people who are our target audience an opportunity to meet 'the real people working in real careers'. They have enthusiasm, expert knowledge, and offer a breadth of viewpoints and experiences. This week, for example, a zoology researcher unfurled a moth's proboscis before a group of delighted students. More mundanely, volunteers can be an extra pair of hands when working with large groups of pupils. Based as we are in a university botanic garden, we can generally expect our scientist volunteers to have experience of presenting their work to both small and large groups. We try not to forget that many of our colleagues have extra skills developed outside their day job, which may offer valuable opportunities, if we take the time to find out about them. Informal chats can lead to scientists revealing their craft skills, for example, and may point the way to an exciting new project.

↑ *A student preparing cuttings*
©Joe Higham photography

They have enthusiasm, expert knowledge, and offer a breadth of viewpoints and experiences.

↓ *A class doing a lab experiment*
©Joe Higham photography

DIFFERENT SKILLS

However, volunteers will almost always be far less experienced in the skills that a qualified educationalist will have – writing a lesson plan, for example, or managing a mixed-ability group, must be taught and practised. An experienced educationalist may not even be conscious of the many skills they have developed, while university lecturers may have had no formal introduction to teaching, and hence are unconscious of the skills it demands. The result can be, as found by an Aim Higher report of 2006, that 'material [is] pitched at too high a level and perhaps delivered by university staff who were inexperienced in teaching younger students'.

While training for our volunteers was available through the University, we found that it offered better preparation for running science festival events and working with young children, than the more challenging activity of designing and running a workshop for teenagers. Running events in an outdoor space brings its own challenges that should not be underestimated. Volunteers did not always realize where their skills were weak, a state of affairs which, together with their own time constraints, discouraged them from taking up proffered training. Yet we should be aware that well-intentioned outreach events can have a negative effect on young people as easily as a positive one: a workshop which is too difficult can result in students thinking that science is 'not for them'.

We have found that to get the most from our volunteers, the core team needs first to spend time reflecting on the skills, experience and qualities needed for each type of event. Since take-up of formal training has been limited, we have found opportunities for people to see well-run events as models of best practice. We endeavour to develop skills by offering opportunities to see experienced people at work, and then gradually increasing the level of difficulty. For example, someone experienced in working with undergraduates might then run a similar session for students aged 16–18. Clear and timely feedback about what has been done well, and what could be improved for the future, is as valuable for volunteers as it is for paid workers.

↑ *Pupils exploring science at the Careers with Plants day ©Joe Higham photography*

Putting volunteers at the centre of our project has resulted in both risks and rewards.

Skills such as writing a lesson plan and managing a mixed-ability group must be taught and practiced.

↓ *RHS apprentices volunteer to share their enthusiasm with pupils ©Joe Higham photography*

FUTURE DEVELOPMENT

The team will continue our volunteer-focused approach over the next three years. This means that the experience for visiting students will be both richer and more variable. We realize there will be times when things go wrong, but overall our volunteers bring a wealth of knowledge and enthusiasm to the events. We gratefully recognize their commitment to the programme – and for our volunteers, a round of applause from a group of teenagers can turn a difficult week into a great one.

How can you get the most from volunteers?

- Aid them in developing their new skills step-by-step: e.g. begin with teaching students aged 16–18 and then move on to the 14–16 age group.
- Offer opportunities to see good practice, by pairing them with more experienced volunteers.
- Take time to find out what people's skills and interests are, and what they want to gain.
- Give people opportunities to develop: practice makes perfect and we saw speakers improve substantially.
- Show tact and sensitivity when working with volunteers, who are not being paid to do this.
- Be clear about the standards that you're looking for, and that this is a high quality experience.
- Be clear about what you're asking for, and how much time it will take. Remind volunteers that they will need to allocate sufficient time for preparation and practice.
- Be clear about what your aims and goals are, and how they will be measured.
- Ask them for (anonymous) feedback from participants and volunteers, and take it seriously.
- Volunteer yourself in turn, and find out what you appreciate.

↑ *A student learning how to use a pipette*
©Joe Higham photography

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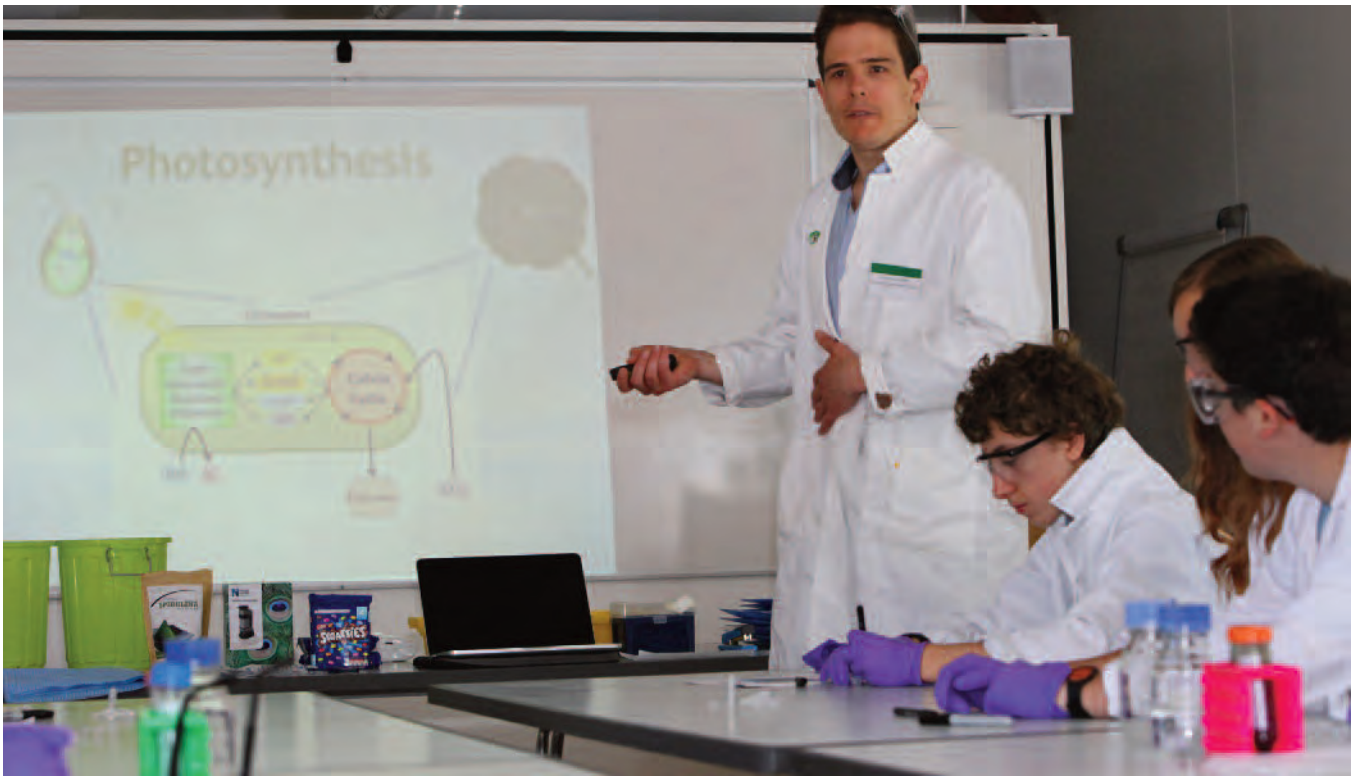
↓ *A presentation to students*
©Joe Higham photography



Authors: Evropi-Sofia Dalampira andNikos Ioannidis

AT ANEL HONEY PARK: THE LEAP FROM SCIENCE COMMUNICATION VOLUNTEER TO DIRECTOR OF A SUSTAINABILITY PROJECT

Volunteering can really change your life. In difficult times, it can give you the psychological strength to keep growing personally. Offering 'what you are good at' to society, will enhance your skills and abilities and can make a period of unemployment worthwhile. This is a story of how one person volunteered her knowledge and ended up playing a key role in an innovative institution dedicated to pollinators, healthy nutrition and a sustainable lifestyle – Anel Honey Park brings new experiences to Greece, in apitourism and apitherapy.

Even though the tradition of volunteering dates back to Athenian democracy in the fifth century BC, when citizens voluntarily served in key public positions, volunteering in modern Greece was not widely practised (just 10 per cent of adults according to Mathou, 2010) until after 2010, when there was a 44 per cent increase in volunteering brought about for a variety of reasons (for example, after the signing up to the EU-IMF bailout, and because of the tragedies resulting from Syrian immigration). In a system that may seem about to collapse, volunteering brings people together and creates opportunities for a better future. This is how my story begins.

In 2015, I was working as a freelancer in the Balkan Botanic Garden of Kroussia (BBGK) in Thermi, as Director of Non-formal Education and Public Engagement, in the context of a new business plan for the garden, a self-funded project (Maloupa *et al*., 2015). My passion for science communication and plant conservation then led me to become a volunteer in communicating the importance of honey bees and beekeeping at the Anel Honey Park, in Thessaloniki. The park is owned by a private company, Anel Co, who have specialized in the making and sale of beekeeping products since 1968. The company also has a strong social role as a sponsor, a donor and in volunteering. Some of its projects include:

- Financial and equipment support for Research Institution ELGO-DEMETRE- Beekeeping Laboratory, Aristotle University of Thessaloniki, Agricultural University of Athens and other institutions.

↖ *Honey tasting ©Evropi-Sofia Dalampira*

↑ *Observation hives: a clear view of honey bees working at a safe distance ©Nikos Ioannidis*

- Education, financial and organizational support for beekeepers' associations in African Countries
- Working with volunteers to support beekeeping in Greece
- Free education and training to new beekeepers
- Internships for young scientists
- Sponsoring local (ΜΕΛΙΑΜΑ, Scientific Center of Apitherapy) and global (APIMONDIA) organizations

In the summer of 2015, I offered to create a 'flight of a bee' tour at the Anel Honey Park, decorated and enhanced with interpretive signs, trails, outdoor collections, an open air museum, observation hives, honey tasting and related activities. The owner of the company, Pandelakis Lefteris, was surprised to see how a park can be made 'more alive' and a tour more engaging and interactive. That September, I was pleased to be asked to run a project (on a freelance basis) consisting of a learning activities program for schools and training for Anel Honey Park staff. We started with 1–2 days a week, but soon more schools learned about the interesting new bee park projects and we had bookings for 2–3 months ahead. And this is how from offering my services as a volunteer, I was honoured to be appointed to a permanent full-time position as Director of Anel Honey Park and Anel Beekeeping Branch of Thessaloniki. Since then, we have made great efforts to make Greece a better place for plants and pollinators.

WHO IS OUR AUDIENCE?

To date, our target groups are

- Students from a very early age (3 years old) to secondary school
- Tourists from all over the world
- Beekeepers all over the world

WHY IS THIS INNOVATIVE?

The tuition was developed in the context of Inquiry-Based Science Education (BGCI, 2012). In creating the proper theoretical and educational framework, I was inspired by the BGCI course, International Diploma in Botanic Garden Education. Educators mainly help visitors to learn about the extraordinary life of bees and about the decline of bees and other pollinators, for reasons other than imparting scientific knowledge. This is a better

Our park dream would not have come true without the great awareness and social profile of ANEL Company

↑ *Apitherapy house ©Evropi-Sofia Dalampira*

"Your passion for your work increases our interest about bees not just their products."
Visitor from Poland, 2016

↑ *Inside the Apitherapy house ©Evropi-Sofia Dalampira*

Something new for Greece: apitourism and apitherapy – offering 'what you are good at' to society, may bring something good for you.

← *Smelling Greek aromatic plants ©Evropi-Sofia Dalampira*

learning process for parks, botanic gardens, museums etc. Also, being a volunteer and member of the CEC IUCN conservation projects #Lovenotloss and #NatureForAll was a key inspirational resource for reflection and enquiry. Anel Honey Park aims to change the habits and attitudes of both students and adult tourists in order to support the survival of bees. These non-traditional Honey Park activities encourage visitors to use all their senses, while raising their awareness and love of nature; people learn to value its importance through experiences, and in this way build a connection (Dutton et al., 2013).

Specifically, a common programme will include: a 'flight of the bee' tour, honey tasting, activities to learn about bee products, and a visit to the apitherapy house. In our 'flight', the visitor will see how pollination works in beekeeping centres all over Greece, learn how bees and other pollinators live their daily lives, be able to collect honey and other products of the hive with the beekeeper and see how bees work at close range, with observation hives. In the apitherapy house, mainly for adults, you can relax by listening to the bees and smelling the aroma of the hive. This is no insignificant insect – the bee is the creature that determines if a third of all our food is going to be available daily at our table.

SUCCESS AND FUTURE CHALLENGES

The project started in September 2015 and we are still gathering data. But in six months, about 850 students and 200 adults (mainly tourists and beekeepers from various countries) visited the park and experienced a guided tour, workshop or seminar. This is a major achievement for a new visitor attraction in Thessaloniki! The real challenge Honey Park faced was attracting the right sort of interested individuals to visit. Since 'who is our audience?' was clear from the beginning of my work as a volunteer, we had to promote something new to make their visit worthwhile. Success is when you find the answer to 'what can they do here?' And there are plenty more activities still to come. You have to draw up a marketing plan and grow your social media profile to make it work. And you have to make it run parallel to the activities programme. Botanic gardens often put in a lot of money and effort to make a spectacular garden. But we have learned that the garden must be created for the right audience; not the other way around.

← *Anel Honey Park: A view of some flowerbeds from above ©Maria Arapi*

↑ *A workshop about making cosmetics from herbs and bee products ©Evropi-Sofia Dalampira*

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https://www.facebook.com/AnelHoneyPark/
http://honeypark.gr/our-bee-love-story/?lang=en
https://twitter.com/anelhoneypark

← *Workshop about the uses of bee products ©Nikos Ioannidis*

Author: Kaveesha Naicker

CREW AT THE FOREFRONT OF CITIZEN SCIENCE PROGRAMMES

With over 20,456 plant species and 1 in 4 endemic plants at risk of extinction, South Africa needed a programme for surveying and creating awareness about threatened plants amongst the general public. Custodians of Rare and Endangered Wildflowers (CREW), founded in 2003 by the South African National Biodiversity Institute (SANBI) and the Botanical Society of South Africa (BotSoc), does just this. Contributions from passionate citizen scientists helps CREW to document populations of threatened plants and identify conservation needs. Data is fed into international reports on biodiversity via the IUCN Red List which informs land-use decisions and protected area expansion.

CREW AT THE FOREFRONT OF CITIZEN SCIENCE

Citizen science is an important mechanism that encourages public participation in science and conservation. It is becoming increasingly significant for scientific research and more people than ever are volunteering their time to help collect data; mainly observations in their local areas. The information gathered by citizen scientists is used to make informed decisions at local and governmental level, it supports land-use management plans and helps researchers acquire a greater understanding of the species being observed and the associated threats influencing the development of that species.

↑ *Citizen scientists conduct demographic monitoring ©Caryl Logie*

Our citizen scientists are a dedicated group of individuals, all with unique CREW experiences. Some of the groups have been active for many decades

← *CREW citizen scientists examine a rare plant in Pietermaritzburg ©Suvarna Parbhoo*

Many people become involved because of the thrilling experience of travelling to mysterious landmarks and pristine locations

Concerns about the state of our environment have created a unified call to action on a global scale. Many more people are aware of the need for the conservation of biodiversity and are offering their assistance. The urgency to act in order to help alleviate the variety of stresses impacting on biodiversity has led to the highest level of public participation seen in the twenty-first century.

South Africa has an astonishing range of plant life in distinct biomes and, being the only country in the world with its own floral kingdom, has quite a lot to boast about botanically. There are more than 20,456 plant species endemic to South Africa, however, one in four of these are currently threatened with extinction.

People's attraction to the beauty of plants is common, but the curiosity to understand and define the intricate features of a particular species is rare. The Custodians of Rare and Endangered Wildflowers (CREW) Programme is a citizen science initiative based in South Africa that encourages members of the public to participate in the conservation and monitoring of threatened plants. It began in 2003 as a pilot programme by the South African National Biodiversity Institute (SANBI) and the Botanical Society of South Africa (BotSoc). The programme was designed to help SANBI and BotSoc engage with people of different economic, social, cultural and ethnic backgrounds, while at the same time collecting information for the assessment of the distribution and population size of threatened plants throughout the country.

↑ *The Fourcade Botanical Group searching for a target species ©Caryl Logie*

EVERYDAY FOLK

The CREW programme has a network of volunteers across South Africa working within CREW groups in their local areas. The members of these groups are committed citizen scientists connected to conservancies within their communities and to stewardship sites in neighbouring areas. They survey and monitor threatened plants and protected areas throughout South Africa, and contribute to conservation.

CREW volunteers are not all botanical scholars; rather they are everyday folk with an appreciation for indigenous plants. The programme has over 300 volunteers across the country ranging from students to retirees, who all have a common trait; their love of plants. For example, CREW citizen scientists Kate and Graham Grieve joined the BotSoc in the early 1970s. Their fascination with South African flora led them, when they retired, to move to Pondoland, one of the country's three biodiversity hotspots. Kate and Graham have several years of experience surveying South African flora, and have been a great asset to the CREW programme as they survey

↑ *Citizen scientists at an iSpot workshop ©Suvarna Parbhoo*

priority sites in Pondoland and regularly conduct field visits to the Umtamvuna Nature Reserve. On the other hand, Julie Braby, another CREW volunteer, was enthused by a course at the University of KwaZulu-Natal. Her interest and her passion for conserving threatened plants blossomed when she was introduced to the CREW programme in 2007.

Many people become involved because of the thrilling experience of travelling to mysterious landmarks and pristine locations. Others are enticed by the idea of rediscovering a possibly extinct species. And some just want to make a difference in the world and contribute to a great initiative. CREW boasts an impressive network of citizen scientists, partly thanks to the Botanical Society of South Africa, whose members were encouraged and inspired to volunteer with the programme.

CREW citizen scientists contribute in various ways, including conducting field surveys, collecting data and specimens, assisting with administrative tasks and mounting specimens. They aid in creating awareness in their local communities and enthusing young people to become involved in conservation activities.

Many volunteers have an avid interest in nature photography and upload their botanical sightings to iSpot, a secure website developed by the Open University for displaying biological discoveries. The site is used by both professionals and nature enthusiasts to share their often astonishing finds and receive assistance with identification. CREW makes very good use of this, obtaining a considerable amount of data on threatened plants from the observations made by the public. The Outramps CREW group situated in the Western Cape, attribute their newfound tech savviness to the frequent usage of iSpot, as they upload their wonderful discoveries for everyone to see.

CREW members use the programme to keep active and satisfy their desire to enjoy South Africa's natural world. Diane Turner recalls her fondest memories with the Outramps CREW group which includes the discovery of ten new species and the unexpected find of *Mimetes chrysanthus*, 70km away from its type locality in Gamkaberg.

↑ *Pondoland group at Ntsikeni Nature Reserve ©Graham Grieve*

The programme has over 300 volunteers across the country ranging from students to retirees

↑ *The Outramps CREW group ©Diane Turner*

IDENTIFICATION COURSES

The CREW staff are unable to survey and monitor the entire country, so we also rely on the observations made by CREW volunteers and members of the public to alert us to populations of threatened plants. Thanks to the work done by our fantastic volunteers, we have been able to obtain records for plant species last seen decades ago, as well as previously unknown or poorly sampled sites. The volunteers do not need botanical backgrounds to become involved. We facilitate several courses throughout the year that provide identification skills for those interested in surveying sites but have a lack of previous experience.

The programme hosts annual workshops in the summer-rainfall and winter-rainfall regions to bring volunteers together and give them the opportunity to share their past year's experiences and interesting discoveries. These are hugely enjoyable occasions with exciting fieldtrips, stimulating identification courses, and memorable talks and presentations, allowing the various groups to get a glimpse of what everyone is doing.

Our citizen scientists are a dedicated group of individuals, all with unique CREW experiences. Some of the groups have been active for many decades; for example, The Fourcade Botanical Group (FBG) who began their quest to enlighten, enrich and conserve Cape flora in 1997. Members of this group were introduced to the CREW programme through Professor Richard Cowling, an established botanist and ecologist in the field of conservation. Caryl Logie, champion of the FBG, has stated that volunteering with the CREW programme is truly an adventure, as they are able to explore so many wonderful natural locations of the Cape during the quest for plants of conservation concern.

'We have benefited by seeing how CREW has brought together people of all ages and from all walks of life with a common passion, which is to learn more about our plants and to do our best to preserve our botanical heritage' Caryl Logie, Champion of The Fourcade Botanical Group

CREW can never repay all those who volunteer their time and energy to monitor and survey South Africa's threatened plants, but we do express our deepest gratitude. We also thank The Botanical Society of South Africa and Mapula Trust for their support.

↑ *The Outramps CREW group ©Diane Turner*

"We have benefited by seeing how CREW has brought together people of all ages and from all walks of life with one common passion which is to learn more about our plants and to do our best to preserve our botanical heritage"
Caryl Logie, Champion of
The Fourcade Botanical Group.

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INTEGRATING VOLUNTEER OPPORTUNITIES INTO THE SCHOOL SYSTEM IN ARGENTINA

Secondary school students are offered internships as part of their school programme for professional development. Jardín Botánico Gaspar Xuarez sj (JBGXSJ) offers internships by integrating students as volunteer guides leading garden tours. These visits consist of a talk about ecosystem services, forest bird and plant species identification and laboratory practice using stereo microscopes to investigate the world of science. In recent years many students have signed up as volunteers with great results; most of them said that they had discovered nature from this experience as well as enhancing their own skills.

INTRODUCTION

National education policies in Argentina state that students must perform mid-level educational practical work to link up with future professional development.

Among recommendations on teaching practices, the Secondary Education Guidelines in Argentina indicate that secondary schools must encourage final- year students to perform internships in scientific research centers, institutions dedicated to health, to science communication and to sustainable development (Ministerio de Educación, 2012).

↑ *Young Bird watchers ©María Laura Perasso*

"Principle 1: Adventure Environmental education needs to be kinesthetic, in the body."
David Sobel

In order to develop these internships, schools and host institutions sign agreements in order to enable and give credit for the activities undertaken by students.

JBGXSJ, which belongs to the Universidad Católica de Córdoba, provides students with the opportunity to perform these internships as volunteers in guided tours offered by the Garden. There, university teachers and professionals provide knowledge to visitors, and volunteers perform internships as field guides. To qualify for this type of volunteer activity, they must first experience a guided tour with their classmates.

The guided tours for visitors are organized in order to contribute to their understanding of biodiversity concepts, for raising awareness of the value of forests through the knowledge of ecosystem services that they provide and for promoting their appreciation of the study and conservation of native plant and animal species. To this end JBGXSJ preserves, in-situ, a woodland fragment of the Espinal ecoregion, which is endangered by agricultural and urban development. Since this ecosystem is in a vulnerable state, schools in the region are interested in having the opportunity for their students to know and conserve native vegetation. So they contact us.

The woodland fragments of Espinal preserved in JBGXSJ can become an important tool for the recognition of native vegetation. For many students, the Garden's educational work is their first experience of environmental issues. Besides, the JBGXSJ is an urban green area accessible to students.

The visitor target groups range between kindergarten to middle level students. The visit and the concepts of biodiversity discussed are adapted to the age of the visitors. Although we receive students of all ages, we focus on students aged 7 to 11 years, based on the recommendation that this stage of a child's is the critical period for them to bond with nature (Sobel, 2008)

Once a school contacts the Garden, a date and time of visit are agreed. The visit takes about 3 hours, with a range of different activities.

The visit begins with a talk about plants and the ecological services provided by woodlands. We thus aim for students to students understand that plants are essential for life on the planet. Then there is a tour of the woodland fragments of Espinal, in order to enable students to recognize plant and animal biodiversity. In this tour we use botanic and bird binomial keys made for this purpose, and students also do bird watching with the help of binoculars to learn how to recognize the birds that inhabit the forest. These practices become relevant to the action of introducing students to scientific methodology.

← *An intern teaching young children about different kind of plant structures ©María Laura Perasso*

"The Jardin Botanico Gaspar Xuarez sj woodland, seed bank and laboratory facilities have been visited by nearly 1000 students each year; many of them are children from poor communities in the State of Córdoba. The youth volunteers are a great help in connecting with them."
Diana Perazzolo

↓ *Children are given the oppertunity to use stereo miscroscopes ©María Laura Perasso*

"The positive aspect of this experience was that we learned new concepts, to help us to teach others to learn to use materials such as stereo microscopes"
Volunteers Victoria, Agustina and Lucas

With the help of instructors and volunteers, students take samples of fruits, flowers, leaves and other plant parts, which later are returned to the forest, and then instructors and volunteers instruct students in the proper use of stereo microscopes located in the Agricultural Sciences Faculty Laboratory. Through guided use of stereo microscopes, students learn a new scientific procedure.

Are specific objectives are to:

- foster in volunteers and students the value of native forest through observation and knowledge of its structures;
- prove that the native woodland fragments of Espinal may harbor a great diversity of plants;
- demonstrate to society that you can enjoy a recreational activity such as using stereo microscopes;
- increase understanding and appreciation of biodiversity through the study of plant structures;
- encourage students to explore and discover by themselves;
- teach students the the basics of handling optical instruments (stereo microscopes) in order to identify and characterise plants and their structures.

In general, these actions contribute indirectly to students' understanding of biodiversity conservation. Specifically in the Botanic Garden, woodland fragments of Espinal represent an ecoregion that is in decline, so knowledge of it contributes to the valuing of its many diverse genetic resources and their potential uses. We approach this in an educational and scientific way to encourage the study of the biology of native flora and fauna.

UNDERWRITING THE VOLUNTEER RECRUITMENT STRATEGY

The Garden uses its Facebook page and an institutional e-mail for direct contact with schools. This facility for direct contact is the trigger for conducting voluntary internships.

Schools that perform this guided tour with their students are then invited to enroll their students as volunteers or as partners in the seedbank at JBGXSJ.

Volunteers are trained in the use of keys for plants and birds, using binoculars in the field and laboratory stereo microscopes are practiced. Having had this training volunteers are ready to accompany new visitors on a tour of the garden.

Another important point is the age of the volunteers. Because they are students in the last years of middle school, they interact in a more familiar way with school groups attending visits. Each volunteer accompanies different groups of visitors so that they can practice with students of different ages.

A report is written by volunteers to help us to understand the impact of their internship experience. Some of the testimonies of the volunteers are as follows:

"We enjoyed using stereo microscopes and being in the forests, especially we liked to connect with nature and know how to listen, to hear within the forest and outside the forest, the difference was amazing. We liked to be field guides and to try to provide our knowledge to students" (Giulietta, Tomás and Leonardo)

↑ *Volunteers learn new skills such as how to use plant identification keys ©María Laura Perasso*

"Nature experiences seem to be a necessary condition for any type of environmentally responsible behaviour...In particular, nature experiences should be provided for the youngest generation."
David Sobel

"A guided tour strategy is based on activities relating to native vegetation, and based on the concept cited by David Orr: "I don't know if it's possible to love the planet or not, but if I know it's possible to love the places we can see, touch, smell and experience "
Laura Perasso Ma.

"I liked doing internships, I learned a lot while I trained young children to use stereo microscopes. I enjoyed doing my internship in a university, dealing with professionals. Teaching the kids the importance of the environment and showing them different trees, types of leaves and objects that we usually use in our daily life can be enjoyable. It was better than I thought "(Victoria)

"I am happy to have done this internship, to get to know the university, to work in a job dealing with other people"(…) "the good times and good memories with children and instructors" (…) "thanks to this internship I discovered that I want to continue as it was outdoors and coordinate educating children". Thank you!" (Agustina)

Finally, we recognize that this project gave volunteers the opportunity to practice procedures that they would not have otherwise, like using scientific devices, laboratory equipment and interacting with children of other ages. Most of these activities are difficult to achieve in our city schools. JBGXSJ members consider this project as a priority activity because it is a way of developing human resources, as proposed by Schwarz Ballard (2011). This development can take into account children's social role, considering that it is important to introduce youth to biodiversity issues and stimulate interest in taxonomy and botany. Also it is an innovative approach that contributes to GSPC Target 14/15: to increase the number of students who are encouraged in the scientific study of plants.

← *The young perspective can help children engage with plants ©María Laura Perasso*

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A NEW PHENOLOGY PROJECT AT QUARRYHILL BOTANICAL GARDEN

This new program, which contributes data from contributors across the country to a national phenology bank, replaced a program at the Garden that was limited in efficacy. After more than 1.5 years since initiation, this program is effectively volunteer-coordinated and executed. Four teams are active and comprise an average of four members. Each team focuses on one tree species. Observations are collected for three to four specimens twice monthly and the resulting data is submitted online.

Nestled in the hills of the Mayacamas Mountains above the Sonoma Valley in Glen Ellen, California, USA, Quarryhill Botanical Garden is a 25-acre tribute to wild-origin species of temperate Asia. Quarryhill cultivates one of the most significant collections of this rich flora outside Asia in a woodland garden that includes magnolias, maples, dogwoods, conifers, camellias, rhododendrons, and roses.

In addition to a robust living collection, Quarryhill possesses a strong, committed team of volunteers. Three years ago, one of them proposed a new project after reading an article in the *Wall Street Journal* titled *A Science of Signs of Spring* (Hortz, 2013). The article discussed the study of *phenology* – the timing of biological events and their relation to climate – and introduced the National Phenology Network (NPN). Created by the US Geological Survey and the National Science Foundation in 2007, The NPN *"serves science and society by promoting broad understanding of plant and animal phenology and its relationship with environmental change. The Network is a consortium of individuals and organizations that collect, share, and use phenology data, models, and related information (USA NPN, 2016a)."*

↑ *A blue anodized tree label identifies the specimen and project ©Natasha Lane*

↖ *Cornus officinalis in autumn with leaves in full color during senescence ©Natasha Lane*

Though the term was not coined until the late 19th Century (Oxford Dictionaries, 2016), the study of phenology is a long-standing area of examination. We can easily imagine our ancestors – far before their conversion from hunting and gathering to agrarian life – observing the relationship between the timing of the availability of different plant parts and animals for food and medicine and the changing intensity and duration of seasons. More recently in the mid-19th Century, *Walden* author and naturalist Henry David Thoreau recorded leaf emergence, first flowering, and migratory bird arrival dates for species in Concord, Massachusetts, USA. With many local naturalists following his lead to present day, observations such as differing or consistent flower times, varying by species, and the disappearance of a full quarter of the wildflower species in the area are evident.

Today, the NPN and similar institutions worldwide (USA NPN, 2016b) exist to unify our individual efforts at this most critical time. Phenological changes are considered one of the most susceptible biological effects of climate change (USA NPN, 2016c). Quarryhill's volunteer and I saw the potential of this work in the garden. Prior to any knowledge of the NPN, we managed a team of volunteers for Garden Flower Surveys, a program that collected information on any flowering or coning garden specimen. Through these surveys, we aimed to track changes in flower timing over successive years and to inform our volunteers about our living collection. The program had limited success. Surveys were broad and the observation sensitivity was low. Recruitment and retention were difficult. In contrast to these surveys, the NPN surveys focus is narrow and deep. Designated specimens of distinct species are selected for observation and a uniform list of characteristics is studied on each specimen. Following a presentation to Quarryhill's volunteers on the concept of phenology, the NPN, and the different focus and scale of this project, we collected 30 names.

To initiate our new program, we registered an account with the NPN (USA NPN, 2016d). We then selected one plant species from their list of registered options for which we had healthy, accessible, established specimens. The ten observation points for flowering plants on the NPN datasheet focus on the development of leaves, flowers, and fruit. Defined as *phenophases*, they include qualitative and quantitative measurements for breaking leaf buds, unfolded leaves, increasing leaf size, colored leaves, falling leaves, presence of flowers or flower buds, open flowers, presence of fruits, presence of ripe fruits, and recent fruit or seed drop. Considering these plant parts, we intuited there would be a benefit in selecting a species that therein displayed significant change. Thus, we developed guidelines to focus on a deciduous, flowering tree with substantial leaves, flowers, and fruit, all of which would display clear developmental change through the seasons. With parts easily distinguishable, anatomical training would be simplified. Further, we hypothesized that the combination of broad leaves that undergo showy color change before falling, distinctive dormant buds that produce attractive flowers, and conspicuous fruit that flush with color during maturation may assist in retaining volunteer participation. The star magnolia, *Magnolia stellata*, became our first study species in February, 2015. We selected four trees. With winter dormancy ending, this was an opportune time to initiate the study.

The level of understanding needed for this work required more detailed botanical training than our corps had received; infrequently does a volunteer have the opportunity to invest so much time learning the anatomy and habits of one species. With valuable teaching materials provided by the NPN supplemented by others developed in-house, we began discussing the magnolia's above-ground winter anatomy including stems with vegetative and floral buds and alternate phyllotaxy and the resulting branching pattern observed.

Phenological changes are considered one of the most susceptible biological effects of climate change

↑ *Training images used to support volunteers' learning around phenology ©Quarryhill Botanical Garden*

To train volunteers in estimating numbers of specific plant parts, such as dormant flower buds, I designed two-dimensional examples on paper. This lesson introduced them to the concept of visually dissecting a tree into representative pieces, with respect to mass in order to estimate the number of flower buds and open flowers. Once comfortable with this concept, we visited our magnolias.

The volunteers and I trained together twice in February. The second session produced 20 attendees; most were anxious to branch off and begin independent work. As planned, we introduced three new species and created four teams. We estimated that teams of five members could comfortably accomplish our goal to collect data twice monthly for their single species. Each species would be represented by three to four specimens. Visits would require one hour. Following our aforementioned selection guidelines, we added *Cornus kousa* from the existing NPN register. We then contacted the NPN to propose adding new species. With hundreds already registered (over 800 species today) (USA NPN, 2016e), they were happy to support our Garden's mission on temperate Asian species and accommodate us. We selected *Cornus officinalis* and *Malus sieboldii*. The fourth team continued to observe *Magnolia stellata*. For the first few months, I met with each team to review the prompts and observe their specimens. Thereafter, teams continued independently. Teammates enthusiastically brought cameras, rulers, binoculars, and materials to press leaves at different maturities, all with the intent of learning their species. We engraved blue accession tags for each study specimen, distinct from our typical black tags, displaying them near paths to highlight our work. Although we have not surveyed self-guided guests about these tags, docents are known to point them out and discuss the relevance of this study on guided tours.

More than 1.5 years into this project, 15 volunteers continue to self-sufficiently operate four independent teams. Each team is managed by a designated facilitator; a team member responsible for maintaining the observation schedule and organizing visits. One volunteer collects observation datasheets from each team and enters this data via our account on the NPN website. Truly a grassroots effort, our volunteers made it possible to take a challenged phenology program of limited success and transform it into one of significant value with potential impact far beyond the institution.

← Kathleen Koran and Kathleen Ross Dahlman study one of their four Cornus officinalis specimens in August. Color on some of the other three specimens are beginning to show signs of autumn ©Natasha Lane

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BOTANICAL GUARDIANS: VOLUNTEERS RESTORING RESILIENT ROOTS

Education for some means research-based methods and learning to access data that promotes change in understanding. For others, effective education requires something less quantifiable – relationships. The Botanical Guardians is a group of volunteers in the US state of Georgia where research and relationships meet. Serving as the eyes and hands of conservation botanists, these citizens safeguard endangered plant species in their local areas. This network of people serves to ensure that the story of one species in particular, the smooth coneflower, will be told for generations to come.

INTRODUCTION: PAST TO PRESENT

The story of the smooth coneflower, *Echinacea laevigata*, is one of hope and resilience. This plant is not as showy as its cousin *Echinacea purpurea*, the common purple coneflower that is famous for its medicinal properties and colorful cultivars in the horticultural trade. But, *E. laevigata* has drawn attention for decades now for another reason – its diminishing numbers. 'Disappearance' is not a characteristic that typically captures one's eye, but to keen observers its decline in numbers has not gone unnoticed. *E. laevigata* with its smooth, metre-tall stem, drooping pale pink rays, and not-so-prominent orange-hued cone of disc florets, resembles its cousin enough to suffer from over-harvesting for its immune system-boosting medicinal properties.

↑ *Echinacea laevigata, the Smooth Coneflower ©Ed McDowell*

"Botanical Guardians know their plants, the habitats, and the research well. They see the big picture; they see that it is "about the plants".

← *Controlled burn at* E. laevigata *restoration site ©Heather Alley*

The smooth coneflower is native to sunny open areas of shallow, often rocky soils in the eastern US states of Georgia, North Carolina, South Carolina and Virginia. Historically it was also in Maryland and Pennsylvania. In the past, the open areas required by Echinacea species were managed by wildfire burns controlled by Native Americans, and native grazing animals. Land management has changed over time, yet the needs of the smooth coneflower remain the same. These changes and over-harvesting led to *Echinacea laevigata* being listed as Federally endangered in 1992 (USFWS, 1992)

Soon after the formation of the Georgia Plant Conservation Alliance (GPCA) in 1995, the smooth coneflower became one of the organization's species of focus. First established by the State Botanical Garden of Georgia, Callaway Garden, Atlanta Botanical Garden, the Georgia Department of Natural Resources-Nongame Conservation Section, and a few others, the goal of the GPCA is to prevent local extinctions of native plant populations. GPCA had a priority list then as it does now of imperilled Georgia plants. The smooth coneflower caught the eye of Heather Alley, then a graduate student of Jim Affolter in Horticulture at the University of Georgia. Alley began her research by getting to know the plant; she established a relationship.

RESEARCH AND RELATIONSHIP

Sustained relationships require give and take. In human relationships we receive care in return for caring. In a human-plant relationship we may receive nutrition or medicine. The return for caring for an entire species, or for endangered plants in general, is more difficult to see. Smooth coneflower restoration in Georgia is a story of a reciprocal relationship – the giving of a great deal of care over decades of time in exchange for hope in the survival of a species.

Initially drawn to the species because of its medicinal properties (or what the plant can give to humans), Alley set out to discover what the plants in her population of study were missing (or what she could restore for them). Alley's study site in northeast Georgia was on public land which gave her right to access. The placement of *E. laevigata* on the Federally endangered species list meant there was a mandate and funding for its management through the US Forest Service. There was great support for restoring the smooth coneflower.

There are two facets to restoration. One involves restoring the integrity of the habitat and the second is reintroduction. While *Echinacea* species are known for their drought tolerance, the rhizomes of Alley's population were literally clinging to the edge of a cliff. Genetically, *Echinacea* crave open areas; they cannot tolerate shade, thus the succession overgrowth in the habitat had literally pushed the smooth coneflower to its limit. As Mitchell learned firsthand on a seed collecting excursion, this was not a location for the faint of heart or those with a fear of heights!

"Echincaea laevigata could easily be misunderstood as 'fragile'. After all, it is endangered; but it not only can withstand fire, it needs it! Instead, the story of Echinacea laevigata is one of resilience, a convergence of research and relationship."

↑ *Alley with young* Echinacea laevigata*, Mimsie Lanier Center for Native Plant Studies at the State Botanical Garden of Georgia ©Debra Mitchell*

"In order to serve as the "eyes and hands" for researchers, Botanical Guardians must thoroughly know the plants and habitat with which they are working." *Heather Alley*

↑ *J. Ceska planting* E. laevigata *and companions at a restoration site ©Heather Alley*

Knowing the evolutionary history of *Echinacea* species and their adaptation to fire, the most obvious answer to clearing and rejuvenating the habitat was a prescribed burn (for which Alley is certified). Unfortunately, although the Forest Service had historically managed burns in the area, the public's misunderstanding of the effects of controlled fire (and ensuing litigation) had led to a halt of its use. As a result, the population had plummeted. Where there had been close to 1000 plants just a few years before, there were now a mere 200 at the most.

Alley turned to the second facet of restoration: reintroduction. Choosing appropriate sites based on her knowledge and her relationship with the species and its natural habitat, she set about reintroducing it into more open areas. Young plants grown at the State Botanical Garden from seed collected at the original plot were transplanted in the reintroduction research plots (Alley, 2002; Alley & Affolter, 2004). To better ensure the survival of her plants, Alley needed volunteers. She could not call on just anybody though. This job was meant for Botanical Guardians.

BOTANICAL GUARDIANS: MORE THAN VOLUNTEERS

The Botanical Guardians are more than people willing to volunteer. In order to serve as the "eyes and hands" of researchers at home base, they must be knowledgeable and skilled. They must be trained in field work techniques and be able to communicate their findings with researchers. They must be educators of others regarding their purpose. In other words, they must be good at relationships – not only with people but also with the plants with which they are working.

Botanical Guardians do not always simply volunteer; they at times are recruited. The State Botanical Garden of Georgia offers a Certificate in Native Plants, a program of rigorous courses and volunteer hours. Many certificate recipients complete their hours at the Mimsie Lanier Center for Native Plant Studies at the State Botanical Garden of Georgia. There they propagate *E. laevigata* and other native and endangered plants. These volunteers then often travel to see their plants off to their new homes in the reintroduction plots. Talk about relationship! Other Botanical Guardians are recruited from the Georgia Botanical Society to manage reintroduction plots, take water to plants, and collect seeds. Botanical Guardians know their plants, the habitats, and the research well. They see the big picture; they see that it is "about the plants" (SBG, n.d.).

FOR THE FUTURE

Alley's research went so well that it inspired the GPCA members in the Forest Service, Georgia Department of Natural Resources Nongame Section, State Botanical Garden of Georgia, Atlanta Botanical Garden, and Zoo Atlanta together to expand the project. There are now *E. laevigata* plots in botanical gardens and nature centers around Georgia as well as in specific reintroduction plots. The Forest Service has now been burning frequently for the past 10 years, and the results are starting to be beneficial. (Fire takes years to help.) For more than 15 years now, hundreds of smooth coneflowers have been propagated from seed annually to restore their historical native habitats. This year there will be 1000 more beautiful, healthy plants reintroduced.

The gracile smooth coneflower could easily be overlooked as a less popular cousin of the robust *Echinacea purpurea*. It could easily be misunderstood as 'fragile'. After all, it is endangered. Instead, the story of *Echinacea laevigata* is one of resilience, a convergence of research and relationship. The endangered endemic smooth coneflower clings to its time on earth and the edge of the world in the rocky glades of northeast Georgia, but its future is hopeful thanks to the perseverance of Alley, the GPCA and a select group of educators/volunteers called the Botanical Guardians.

The endangered, endemic smooth coneflower clings to its time on earth and the edge of the world in the rocky glades of northeast Georgia, but its future is hopeful thanks to the perseverance of Alley, the GPCA and a select group of educator/volunteers called the Botanical Guardians.

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PLANTING PARTNERSHIPS: KINGS PARK SCIENCE TEAMS UP WITH DEDICATED VOLUNTEERS

A team of experienced Kings Park volunteers and Kings Park Science staff have collaborated in a planting project to investigate how plants respond to fire regimes. The long-term project, which is expected to help inform fire management of Perth's Banksia Woodlands, has revealed the benefits of incorporating volunteers across different disciplines at Kings Park and Botanic Garden. The experience of the Kings Park Science staff working with volunteers on this project has been very positive, with the team indicating they would look at working with Kings Park's five volunteer groups in future projects. This opens a new realm of possibility for cross-collaboration and community involvement in scientific research.

Thousands of native seedlings have been planted as part of a fire research project in Kings Park and Botanic Garden, which has seen Botanic Gardens and Parks Authority (BGPA) staff and volunteers working together in an exciting science collaboration.

The project is being carried out under the guidance of Kings Park Science Director Dr Ben Miller, Biodiversity and Conservation Manager Steve Easton and Fire Ecology Research Scientist Dr Alison O'Donnell. Staff and students from the Kings Park Science and Kings Park Bushland teams have also been involved, alongside a number of volunteers.

Taking place in Rio Tinto Naturescape, the aim of the project is to assess how long it takes for new native seedlings to develop their capacity to re-sprout and survive after fire - a question recognised as an important gap in our current understanding of plant responses to fire regimes.

↑ *Peter Buckman, from the Kings Park Garden Carer volunteer group and Ursula Keel from the Kings Park Guides were among the many volunteers who were involved in the planting ©BGPA*

The project was deemed a fantastic opportunity to foster collaborative relationships between Kings Park Science and volunteer groups

To investigate this, Kings Park is growing seedlings of re-sprouter species, which are native to Kings Park, for different lengths of time – either two, three or four years – before they are treated with burns.

The 13 varieties of native re-sprouter species chosen are known to be capable of re-sprouting following fire. These include Jarrah (*Eucalyptus marginata*), Tuart (*Eucalyptus gomphocephala*), *Banksia attenuata, Allocasuarina fraseriana* and the hemiparasitic tree *Nuytsia floribunda* as well as several shrub, herb and grass species.

Fire Research Scientist Alison O'Donnell said: "These species were chosen as they represent a range of different re-sprouting strategies (e.g. epicormic, basal, lignotuber, rhizome, tuber), growth forms, and families of the native plants of Kings Park. We aim to monitor the development of physical attributes related to survival and re-sprouting capacity (such as plant size, bark thickness, lignotuber development, rhizome development) of each species prior to the fire treatment and then assess their re-sprouting success after fire. We intend that the findings of this project will inform fire management by providing evidence of the minimum tolerable fire intervals for re-sprouter species to successfully recruit from seed."

PREPARATION AND PLANTING

The early stages of the research project were initiated in 2015. Kings Park Science staff fenced off an area in Rio Tinto Naturescape Kings Park to use for the project, and the Kings Park Bushland team then undertook a managed burn in the designated plot area in April 2015, ready for planting in 2016.

"Rio Tinto Naturescape Kings Park was chosen for this research partly because it is already fenced and secure from interference, and has infrastructure available for irrigation, but also because it is visible from with the Naturescape environmental learning space, providing an opportunity for education and to engage with the public about some of the fire research being conducted at BGPA," Dr O'Donnell said.

Seedlings were germinated and grown in the glasshouse from April until June 2016 and were planted in the field plots in winter 2016. Initial attempts to sow seed directly into the field research plots resulted in poor germination and survival rates. This prompted the decision to germinate and grow seedlings in the glasshouse facility at Kings Park and then transplant them into the field plots once they were large enough.

← *Twelve thousands seedlings from 13 native species were planted over a four-day period, made possible by the dedication of Kings Park's volunteers ©BGPA*

A variety of volunteers were recruited to help plant 12,000 seedlings over a one week period in winter 2016. A call out was put to the coordinators for two of Kings Park's five volunteer groups: the Friends of Kings Park and the Kings Park Volunteer Master Gardeners. Volunteers were involved over the four day period, and all 12,000 seedlings were planted, ahead of schedule.

↑ *Fire Ecology Scientist Dr Alison O'Donnell working with volunteers at the fire research plot in Kings Park ©BGPA*

"We hope that these volunteers feel invested in the outcomes of the project and that they gain a sense of satisfaction by contributing to research that will inform ecologically-appropriate fire management of Perth's Banksia Woodlands."
Kings Park Fire Ecology Scientist Dr Alison O'Donnell

VOLUNTEER INVOLVEMENT

Volunteers with a range of interests and skills were recruited to help plant 12,000 seedlings over a one-week period in late June and early July 2016. A call was made to the coordinators of two of Kings Park's five volunteer groups: the Friends of Kings Park and the Kings Park Volunteer Master Gardeners. Volunteers worked over a four day period, and all 12,000 seedlings were planted ahead of schedule.

Dr O'Donnell said this was an excellent result, particularly as it was very important for the project that all of the seedlings were planted over a relatively short time frame to minimise any potential differences in growing times and conditions among the research plots.

Kings Park Volunteer Coordinator Larr Rose said it was an ideal collaboration between staff and volunteers, as it enabled enthusiastic Kings Park volunteers to work directly with Dr O'Donnell.

The decision was made to particularly encourage volunteers from the Friends of Kings Park and the Kings Park Volunteer Master Gardeners because of their enthusiasm, experience and dedication. However, volunteers from several other groups received the invitation and participated as well.

Kings Park Volunteer Coordinator Larr Rose said: *"Volunteers assisting were from a range of our Kings Park volunteer groups such as Naturescapers, Friends of Kings Park Garden Carers and Bushland Carers, Volunteer Master Gardeners and Kings Park Guides, This was a wonderful opportunity for volunteers from all groups to get involved and interact with each other as well as expert staff. Some volunteers do not get the opportunity to plant and be hands-on in the park. Volunteers could give any amount of time they had."*

As well as planting, volunteers were also involved in preparation for planting and packing up equipment at the end of each day. Despite the challenges of wet weather, the volunteers diligently continued planting and some volunteers assisted on the project for several hours after having already carried out their usual volunteer duties for the day.

This was a short-term project which involved current active and committed volunteers, so a retention plan was not necessary.

COLLABORATION RESULTS AND FUTURE OPPORTUNITIES

The project was deemed a worthwhile opportunity to foster collaborative relationships between Kings Park Science and volunteer groups and to broadly inform other groups in the Park of some of the research Kings Park Science is conducting.

Dr O'Donnell said that it had been fantastic to work with volunteers on the project and that Kings Park Science is keen to consider working with Kings Park's volunteers whenever an opportunity arises on future projects.

She said: *"This collaboration was a great way to engage the volunteers with our research – as the site is visible to the public; many volunteers mentioned that they looked forward to watching the seedlings develop over the years and seeing how they respond to the fire treatments, Overall, volunteers have made a valuable contribution to the success of the project. "We hope that volunteers feel invested in the outcomes of the project and that they gain a sense of satisfaction by contributing to research that will inform ecologically-appropriate fire management of Perth's Banksia Woodlands."*

↑ *A selection of seedlings from native re-sprouter species ready for planting ©BGPA*

"This was a wonderful opportunity for volunteers from all groups to get involved and interact with each other as well as expert staff. Some volunteers do not get the opportunity to plant and be hands-on in the park. Volunteers could give any amount of time they had."
(LArr Rose - Kings Park Volunteer)

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INNOVATIVE VOLUNTEERING SUPPORTS A UNIQUE BUTTERFLY GARDEN

©Carlos Thays BG

The Butterfly Garden at the Carlos Thays Botanical Garden aims to increase urban biodiversity in the local area. Developed as a conservation strategy for the protection of Buenos Aires' Lepidoptera, the garden relies upon a team of volunteers for its maintenance. It highlights a successful example of group planning and organisation, which could be emulated in other sectors of the garden, and indeed other gardens, replacing sporadic and haphazard volunteering schemes, with one that has planned objectives. The voluntary team schedule has achieved significant results, with fewer people and resources than comparable initiatives.

BUTTERFLIES IN THE GARDEN

The Carlos Thays Botanical Garden is situated at the heart of Buenos Aires city in an area of dense population, heavy traffic and high air pollution. It forms a green island of 8 hectares, harbouring a precious collection of species from all over the world with an emphasis on Argentinian flora. This is a true green treasure and its integrity has been maintained despite the surrounding urban development. The historic site, which has been an official National Monument since 1996, now has a special area dedicated to attracting and maintaining butterflies, offering them a greener habitat than their otherwise polluted environment.

The Carlos Thays Botanical Garden is the first public space in Argentina with an outdoor butterfly garden. It has become a national and international point of reference and has inspired similar initiatives elsewhere. As a center for education it serves to raise community awareness about the fragility of butterflies in urban environments.

↑ *The volunteers help with maintenance*
©Carlos Thays BG

The Butterfly Garden was conceived in 2010, in an effort to improve the biodiversity of the surrounding urban area. Meticulously designed, it is achieving its main objectives: to offer an attractive place for visitors and an educational experience for children and adults helping to promote conservation strategies for native fauna.

The garden has special features, it is unique and the balance is fragile. As a result it demands a high degree of maintenance to enable butterflies to flourish and reproduce in an unbalanced and polluted urban environment.

FIRST VOLUNTARY SCHEME

To make this unusual and attractive project into a tangible reality for people to enjoy and for butterflies to live in requires a complete strategic system. The garden has been designed to survive and maintain its beauty for the future. Therefore, it must be sustainable and it must facilitate the complete life cycle of a varied Lepidoptera community.

The First Voluntary team was a key element put in place by the manager of the Butterfly Garden, Soledad Mesía Blanco, a floriculture technician fully dedicated to the butterfly project since she joined the garden. This team specializes in the butterflies and their host plants.

The volunteers help with maintenance work and, as a 'reward', are taught both gardening techniques and the biology of Lepidoptera. As the main aim is to encourage and protect the life cycle of the insects, the gardening techniques used here are not the same as for general gardening. The volunteers learn and apply original techniques for cultivating this site. They also learn about butterflies' role in ecosystems, which plants attract them and how to identify species. Their experience is then shared with others, helping to disseminate valuable environmental knowledge. The first voluntary team's help also allows the garden staff to have more time for other activities such as research, seminars and talks, guided visits and more.

← *Volunteers learn about butterflies' role in ecosystems and how to identify species ©Carlos Thays BG*

↑ *The Carlos Thays BG is the first public space in Argentina with an open air Butterfly Garden ©Carlos Thays BG*

The research and educational activities would be impossible without the help of the volunteers. And the butterflies' life would certainly be harder.

↑ *The volunteers learn and apply new gardening techniques of gardening work ©Carlos Thays BG*

← *Soledad Mesia Blanco is in charge of the Butterfly Garden and designed the volunteers' management system ©Carlos Thays BG*

As of this January (2016) the personnel in the voluntary team are changed every two months, throughout the year. A maximum of 15 people attend weekly training sessions over two months in order to be part of the team. In this way, the volunteer commits to the work, so each job takes less time, and the results are a lot more organized. The programme has found that coordinated tasks generate a pleasurable work environment and gain a high degree of satisfaction from everybody; it also stops volunteers from feeling tired or becoming bored. Volunteers also receive an official certificate of gratitude from the garden authorities, plus a pack of specifically designed digital learning materials.

The volunteers work hard, but they learn at the same time, and always seem to have a smile on their faces.

DUTIES AND REWARDS

At present, the team includes up to 15 people; 10 apprentices and 5 experienced volunteers helping the novices. There have been 40 new volunteers since the beginning of this year and a new team is forming at the time of writing. It is predicted that there will be about 100 volunteers helping butterflies to thrive by the end of the year.

The invitation to volunteer is sent out through social networks, the Garden's website or personal mailings. Many of those who respond are college students, from the agricultural department of the National University of Buenos Aires, but there are no restrictions on who applies. After the first contact, they are called to a meeting where our work is explained, including its responsibilities, duties and rewards.

The Butterfly Garden is now in excellent condition and has become a highlight of the Botanic Garden experience. The research and educational activities would be impossible without the help of the volunteers, and the butterflies' lives would certainly be harder.

The Carlos Thays Botanic Garden has already successfully extended its biodiversity to more than 80 different species of butterflies and moths, a great increase from the 10 that were recorded in a list generated in 2010. This is thanks to the existence of the Butterfly Garden and to the unique and innovative care of the Voluntary Team.

Replacing the old sporadic volunteering scheme, without planned objectives . . . the voluntary team schedule has achieved notably better results, with fewer people and resources.

↑ *The Voluntary Team renews its personnel every two months ©Carlos Thays BG*

Coordinated tasks generate a pleasurable work environment and gain a high degree of satisfaction from everybody

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www.buenosaires.gob.ar/jardinbotanico

www.buenosaires.gob.ar/ambienteyespaciopublico/mantenimiento/espaciosverdes/jardinbotanico/jardin-de-mariposas

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← *An attractive place to visit and an educational centre for children and adults ©Carlos Thays BG*

Author: Bongani Vincent Mashele

SANBI'S INVASIVE SPECIES PROGRAMME

The Invasive Species Programme (ISP) based in South African National Botanical Institute (SANBI), is a national programme which targets localized invasive species with the aim of nipping these in the bud before they become established invaders.

SANBI, with funding from Natural Resource Management under Department of Environmental Affairs, has a legal mandate to promote the conservation of South Africa's biodiversity and also to monitor and report on invasive alien species. The ISP seeks to reduce alien plants invasions in South Africa through early detection and identification. Once the identity of the potential invasive plant has been verified, risk assessment and response planning is implemented. One of its focal species is *Pueraria montana* var *lobata* (Kudzu vine). Kudzu vine is listed in the top 100 worst invaders in the world. It has potential to become a widespread invader if not controlled at an early stage. It is notorious in the USA having spread over 3 million ha of the eastern United States (Blaustein, 2001).

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Kudzu vine is an aggressive invader, is drought tolerant and has the ability to smother indigenous plants causing them to collapse. Farmers need to be aware of kudzu vine as it can be mistaken for soybean when it is still young and can be an alternate host for soybean rust.

Clearing efforts with the aim of eradicating the species from South Africa have been in carried out by the ISP for the past four years, using teams from local disadvantaged communities. The programme started with three clearing teams comprising of 12 people per team clearing Kudzu vine in Mpumalanga Province. Follow up is done annually. So far only one team is needed to clear the remaining populations as there is little regrowth and soon the species will be eradicated.

The programme works closely with private landowners, as well as municipalities and provincial authorities. A very important aspect of ISP's work includes raising awareness amongst the general public about the damaging effects of Invasive alien species and how they can be contained or eradicated and encouraging community members to become volunteer 'spotters'. Local spotters are asked to report new sightings of these plants to the ISP. To do this they will need to know its exact locality and supply any landmarks and GPS information if possible, as well as the infestation size. This approach has successfully led to several reports of new occurrences of the target species.

↑ *Kudzu vine forms dense mats over the ground ©SANBI*

↑ *Kudzu vine ©SANBI*

REFERENCES

→ Blaustein R. J. (2001) Kudzu's invasion into Southern United States life and culture. In: The great reshuffling: human dimensions of invasive species, pp. 55–62, McNeeley, J. A., Ed., IUCN, The World Conservation Union, Gland, Switzerland and Cambridge, UK.

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PIONEERS IN PUBLIC ENGAGEMENT

ANIMALS ARE MORE NOTICEABLE

Fred Weber actually wanted to become a brain surgeon; however, after not managing to gain a place at medical school, he chose to study biology instead. For eight years Fred focused his studies in a number of different areas including; environmental studies, environmental law, a bachelor in psychology and the relationship between mankind and animals. At that time, 1984, there was little work for biologists so, after finishing his studies, Fred retrained as an IT specialist and then business administration where he enjoyed a career as a business analyst.

Over the years Fred's interest in nature grew and intensified. During this time he acquired an allotment and started keeping bees. He came to the Hortus Botanicus Leiden through this interest when the garden was looking for a beekeeper. Soon after he arrived a summer exhibition about bees was organised which included a treasure-hunt booklet written by Fred. By then he was expanding his knowledge of plants, a subject that gave him ever-increasing enjoyment. Many of the visitors of the Hortus have a tendency to focus on animals, often overlooking the plants that are so vital to the fauna they support. Fred found that, after engaging members of the public in conversation about bees and other pollinators, he was able to open their eyes to the richness of the plant world and the symbiosis that exists between species.

Fred is interested in animals and plants but also – perhaps predominantly – in people. He loves to get into conversation and to share his enthusiasm about nature with visitors of every age group and background. He is as equally at ease looking for daisies with toddlers as he is helping secondary school pupils to discover stick insects. He is as happy helping students create perfumes as he is tracking down spices with elderly people who often need a great deal of assistance. Fred has shown that illustrating the interaction between animals and plants shows people the wonder of plants, helping them to fully appreciate their value to the world.

At the moment Fred, along with a number of volunteers, is busy recording details of the plant species that are particularly important to bees. It is hoped that by 2018 their hard work will mean they have built up substantial information about pollinators in the Hortus.

A botanic garden is a treasure-trove of wonders that can be shared; this is particularly rewarding when it involves members of the public. Fred shows that gardens can be used as a way to inspire people and provide a great location to show them all kinds of interesting biodiversity and help them see the value nature.

Author: Sharon Willoughby

PIONEERS IN PUBLIC ENGAGEMENT
JENNY HAPPELL

Most staff at the Royal Botanic Gardens Victoria, Melbourne Gardens will struggle to think of a season or a week in which they haven't seen Jenny Happell's brisk stride bisecting the lawns or her sunny smile emerging from amongst the blooms in the Camellia Collection. Jenny Happell has been a volunteer guide at the Gardens for 32 years and she is one of the gardens' most precious living treasures having shared her passion for plants with the hundreds of visitors she has shown around Melbourne Gardens during her tenure.

The gardens' tour guide program started in 1981 when a group of women were recruited to show around the wives of delegates to the Commonwealth Heads of Government Meeting in Melbourne. Now 35 years old the Volunteer Guide program goes from strength to strength with the most recent recruitment and training of volunteers concluding at the end of May 2016.

Jenny had a friend in the first intake of volunteers and this is how she found out and was attracted to the idea of volunteering. She loved plants but felt she had a lot to learn and that this volunteering might be the way to do just that. Jenny is a lively tour guide with a deep knowledge and passion for plants that she readily shares with visitors.

Jenny has another passion at Melbourne Gardens, the Camellia Collection, which she started documenting in 1991. Jenny wasn't so keen on Camellias to begin with but after 23 years of trying to identify them with the help of Australian and international experts she has become completely obsessed. There are almost 300 camellia species and 20,000 cultivars worldwide which means that garden staff have greatly appreciated Jenny's help in trying to identify the plants in the gardens' historic collection. The gardens' collection is made up of 950 plants in total. Many were planted in the 19th century by Director William Guilfloyle and others by Director Alexander Jessep during the 1940s and 50s reflecting peaks in the popularity of this charismatic plant.

Over the years Jenny has led many general tours through the Garden but she has also developed specialised walks about Camellias and the development of *C. sinensis* into tea. She has also contributed to the Friends of Geelong Botanic Gardens, regional botanic gardens to the west of Melbourne, the Friends of the Royal Botanic Gardens Melbourne and the Volunteer Guides Committee. She is also known for actively supporting new volunteers and I can remember my first weeks at the Botanic Gardens in Melbourne, nearly 18 years ago, and the number of times Jenny patiently shepherded me around and around as I learnt the names of significant trees, paths and garden beds.

Author: Gail Bromley

BRIGHT THINGS - GREAT RESOURCES

VIVA LA VOLUNTEER!

Volunteers offer an amazing resource for our organisations, however they also need pastoral care and supervision, travel costs, uniforms and/or equipment and training; you also need training for the paid staff who will manage them. Volunteers are therefore not necessarily a cheap option, so it is really useful not just to be able to **qualify** their value but also to **quantify** it. This can really help when justifying the costs of volunteer programmes.

You can put an economic value on your volunteer service using the 'VIVA' ratio (the Volunteer Investment and Value Audit). This measurement tool assesses the 'outputs' of volunteer programmes (the value of volunteers' time) in relation to the 'inputs' (the resources used to support the volunteers). VIVA offers simple indicators reflecting the scale and significance of volunteers and the payback on an organisation's investment in volunteering. The VIVA tool allows you to total all the annual costs related to your volunteer programme and analyses volunteer inputs (time and effort), matching it against the cost of equivalent paid work and applying the current market salary.

You will need to document the hours spent by the volunteers in your organisation, so you will require time sheets for all your volunteers, in order to total the hours donated to the organisation. You will also need to note the type of work done e.g. basic garden chores, selling in the shop, supporting events etc., so that you can find an equivalent salary that would have been paid to a member of staff doing the same work. Include both regular volunteers and non-regular volunteers e.g. Trustees, seasonal volunteers, special event volunteers, fundraising volunteers (NB do not include any funding amounts raised, but make sure these funds are reported as 'value added' in any evaluation report). After totalling the value of the inputs, it is useful to add in your organisation overhead (usually 20-30%) as employers have to pay pensions, insurance and other benefits.

You now need to consider which expenditures relate to your programme by asking yourself 'would we have to spend this if we didn't have volunteers?' e.g. volunteer equipment , paid volunteer coordinator, refreshments etc. A 'no' answer reflects a volunteer cost to the organisation. Make sure that you collect all expenditures over the year from your accounting or budget documentation; a good estimate will serve if you don't have detailed figures.

Once you have gathered all the data, divide the total volunteer value (outputs) by the total volunteer investment (inputs) to produce the VIVA Ratio. For example, a total value of £50,000 and expenditure of £10,000 yields a Ratio of 5. The Ratio has a simple meaning: 'for every £1 we spend on volunteers, we get back £5 in the value of the work they do', a five-fold return on the organisation's investment in volunteering.

Please note that the VIVA ratio only offers a financial value. It is really important that you always also take into account other valuable aspects of the volunteering process in any reports.

To use the VIVA spreadsheet and see completed examples go to:

http://www.volunteernow.co.uk/supporting-organisations/volunteer-impact-assessment-toolkit/volunteer-investment-to-value-audit

CONTRIBUTE TO THE NEXT ISSUE OF ROOTS

13 TO 18 YEAR OLDS ARE A NOTORIOUSLY DIFFICULT AGE GROUP TO REACH, YET THEY ARE AN ESSENTIAL GROUP TO SPREAD OUR CONSERVATION MESSAGES TO

THAT IS WHY THE NEXT ISSUE OF ROOTS WILL LOOK AT ENGAGING YOUTH

Are you one of the few botanic gardens that has managed to effectively engage this age group? Are you a young person working in conservation? Do you run projects in a different sector that could be helpful to our readers? Or do you have some helpful resources you want to share?

We want to hear from you! Get in touch by 1st February to see your work in the next issue of Roots.

We are currently looking for a variety of contributions including articles, education resources and profile of an inspirational garden staff member or volunteer.

Find out more about how you can get involved on our website **(www.bgci.org/public-engagement/roots/)**
or email **Liliana.derewnicka@bgci.org**

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Camelia chrysantha-cultivated in SCBG ©Ouyang Pei

DOES YOUR GARDEN HAVE ANY THEACEAE TAXA?

BGCI is conducting an analysis of *ex situ* collections of Theaceae taxa using information held in our PlantSearch database. This survey will allow us to identify which species are present in *ex situ* collections around the world. It will also help us identify any threatened species currently absent from *ex situ* collections that could be prioritised for future *ex situ* conservation programmes.

This survey will be published along with the newly updated Red List of Theaceae in Spring 2017

How you can help?

If your garden has a Theaceae collection, please ensure your collection data is up to date on our PlantSearch database **http://www.bgci.org/plant_search.php**.

If your collection data is not yet uploaded to PlantSearch, information on how to upload your data can be found at **http://www.bgci.org/worldwide/plant_upload/**.

Please send photos of your Theaceae collections to **redlist@bgci.org**, including species name and a credit for the photo. These photos could be used in our report. We are particularly interested in photos of rare collections.

Please pass this request on to your colleagues and other institutions with Theaceae collections. The deadline for uploading collection information for use in the survey is 15th January.

More info: **http://www.bgci.org/news-and-events/news/1379/**